DRAFT ENVIRONMENTAL IMPACT STATEMENT

STAR WAREHOUSE EXPANSION

20 Industry Drive
Town of Cornwall, Orange County, New York
Tax Map Number: Section 33, Block 1, Lot 49.12

Lead Agency: Town of Cornwall Planning Board
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Lead Agency Acceptance Date: August 1, 2022

Date of Public Hearing: January 3, 2023

Comment period will extend for a minimum of 10 days following close of Public Hearing

November 30, 2022

List of Consultants

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1.0 EXECUTIVE SUMMARY

Introduction

Cornwall Properties LLC (the "project sponsor" or "Applicant"), proposes a 50,000 square foot expansion to an existing 185,835 square foot warehouse, on a 36.9-acre lot located at 20 Industry Drive, in the Town of Cornwall, New York. The proposed action involves an application for site plan approval for the expansion of a Special Permit use. The subject property is comprised of tax lot Section 33, Block 1, Lot 49.12. Access to the site is from Industry Drive, a private shared access drive to NYS Route 32. The location of the site is shown on Figures 2-1 and 2-2.

This Draft Environmental Impact Statement (DEIS) evaluates a focused scope of potential environmental impacts for the Proposed Action, based upon the Scoping process conducted by the Town of Cornwall Planning Board, the Lead Agency.

This DEIS is prepared in accordance with Section 8-0101 of the New York State Environmental Conservation Law and the regulations promulgated by the New York State Department of Environmental Conservation (NYSDEC) thereunder, which appear at 6NYCRR Part 617 (known as the New York State Environmental Quality Review Act, SEQRA, or SEQR).

On January 3, 2017, the Town of Cornwall Planning Board, acting as SEQRA Lead Agency, designated the site plan and Special Permit application as a Type 1 Action and adopted a Positive Declaration for the Star Warehouse Expansion. The Notice of Positive Declaration was circulated to involved and interested agencies at that time. Limited review of the application occurred until the Scoping process in 2020.

The applicant submitted a draft Scoping Document to the Planning Board in July 2020. A public scoping meeting on the Scoping Document was held on October 5, 2020. The Scoping Document was reviewed and modified by the Planning Board and adopted on November 2, 2020.

1.1 Brief Description of the Proposed Action

The proposed warehouse expansion would involve the construction of a 50,000 square foot addition to an existing 185,835 square foot warehouse. The addition would involve the north (northeast) end of the existing building, generally extending the footprint of the existing building to the northeast.

The area proposed for the expansion is a flat vacant field, partially gravel covered. The existing building is 20 feet in height and the addition is proposed at 40 feet in height. The increase in height is proposed to accommodate current warehouse operational activity and equipment, since the original building was constructed in the 1950's.

Four new loading docks would be constructed at the western side of the building facing Interstate 87. New pavement and a turning area for trucks would be constructed west of the loading area. Improvements to the existing facilities would include the replacement of an existing unpaved emergency access drive with a relocated emergency access drive to Star Road / Creamery Hill Road. The emergency access drive will be 20 feet in width and provided with and locked gate at its intersection with Star Road / Creamery Hill Road. The Town Fire Department and other emergency service providers will have a key to the gate.

A new stormwater management basin is proposed on the north side of the new building addition adjacent to Creamery Hill Road. A total of 14 new parking spaces will be added connected with the building addition and eight new parking spaces added on the eastern side of the building (total of 22 new parking spaces). No additional employees are anticipated as a result of the expansion, since the space is necessary for additional storage.

Industry Drive is a shared commercial access drive with the adjoining 19 Industry Drive property. As part of the proposed expansion, Industry Drive would be resurfaced in its existing footprint. The existing guiderail that runs along Industry Drive near Woodbury Creek will be replaced. The existing Industry Drive entrance will be reconstructed as part of the project. The entrance currently has an Island with a facility entrance sign. The Island will be removed and curbing added to make the entrance safer and more efficient for trucks and passenger vehicles. The facility sign will be replaced and moved to the south of the entrance.

A new sign is proposed internal to the site to direct truck drivers and visitors to either 20 Industry Drive of the adjoining 19 Industry Drive building south of the site. The sign on the eastern portion of Industry Drive will not be visible to drivers on local roads.

The proposed expansion would improve the fire safety conditions for the entire facility, including the existing portions of the warehouse. These improvements are further described in Section 3.9 Emergency Services of this DEIS. Improvements would include the construction of a new 250,000-gallon water tower at the southern edge of the property, the provision of new fire safety pumps and extending piping and sprinklers to all portions of the warehouse building both existing and in the new addition. The fire safety improvements would be constructed to NYS Building Code standards. No changes or upgrades to the existing water suply well or existing septic system are proposed.

The long-term maintenance of the shared facilities between the project sponsor (Star Warehouse) and the adjoining 19 Industry Drive property will continue to be subject to the filed “Reciprocal Easement, Right-of-way and Maintenance Agreement”. The warehouse expansion does not change the access and maintenance agreements between the two properties.

1.2 Potential Impacts and Proposed Mitigation Measures

1.2.1 Wetlands and Watercourses

<u>Watercourses Potential Impacts</u>

A mapped FEMA floodplain (with base flood elevations between 251’ and 255’ msl) is associated with the Creek, and is depicted on the attached site plans. No part of the existing or proposed development area occurs within the mapped 100-year floodplain, or would have a direct impact on the Woodbury Creek or its adjacent wetlands.

A NYSDEC stormwater pollution prevention plan (SWPPP) is required in compliance with the SPDES General Permit #GP-0-20-001. A SWPPP has been prepared by Pietrzak and Pfau, and is attached to this DEIS as Appendix C.

The existing drainage area at the location of the proposed expansion is a small catchment of 3.76 acres that drains from the embankment of the New York State Thruway, through the northern part of the site and into an existing swale at Creamery Hill Road. This swale flows to the Woodbury Creek.

The proposed warehouse expansion would increase the amount of impervious surface within the drainage area from approximately 0.61 acres to 1.72 acres. This increase has a potential to increase the volume and flow rate of runoff leaving the site, as well as potential water quality impacts. Therefore the project engineer has designed a stormwater pollution prevention plan (SWPPP) to mitigate these potential impacts. The SWPPP is provided as Appendix C of this DEIS.

The proposed warehouse expansion involves no direct impacts to the wetlands identified on the property including the wetland fringe found along Woodbury Creek.

Mitigation Measures

A stormwater infiltration pond will be constructed on the north side of the warehouse expansion, and runoff form the new area and expanded parking/driveway will also be routed to this basin. Runoff from the roof will be conveyed directly to a pre-treatment sediment basin. Runoff from the proposed driveway expansion will be conveyed to the same basin via a grass lined swale. An infiltration basin is an especially efficient means of stormwater volume capture and treatment, and on-site testing has demonstrated that the soils in the proposed basin have suitable infiltration capacity. Pre- and Post development peak stormwater flow rates will remain the same or will decrease, in accordance with NYSDEC requirements.

The infiltration basin will allow the majority of stormwater to infiltrate into the shallow groundwater underlying the site and eventually discharge to Woodbury Creek over a distance of approximately 550 feet. The proposed infiltration and groundwater discharge will provide thermal protection for stormwater run-off from the developed portion of the site to Woodbury Creek. The temperature of groundwater is generally equal to the mean air temperature above the land surface[1]. Groundwater temperatures are typically in the range of 52 degrees Fahrenheit in the Hudson Valley.

No activities are proposed within or adjacent to the mapped FEMA floodplain. The stormwater management plan will reduce the volume and rate of runoff leaving the site, and therefore will not have a cumulative effect on the floodplain.

The stormwater management basins will be planted with wetland vegetation (both woody and herbaceous) and overseeded with seed mixes appropriate for the transitional nature of the hydrology associated with storm basins.

An erosion and sedimentation control plan has been prepared as part of the SWPPP. The entire development area is flat, and therefore erosive velocities are not likely to occur. During construction, silt fence, stone check dams and a temporary diversion swale will be implemented to keep clean water clean and protect adjacent areas form possible siltation. If temporary soil stockpiles are used, the stockpile will be ringed with silt fence and seeded if it will remain in place for more than 14 days. Regular inspections will occur during construction, and the limited areas of exposed soil will be permanently stabilized with perennial ryegrass.

Wetlands Potential Impacts

A narrow wetland fringe on the west side of the Woodbury Creek was delineated in June of 2021. Based primarily on vegetation and hydrology, the line was generally within 3 - 4 feet of the

[1]Groundwater Hydrology for Water Well Contractors, National Ground Water Association, 1999.

high-water line of the Creek. At the southern end of the corridor the stream bank is made up of large stones and old fill acting as a retaining wall, likely part of an historic disturbance in this area. Further north the streambank becomes more natural. The wetland vegetation along this segment would serve to slow floodwaters during extreme rain events.

A small pocket of wetland was observed in the field area between the existing building and the stream corridor. A mix of native and invasive species, this small depressional area function to store some runoff but otherwise is limited by its size for any habitat or vegetative diversity function.

Mitigation Measures

Since no disturbance will occur within or adjacent to the wetland/watercourse corridor, no permits for the proposed activities are required and no mitigation necessary.

1.2.2 Groundwater Resources

Potential Impacts

The project engineer indicates that the proposed warehouse addition will not require additional water demand. The applicant has indicated the expansion will add needed storage space and that the space will not require the adding of additional employees. The proposed 50,000 square feet of storage space is an increase of approximately 27 percent of the existing warehouse space. If the current water usage were to be increased proportionally to the building square footage, then a 27 percent increase in average daily water usage would be an additional 623 gallons per day. The total estimated future average water usage would be 2,931 gallons per day. This volume is well below the existing well capacity of 10,800 gallons per day.

The continued use of an existing long-term water supply well at its current location and pumping rate will not impact nearby water supply wells.

Petroleum leaks and spills have the potential to impact both surface water and groundwater (aquifer) resources. The Star Warehouse currently does not have underground or aboveground petroleum storage tanks and therefore, petroleum leaks and spills are limited to cars and trucks accessing the property. The proposed warehouse expansion is likely to include an emergency service fuel storage tank to service fire safety pumps, in the event that electrical power is lost at the warehouse. It will likely be located in the area of the proposed new water storage tank in the southwest portion of the site, near Industry Drive. Any on-site fuel oil tank will have secondary containment and be installed according local and NYSDEC petroleum storage tank regulations. Depending upon the size of any future petroleum storage tank, the tank may require Petroleum Bulk Storage registration with the NYSDEC, per 6 NYCRR Part 613. If the total storage capacity of on-site aboveground tanks is greater than 1,100 gallons, the tanks will be registered with the NYSDEC.

Petroleum leaks or spills from vehicles typically occur during vehicle accidents where fuel storage tanks are damaged. These spills would be responded to by emergency service responders including The Town of Cornwall Fire Department and the spill would be contained to the pavement to the extent possible. Minor leaks of petroleum onto pavement is designed to be treated in the proposed stormwater management facilities. The proposed expansion of the warehouse is not expected to increase the risk to local aquifers from petroleum leaks and spills.

Mitigation Measures

As described above, the average daily water withdrawal rate following the warehouse expansion is not expected to change from existing withdrawal rates. The actual measured average daily withdrawal rates are well below the rates permitted by Orange County Department of Health in the water treatment system permit (# 3530230). The water treatment system was approved to treat the water at a rate of 15 gallons per minute (GPM) with a pumping rate of 7.5 gpm or 10,800 gallons per day. The average daily usage rate in 2013 and 2014 was 2,308 gallons per day.

No petroleum or hazardous materials will be stored in the existing or proposed warehouse expansion space, with the potential to impact the underlying shallow or bedrock aquifers. The fire safety consultant has recommended an emergency service fuel oil storage tank to service fire safety pumps. Any on-site fuel oil tank will have secondary containment and be installed according local and NYSDEC petroleum storage tank regulations.

The proposed stormwater management facilities for the expanded warehouse space and parking areas are designed to treat the stormwater run-off from new pavement, including minor leaks of petroleum from vehicles onto pavement.

No further groundwater mitigation measures are required or proposed for the planned warehouse expansion.

1.2.3 Ecology (Flora and Fauna)

The 36.9-acre subject site is the location of an existing warehouse facility with associated parking and outbuildings. The eastern boundary is the relatively undisturbed Woodbury Creek corridor. South of the site is another warehouse facility, to the north is a residential development. The New York State Thruway forms the western boundary of the site, separating it from the natural lands associated with Schunnemunk Mountain to the west. According to the NYSDEC database (EAF Mapper) no portion of the property is a designated significant natural community, and no rare or threatened plants are known to occur in the area.

Vegetation

The site is relatively flat from west to east and north to south throughout development area, with a hillock to the east of the existing building. This hill contains an existing residence and a cell tower enclosure. Along the eastern edge the property slopes down steeply to the stream corridor. The majority of the development area is maintained as managed lawn, with sparse landscaping around the existing building. Vegetation outside of the development area is characterized by a wooded fringe along the edges of grass areas east of the site access road. Trees along this wooded edge include black walnut, mulberry, black locust, Norway maple and occasional oaks and red maple. Grasses and forbs are dominated by clover, lesser celendine, plantain, and several species of wildflowers.

The location of the proposed building extension is currently maintained as a gravel parking area A few small trees along the north side of the existing building will be cut to connect the new extension. No other trees are expected to be cut for this proposal. The location of the proposed stormwater treatment basin is maintained as lawn/meadow.

The stream corridor along the eastern boundary of the site has similar woody vegetation along its banks. Site observations and historic aerial photos show that much of the stream corridor was filled, resulting in steep banks and opportunistic vegetation growing in this area. The rapid flow of water in the stream prevents any vegetation from growing within the channel itself.

Wildlife

No rare or unusual wildlife species were observed on the site. During the two days of observations, only eastern gray squirrels (*Sciurus carolinensis*), chipmunk (*Tamias striatus*), woodchuck (*Marmota monax*) and common resident bird species were observed. This is not unusual considering the site's current use and the amount of managed landscape surrounding the existing building. The area of the proposed extension does not provide any wildlife habitat value.

The level of past site disturbance is reflected in the habitat potential and number of species that are expected to be observed on these parcels. Green frogs, American toads, raccoons, garter snakes and other small mobile species may utilize the wetland corridor system. Some of the smaller bird species (wrens, sparrows, bluebirds) likely feed on the seeds of the grasses and wildflowers that are found on the site.

Regarding threatened or endangered species, the DEC Environmental Resource Mapper identifies one reptile species (timber rattlesnake, *Crotalus horridus*) and two bat species (northern long-eared bat (*Myotis septentrionalis)* and Indiana bat (*Myotis sodalis*)) as being known to occur in the area of the site.

The proposed area of warehouse expansion and ground disturbance, including for the warehouse, parking areas, emergency access and stormwater basin currently consists of previously disturbed lawn area or gravel or asphalt parking lots. These areas currently provide no significant habitat for local flora or fauna. No trees will be removed for the proposed development. The existing wooded fringe and stream corridor habitat in the eastern portion of the site will remain undisturbed by the proposed development.

Proposed Mitigation

Since no undisturbed habitat or areas of significant vegetation or potential habitat value will be disturbed by this proposal, no mitigation for potential adverse impacts to vegetation or wildlife is proposed is required.

1.2-4 Transportation

Transportation Potential Impacts

The transportation section provides a summary of the Transportation Study for the Star Warehouse expansion, June 28, 2022. The full Transportation Study and technical documents were completed in 2022 and are provided as Appendix G of this DEIS.

The Transportation Study evaluated transportation Existing Conditions, future conditions without the project (No-Build Conditions) and future conditions with the project (Build Conditions). For the evaluation of existing transportation conditions, the following analysis was completed:

- Existing Peak Hour Volumes: Traffic counts were collected at the single studied intersection, NYS Route 32 and Industry Drive. Hourly volume data was obtained on April 6, 2022, 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. at NYS Route 32 and Industry Drive.
- Effects of Covid-19 Pandemic: Traffic data from the New York State Department of Transportation's count station on NYS Route 32 pre-COVID were compared to more recent data in the same section of roadway to determine the impact of the COVID-19 pandemic on 2022 traffic counts. The review concluded that no adjustment was needed for the existing April 2022 traffic.
- Accident Data: Accident data from 2016 to 2021 was review for the three tenth miles sections at the Industry Drive intersection with NYS Route 32. The three tenth of a mile sections had on average one (1) vehicle collision with another vehicle per year and none reported with trucks. Of 20 collisions reported over a five year period, 15 were with animals or off road objects.
- NYS Route 32 Road Speed Study: The speed of vehicles traveling on NYS Route 32 is important for assessing the safety of future vehicles entering and exiting the project site. The speed limit on NYS Route 32 is 55 miles per hour in vicinity of the Industry Drive. A speed survey was conducted on NYS Route 32 approaching Industry Drive. Vehicle speeds approaching Industry Drive during clear, daylight, uncongested conditions are 59 miles per hour northbound and 56 miles per hour southbound.
- Industy Drive Sight Distance: The project engineer (Pietrzak & Pfau, PLLC) surveyed the sight distance at the Industry Drive shared driveway and found the distance to be 550 feet to the north and 585 feet to the south. These distances meet the stopping sight distance criteria for the "all conditions" 85th percentile speeds for both northbound and southbound traffic

NYS Route 32 is a two lane road paralleling Interstate 87 (The Thruway) in eastern Orange County. NYS Route 32 is classified by New York State Department of Transportation (NYS DOT) as a urban minor arterial and has one eleven foot travel lane in each direction. The speed limit on NYS Route 32 is 55 miles per hour in the area of the project site.

Interstate 87 (The Thruway) parallels NYS Route 32 with interchanges at Interstate 84 in Newburgh and Route 17 (Soon to be Interstate 86) Harriman interchange. The Thruway provides for regional north south travel in this section parallel to NYS Route 32. With the presence of Interstate 84 most regional traffic does not use NYS Route 32 between the City of Newburgh and Harriman in this area. NYS Route 32 widens out near Woodbury Commons in southern most part of the Town/Village of Woodbury.

The project site has a single primary access point onto NYS Route 32, from Industry Drive. Industry Drive is a private road, approximately 30 feet in width, which provides access to the site (20 Industry Drive) and an adjoining warehouse property to the south at 19 Industry Drive. The subject property has a second access drive to Creamery Hill Road to the north, which also accesses NYS Route 32. The Creamery Hill driveway is typically not used by employees, visitors or deliveries to and from the site.

Future Build Traffic Conditions

Project Trip Generation and Distribution

The Applicant, proposes a 50,000 square foot expansion of the existing warehouse building, which has 185,835 square feet of space. Industry Drive is used by the 185,835 square foot existing Star warehouse and by the adjacent warehouse with approximately 131,500 square feet of space. The total warehouse space currently utilizing Industry Drive is 317,335 square feet. The trip generation rates during the peak hour are shown in Appendix G - Table 9. The actual trip rate is based on the total square footage of all the buildings using Industry Drive and traffic using Industry Drive, as counted in April 2022. The actual counted trips rates more closely match the rates for typical "Warehouse" as opposed to "Light Industrial use".

Future Loading

The number of loading areas required is based on discussions between the Planning Board and Applicant, according to the Town Code (158-16B (38). There are currently 11 tractor trailer loading bays at the warehouse and four (4) new loading bays are proposed.

Future Parking

The estimates for the required number of proposed parking spaces are based on the newly proposed warehouse square footage and not on employees. The Parking Generation Manual indicates an average parking rate of 0.39 spaces per 1000 square feet and 0.47 spaces per 1000 square feet at the upper 95% confidence level. These rates equate to 93 spaces on average and 111 for the 95th percentile. A total of 110 parking spaces are proposed. The proposed parking meets the existing rate of parking per 1000 square feet and is nearly double the minimum rate allowable.

Existing Conditions Level of Service

Level of service is a grade descriptor A to F, of how well intersection movements work using delay as the primary operating characteristic. As delays increase so does driver frustration. Volume to capacity ratio is also used as determinate of level of service. The level of service was determined for Industry Drive at NYS Route 32 for the Existing condition.

All of the studied intersection lane groups operate with additional available capacity and operate at the most efficient levels of service A to B during the a.m. peak hour and level of service A to C in the p.m. peak hour. Level of service is summarized in the Transportation Study (Appendix G - Table 14).

No-Build Level of Service

In the No-Build condition, the level of service at the studied intersection can be expected to remain at efficient levels of service A to C with no change in level of service from the Existing Condition.

Build Condition and Sensitivity Analysis at Industry Drive and US Route 32

The Project site is projected to add 10 trips in the a.m. peak hour and 11 trips in the p.m. peak hour. The sensitivity analysis using light industrial for the expansion would add 38 trips in the a.m. peak hour and 24 trips in the p.m. peak hour.

The level of service will remain unchanged from the Existing Condition through both the Build condition (proposed Warehouse use) and Sensitivity Build Condition (treating the 50,000 square feet as light industrial).

Transportation Mitigation

The proposed project will result in the reconstruction of the site access including the removal of an existing island. A replacement sign will be placed further from the travel lanes and out of the state right-of-way. These site access changes are subject to New York State Department of Transportation Highway Permit Approval. These improvements are intended to improve safety. As part of the proposed expansion, Industry Drive would be resurfaced in its existing footprint. The existing guiderail that runs along Industry Drive near Woodbury Creek will be replaced.

New wayfaring signs are proposed primarily to help new truck drivers, new employees, and package mail delivery drivers and will include direction to 19 Industry Drive not only at the entrance but at the two junctions as vehicles traverse Industry Drive.

The proposed parking and loading is more than adequate to meet zoning requirements. The land banking of 130 spaces provides assurance that the facility parking needs can be met in the future. The newly proposed parking and loading areas will be delineated with pavement markings as part of the construction process. Land banking of spaces is an environmental mitigation to reduce impervious pavement when applicable. Land banking can be permitted under 158-16 A (7)(c) of the Cornwall Town Code.

The emergency access at the northwest corner of the property connecting to Star Road will be improved. This emergency access is currently an unpaved road with no controls. The drive will be paved and will be gated and locked to prevent unauthorized use. A standard Town of Cornwall emergency service lock box will be used at the emergency access.

A number of accidents near the site involved vehicles running off the road, and the cause of those accidents is unknown. The Applicant will work with NYSDOT for the removal of any vegetation in the NYS Route 32 right-of-way near the site entrance, which may improve safety.

The applicant will work with the NYSDOT regarding any necessary driveway warning signs and associated TRUCK or other auxiliary plates as part of the Highway Work Permit.

1.2.5 Historical and Archeological Resources

Potential Impacts

The project site is near two properties listed on the National Register of Historic Places: the Elias Hand House and the Mountainville Grange. This information is based upon a resource review and information provided by the NYS Office of Parks Recreation and Historic Preservation (OPRHP).

The NYS Office of Parks Recreation and Historic Preservation (OPRHP) provided a letter dated September 22, 2016, that the proposed project will have "No Adverse Impact upon adjacent historic properties. In addition, there are no archeological concerns associated with this project". This letter was in response to a site plan and information provided by the project engineer in 2016 (see Appendix B - Correspondence).

The proposed building expansion will involve the grading of approximately 2.6 acres of mostly disturbed land. The grading and excavation has the potential to disturb archeological cultural resources, should they be present on the property. Two properties on the National Register of Historic Places are located near the property: the Elias Hand House and the Mountainville Grange Hall.

After reviewing the proposed warehouse expansion site plan in 2016, the NYS OPRHP found the project to have "No Adverse Impact" to both archeological and historic resources. The current site plan and photos of the area of proposed disturbance were recently submitted to the OPRHP for a confirmation of their 2016 determination.

The OPRHP recently provided two letters of determination in response to TMA's request for comments on the proposed Site Plan. The letter from August 16, 2021 acknowledged that the project area is adjacent to the Elias Hand House, which is listed in the State and National Registers of Historic Places. Based upon a review of recently submitted information the OPRHP, the Technical Preservation Unit "has no concerns regarding above ground / architectural resources". The letter dated August 17, 2021, indicates it is the opinion of the OPRHP "that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project.

Proposed Mitigation Measures

Based on the determination by OPRHP, the project will have no adverse impact to archeological or historic resources. Therefore, no mitigation measures are warranted or proposed.

1.2.6 Community Services and Facilities

Potential Impacts

The proposed warehouse expansion will increase the storage space and capacity at the warehouse, incrementally increasing the need for emergency services, as compared to existing conditions. As described, the expansion would increase warehouse space by 50,000 square feet or by approximately 27 percent. According to the applicant, the expansion is not expected to increase employees at the warehouse facility.

Increased traffic may result in accidents either on-site or potentially off-site for facility related vehicles traveling to or from the site. The 2022 Transportation Study indicates that the expansion will result in an increase in all traffic of 11 vehicles in the a.m. and p.m. peak hours (including trucks). This is a relatively low increase in traffic and therefore, emergency calls related to project traffic are also anticipated to be low. Emergency medical or fire emergency calls are expected to remain infrequent for the warehouse, based upon the no specific changes in the use or operation of the warehouse, except for expanded storage space.

Solid waste will continue to be collected on a regular basis by County Waste of Montgomery following the warehouse expansion. A designated area and containers for waste collection will be provided for the new space.

Overall, the warehouse addition is not expected to substantially increase emergency calls or the demand for public services.

Proposed Mitigation Measures

Section 3.11 Emergency Services provides and discussion of Emergency Services and proposed improvements to the site's overall emergency services infrastructure, including: a new 250,000-gallon water storage tank for fire protection water service, new fire pumps to provide adequate pressure to fire hydrants and the new building sprinkler system, and a fire protection sprinkler system to serve the proposed addition as well as the existing warehouse space.

In addition, a new paved emergency access will be provided from Star Road, at the north end of the site. The site entrance at Industry Drive and Route 32 will be reconstructed to remove an island and relocated the entrance sign. These improvements to the entrance are expected to improve access and safety for all vehicles, including emergency service vehicles accessing the site.

The above facility improvements will enhance the ability of the Town emergency response agencies, especially the Town of Cornwall Fire Department to respond to any emergency or fire incident at the Star Warehouse facility.

1.2.7 Visual Resources

Potential Impacts

The proposed warehouse expansion will introduce an addition to an existing warehouse building expanding the footprint of the building approximately 120 feet to the north. The building height in the new space will be increased from 20 to 40 feet. The grey metal siding will be similar in color and appearance to the existing building. Drivers on Interstate 87 who are familiar with the existing warehouse building will likely notice a change from the original building but not a significant alteration of local views or the landscape. The expansion will not introduce a new visual feature into the landscape, but rather expand upon a feature that has been part of the local landscape since the 1950's.

Development of the project will alter the visual character of a short portion of Star Road and Creamery Hill Road with a higher and more prominent building, closer to Creamery Hill Road. These views of the building will be limited to local residents and visitors to the Hamlet of Mountainville traveling on Creamery Hill Road.

Potential change in views from the seven key views identified above, are described as follows.

Schunnemunk Mountain State Park

- Location 1 – The expanded warehouse building will be visible for hikers on the Sweet Clover trail from vantage points that have direct views of the Woodbury Creek/Moodna Creek valley. The warehouse building is visible but part of a large landscape and at a distance of approximately 1.2 miles. From this vantage point,

and similar points from the eastern ridge line of Schunnemunk Mountain the expansion is expected to be barely noticeable.

- Location 2 - Location 2 – The expanded building will be noticeable in the views towards the southeast from this location, but will be an extension of the existing large building and warehouse roof. The higher building roof line will be a change from existing views, but not a significant change from the views of the existing building and water tower, beyond Interstate 87 and below the rising elevations of Cornwall ridge to the east.

Views from Local Roads

- Location 3 – Views of the expanded building for drivers on NYS Route 32 from this vantage point will continue to be partially obscured by existing woods, between Route 32 and the warehouse building. The proposed construction will not remove any existing vegetation.
- Location 4 – Views of the expanded building from this vantage point on Long Hill Road will remain largely unchanged due to the distance, intervening woods and topography. The building is generally not visible from this vantage point.
- Location 5 – Drivers on Star Road and Creamery Hill Road will observe a higher and more prominent building, closer to Creamery Hill Road. As indicated, existing views of the building are direct, across an open field. These views of the building will be limited to local residents and visitors to the Hamlet of Mountainville traveling on Creamery Hill Road.

Storm King Arts Center

Locations 6 and 7. The warehouse building addition is not expected to be visible from any vantage point at Storm King Art Center, based upon the distance and intervening topography and vegetation. The proposed increase in building height from 20 to 40 feet will not be visible from the Art Center.

Proposed Mitigation Measures

The proposed building expansion will result in a modest change in the views of the existing building from local vantage points, most prominently from Interstate 87, from the Jessup / Sweet Clover trail in the meadow above Interstate 87, and for drivers on Star Road and Creamery Hill Road adjacent to the property. The building addition will require an increase in height due to current warehouse storage practices. The location of the expansion is limited to the north end of the building by the configuration of the existing building and the property. The expansion will not introduce a new visual feature into the landscape, but rather expand upon feature that has been part of the local landscape since the 1950's.

Landscaping may provide a limited softening of the building addition, but the building cannot be practically screened due to its size. Tree landscaping near the building is limited by proposed stormwater detention and treatment basin at the north side of the addition, near Creamery Hill Road. The applicant has prepared a landscaping plan and it is included with the Site Plan drawings.

1.2.8 Human Health

Potential Impacts

The subject property is a Class 2 Inactive Hazardous Waste Disposal Site (IHWDS) and has been assigned NYSDEC Site No. 336008. Environmental consultants, TRC Engineers, Inc. recently completed a *Remedial Investigation Report* for the property in September 2020[2]. The report investigated and describes soil, groundwater and soil vapor conditions for the site. *(see Appendix F)*.

According to the applicant, no petroleum or hazardous materials are currently stored at the project site. No petroleum storage tanks are registered for the property, according to the NYSDEC petroleum bulk storage and aboveground and underground petroleum storage tank databases.

The proposed warehouse expansion is not contingent upon nor is it constrained by the implementation and completion of any future site remediation. Following discussions with Mr. Jeff LaRock, the TRC environmental project manager, the NYSDEC and the NYS Department of Health will likely require additional groundwater sampling and soil vapor intrusion (SVI) air sampling prior to the preparation of a Focused Feasibility Study (FFS) to develop remedial action alternatives which will be used for site clean-up[3]. The NYSDEC and the NYSDOH are currently reviewing the results of a June 2022 report on the most recent soil vapor intrusion testing.

It is noted that site remediation options or the extent of clean-up have not yet been determined by NYSDEC and NYSDOH, since the investigation data is still under review by those agencies.

The proposed area of warehouse expansion, including the proposed stormwater management areas are not identified as Areas of Concern (AOC) in the Remedial Investigation Report. The limited grading, excavation for the building foundations and grading for the stormwater management facilities and expanded loading dock area are not expected to encounter contaminated soils. The proposed warehouse expansion will not affect the health and safety of construction workers building the expanded space.

The warehouse expansion will not involve the storage of petroleum or hazardous materials. Emergency generators for proposed fire response pumps may be supplied by natural gas or propane. If diesel fuel is necessary for new emergency generators the tanks would be provided secondary containment in compliance with all Town and NYSDEC regulatory requirements.

Proposed Mitigation Measures

The subject property is a Class 2 Inactive Hazardous Waste Disposal Site (IHWDS) and the results of an extensive Remedial Investigation characterizing on-site soil, groundwater and soil vapor is currently under review by the NYSDEC. The property owner (applicant) is committed to the continued and expanded warehouse use on the property, and thereby committed to the necessary remediation of the property. According to Mr. Jeff LaRock, of TRC Engineers, Inc., it

[2]Remedial Investigation Report; Former Star Anchors and Fasteners (a.k.a. Star Expansion) Site, TRC Engineers, Inc. September 16, 2020.

[3]Telephone conversation on August 10, 2021.

is likely that a sub-slab depressurization system will be installed under the existing warehouse building to reduce the potential for soil vapor intrusion. Any selected remedial actions will be designed to protect human health and the environment and will ensure the continued safe operation of the warehouse.

1.2.9 Emergency Services

Potential Impacts

The proposed warehouse expansion will create additional warehouse space that has the potential to increase the need for emergency service calls in the Town. The Star Warehouse is an existing long-standing commercial space in the Town and therefore, an expansion would only incrementally increase potential emergency service calls. The Town of Cornwall has a 100-foot aerial ladder truck that can currently service the existing warehouse building and the proposed addition. The proposed addition meets the Town Code requirement for building height. It is not anticipated that the Town Fire Department will require any new equipment to serve the proposed addition.

Emergency Access

The three existing emergency access locations will remain the same, although improvements will be made to the emergency access drive in the northwest corner of the site and to the main access at Industry Drive and Route 32. The emergency access drive to connect the site to Star Road will be relocated slightly to the west of the existing location and will be fully paved with a 20-foot width. A locked gate with a key provided to Town emergency service will limit use to emergency response. The proposed emergency access gate will comply with the requirements of D103.5 of the 2020 Fire Code of NYS. The improvements are shown on site plan Drawing 3.

The Industry Drive entrance at Route 32 will be improved providing a curbed radius, a 40-foot width and an existing island will be removed. The entrance upgrades will improve safety for trucks, including emergency access vehicles, entering and exiting the site.

The project engineer has prepared a Fire Apparatus Turning Analysis to demonstrate the adequacy of site entrances and driveways to accommodate emergency vehicles, including the largest truck in the Town Fire Department fleet, the 100-foot aerial ladder truck. Two fire truck turning analyses are provided: one showing a Star Road / emergency access entrance and a Creamery Hill Road exit, and a second showing a Route 32 entrance and a Star Road exit. The turning analysis demonstrates adequate site driveway and entrance geometry to allow emergency service vehicle access. The Fire Apparatus Turning Analysis sheet is provided with the site plan drawings.

The 2020 Fire Code of NYS requires a minimum road width of 26 feet, exclusive of shoulders, where a fire hydrant is located on a fire apparatus access road (Section D103.1). The majority of existing Star Warehouse on-site access roads in the vicinity of hydrants meet the 26-foot minimum width requirement, but certain sections of road do not. Aerial fire apparatus access will be required, based upon the 2020 Fire Code of NYS, D103.5, and the proposed building height of 40 feet. The project engineer will coordinate with the Town of Cornwall Fire Department and Building Inspector to ensure adequate access in compliance with the Code.

Proposed Emergency Water Service

Fire safety improvements for the proposed and existing warehouse space have been prepared by Active Fire Protection, Inc. of Monroe New York. The following is a summary of the proposed improvements. Preliminary design specifications for fire water demand and pressures, sprinkler specifications and locations, and flow and pressure calculations are attached in Appendix F - Fire Safety Design. The fire flow design was based on ISO methods for the sprinklers based on riser demand. The improvements are designed to meet NY State Fire Code requirements for the proposed and existing space (2020 Fire Code of NYS).

Fire safety water demand will be provided by a new 250,000-gallon water storage tank. The tank will be located southeast of the existing water tank, at the edge of an existing parking lot. The preliminary design for the tank is 48-feet in height and 30-feet in width. The height of the storage tank is primarily determined by the needed water pressure. The final design of the water storage tank will be completed during the site plan review process and will include final height and paint surface color to minimize visual impacts. Currently, the applicant is exploring options for the existing water tank with construction firms, which may include its demolition and removal.

Initial calculations show that 1520 GPM will be required for internal sprinkler system and 250 GPM for outside hose demand for up to 60 minutes. The total water needed would be 106,200 gallons. The proposed 250,000-gallon storage tank is more than adequate to provide fire safety supply. According to the Applicant, the proposed 250,000-gallon tank will provide service to Star Warehouse (20 Industry Drive) and will not serve 19 Industry Drive.

Water will be distributed by a diesel fuel supplied fire pump rated at 1,500 GPM at 150 PSI. The water will be distributed to the sprinkler system and hydrants by the existing 8-inch ductile iron pipes resulting in an approximate static pressure of 170 PSI at the hydrants. The existing 8" ductile iron pipes and existing hydrants will be inspected and tested according to NFPA 25, prior to being put into service with the new water supply. The pipes and hydrants will be maintained according to NFPA following the start of service. The Fire Department connections will be approved by the Cornwall Fire Department.

The proposed sprinkler system is designed to meet National Fire Protection Association (NFPA) warehouse rack storage space specifications. Based upon the 2020 Fire Code of NYS, the requirements for “high-piled combustible storage” apply to this project since storage of combustible material will exceed 12 feet (Section 3206). The applicant anticipates that the design of the proposed fire safety improvements will require review by and consultation with the Town Fire Inspector and the Lead Agency, the Town of Cornwall Planning Board.

The proposed fire safety improvements will enhance safety at the warehouse and ensure that any potential fire at the facility can be addressed.

Proposed Mitigation Measures

The proposed warehouse expansion plan includes improvements to the facilities overall fire safety and emergency response capacity. Access to the facility by the Town Fire Department and Volunteer Ambulance Corps will be improved by relocating and paving the emergency access drive on Star Road and by improving the site entrance at Route 32 and Industry Drive.

Fire safety for the building will be improved by constructing a new 250,000 gallon water storage tank, providing a new fire pump system and by installing a sprinkler system in the existing

warehouse space and in the proposed addition, to provide fire safety features that meet current NY State Fire Code requirements (2020 Fire Code of NYS). .

1.3 Reviews, Permits and Approvals

Approvals, reviews and/or permits required for the implementation of this development are listed below by issuing agency. These agencies are called Involved Agencies under SEQRA, and have approval authority over one or more aspects of this application.

Site Plan, Special Use Permit Expansion
Town of Cornwall Planning Board
183 Main Street
Cornwall, NY 12518

SPDES General Permit for Stormwater, Wetland Permit
NYS Department of Environmental Conservation
21 South Putt Corners Road
New Paltz, NY 12561

Highway Permit
NYS Department of Transportation
4 Burnett, Boulevard
Poughkeepsie, New York 12603

In addition to the Involved Agencies, the following Interested Agencies will be included in the distribution for the DEIS.

- Orange County Department of Planning
- New York State Office of Parks, Recreation and Historic Preservation
- NYSDEC Department of Fish and Wildlife
- Palisades Interstate Parks Commission
- Canterbury Fire District
- Town of Cornwall Fire Inspector

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 INTRODUCTION

Cornwall Properties LLC (the "project sponsor" or "Applicant"), proposes a 50,000 square foot expansion to an existing 185,835 square foot warehouse, on a 36.9-acre lot located at 20 Industry Drive, in the Town of Cornwall, New York. The proposed action involves an application for site plan approval for the expansion of a Special Permit use. The subject property is comprised of tax lot Section 33, Block 1, Lot 49.12. Access to the site is from Industry Drive, a private shared access drive to NYS Route 32. The location of the site is shown on Figures 2-1 and 2-2.

This Draft Environmental Impact Statement (DEIS) evaluates a focused scope of potential environmental impacts for the Proposed Action, based upon the Scoping process conducted by the Town of Cornwall Planning Board, the Lead Agency.

This DEIS is prepared in accordance with Section 8-0101 of the New York State Environmental Conservation Law and the regulations promulgated by the New York State Department of Environmental Conservation (NYSDEC) thereunder, which appear at 6NYCRR Part 617 (known as the New York State Environmental Quality Review Act, SEQRA, or SEQR).

On January 3, 2017, the Town of Cornwall Planning Board, acting as SEQRA Lead Agency, designated the site plan and Special Permit application as a Type 1 Action and adopted a Positive Declaration for the Star Warehouse Expansion. The Notice of Positive Declaration was circulated to involved and interested agencies at that time. Limited review of the application occurred until the Scoping process in 2020.

The applicant submitted a draft Scoping Document to the Planning Board in July 2020. A public scoping meeting on the Scoping Document was held on October 5, 2020. The Scoping Document was reviewed and modified by the Planning Board and adopted on November 2, 2020.

2.1.1 Site Location and Environmental Setting

Property Location

The development site is located west of NYS Route 32 in the southwest portion of the Town of Cornwall, and immediately east of Interstate 87, also known as the NYS Thruway. Industry Drive, a private road, provides access to the site from NYS Route 32 and to an adjoining property, 19 Industry Drive. The property has frontage on Creamery Hill Road and Ketcham Avenue in the northern portion of the site. The site is comprised of a single tax lot: Section 33, Block 1, Lot 49.12.

Environmental Setting

The development site is located within an area of commercial industrial and low-density residential development, undeveloped land and transportation uses, as shown in Figure 2-2 Aerial Photo. The land uses in the area are predominantly low density residential, although the subject site has supported manufacturing and warehouse uses since the 1950's. The adjoining 19 Industry Drive property was developed with similar warehouse space in the 1960's. The

subject property is located in the Planned Industrial Office (PIO) Zoning District. This district is located between NYS Route 32 and Interstate 87.

The property is currently developed with the existing warehouse building, approximately 185,355 square feet in size. Driveways and parking areas are located on the east and west sides of the building and a gravel parking area and a grassed lawn are located in the area of the proposed warehouse addition. A single-family residence and a cell tower are located in the northeastern portion of the site, along with wooded land. Industry drive, a parking lot and a water tower are located in the southern portion of the site.

The existing warehouse building is used for the storage, transport and distribution of goods by several tenants, including: Pyramid Sound, Inc., Accentuation by Design, Mym Trading, Kats Gluten Free and Ner Shave. The warehouse currently operates from 8:00 a.m. to 5:30 p.m. Monday through Friday and 8:00 a.m. to 12:00 p.m. on Sundays. The warehouse will continue to operate during the same hours following the proposed expansion.

The subject property is located in a river valley occupied by Woodbury Creek with the topographic ridge of Schunnemunk Mountain to the west and the Cornwall Highlands to the east. Topography on the project site is relatively level with the lowest elevations near Woodbury Creek at approximately 240 feet. Elevations near NYS Route 32 are at approximately 300 feet and slope gradually to the Creek and then rise to the area of the warehouse building at approximately 270 feet. A low hill is located directly east of the warehouse, the location of the cell tower. Interstate 87 is approximately 10 feet higher than the elevation of the warehouse elevation, in the vicinity of the building.

Woodbury Creek flows from south to north generally along the eastern property border. Industry Drive crosses Woodbury Creek with a Bridge crossing in the southern portion of the site. A wetland and floodplain associated with Woodbury Creek are located in the southern and eastern portions of the site. The wetlands are regulated by the Town of Cornwall and by the U.S. Army Corps of Engineers. Based upon mapping by the NYSDEC the property is not part of or adjacent to any state listed Critical Environmental Area. The NYSDEC mapping indicates the project site is contains a designated significant natural community, listed as Chestnut Oak Forest. The wetland area and the hill east of the building contain mature woods and brush. Wetland vegetation is found south of Industry Drive. The area of the site surrounding the warehouse building and bordering Interstate 87 is mostly clear of trees.

Easements and Restrictions

The subject property was subdivided in 1997, resulting in the creation of two commercial warehouse lots: 20 Industry Drive “Lot B” and 19 Industry Drive, the adjoining property to the south, “Lot A”. The Filed Map #26-97 prepared for that subdivision included notes and an “Reciprocal Easement, Right-of-way and Maintenance Agreement”, filed with the Orange County Clerk’s Office. The subdivision map and easement and maintenance agreement are attached in Appendix B.

The subject property (Lot B) has a shared commercial access right of way along Industry Drive with the neighboring property to the southwest (Lot A). The agreement includes the shared maintenance of the shared commercial access way, private drainage facilities, and any private water or sanitary sewer facilities between the two lots. According to the filed map notes, the following easements and right-of-way are granted:

- Easement in favor of Lot B, under Lot A, to maintain the fire main servicing Lot A from Lot B.
- Easement in favor of Lot B, under Lot A, to maintain the four (4") water main and meter in the building on Lot A.
- Easement in favor of Lot A, to maintain the storm drain line discharging to the pond, east of the water tower on Lot B.

The following right-of-way are provided for the two lots:

- Right-of-way to the owner of Lot A, to enter and exit using the main entrance, now known as Industry Drive, a shared commercial access way.
- A right-of-way to the owner of Lot A, for emergency access and egress over Lot B from Creamery Road to service Lot A over the Road now known as East Road.

The Easement and Maintenance Agreement between the 20 and 19 Industry Drive properties does not specifically address shared utilities or firefighting capacity. The two properties have individual water supply wells and septic systems for each property. The Easement and Maintenance agreement addresses the right of access across each property, including the joint use and maintenance of Industry Drive which provides access to both properties. The Easement and Maintenance Agreement allows for the maintenance of utilities for one property that pass through the adjacent property. It is the intent of the applicant to construct upgraded emergency water supply storage with a new storage tank and pumping equipment to provide service for 20 Industry Drive. Current plans do not provide for fire service water supply to the adjacent 19 Industry Drive property.

The existing easements, right-of-way and maintenance agreements between 20 and 19 Industry Drive will not change with the proposed warehouse addition.

Zoning and Land Use

The subject property is located in the PIO Planned Industrial Office district, which includes the project site and several properties between NYS Route 32 and Interstate 87 in the vicinity of the site. The property is bounded on the north by a small municipal park and residences, and to the west by Interstate 87. West of Interstate 87 are single family residences and agricultural fields, part of Schunnemunk State Park and the Town designated Schunnemunk Agricultural Scenic Overlay District. Residences and NYS Route 32 adjoin the property to the east and the 19 Industry Drive warehouse property and vacant land is located south of the property.

Existing Infrastructure

The site is serviced by electric, telephone and cable service from private utilities on NYS Route 32. The site has private wells and septic system and municipal water and sewer are not available to the site. The primary well serving the warehouse is located near the southeast corner of the existing building. A second well serves the single-family residence near Creamery Hill Road. On-site utilities, including existing water lines are shown on Drawing 2 – Existing Conditions of the Site Plan drawings. The water lines were recently located by a utility location service.

Solid Waste Disposal

Currently, solid waste generated at the Star Warehouse facility is regularly collected and disposed of by a commercial waste contractor, County Waste of Montgomery. Designated waste collecting containers are located near entrances around the building. A waste collection area will be provided for the proposed new warehouse space and waste will continue to be collected by County Waste.

2.1.2 Description of Proposed Action

The proposed warehouse expansion would involve the construction of a 50,000 square foot addition to an existing 185,835 square foot warehouse. The addition would involve the northeast end of the existing building, generally extending the footprint of the existing building to the northeast (see Figure 2-3 – Warehouse Expansion Plan and Figure 2-4 Warehouse Expansion Grading Plan).

The area proposed for the expansion is a flat vacant field, partially gravel covered. The existing building is 20 feet in height and the addition is proposed at 40 feet in height. The increase in height is proposed to accommodate current warehouse operational activity and equipment, since the original building was constructed in the 1950's. The building layout and elevations for the addition are provided as Figure 2.5 – Warehouse Addition Elevations.

Four new loading docks would be constructed at the western side of the building facing Interstate 87. New pavement and a turning area for trucks would be constructed west of the loading area. Improvements to the existing facilities would include the replacement of an existing unpaved emergency access drive with a relocated emergency access drive to Star Road / Creamery Hill Road. The emergency access drive will be 20 feet in width and provided with and locked gate at its intersection with Star Road / Creamery Hill Road. The Town Fire Department and other emergency service providers will have a key to the gate.

A new stormwater management basin is proposed on the north side of the new building addition adjacent to Creamery Hill Road. A total of 14 new parking spaces will be added connected with the building addition and eight new parking spaces added on the eastern side of the building (total of 22 new parking spaces). No additional employees are anticipated as a result of the expansion, since the space is necessary for additional storage.

The area around the warehouse addition and new stormwater management basin near Creamery Hill Road will be landscaped and planted with native grasses, shrubs and trees. A Landscape Plan is provided with the Site Plan drawings (see Attached). Ornamental and native trees will be planted at the front of the new addition and in the area between the stormwater basin and Creamery Hill Road. The landscaping will soften the views of the warehouse addition from Creamery Hill Road and from Interstate 87.

Industry Drive is a shared commercial access drive with the adjoining 19 Industry Drive property. As part of the proposed expansion, Industry Drive would be resurfaced in its existing footprint. The existing guiderail that runs along Industry Drive near Woodbury Creek will be replaced. The existing Industry Drive entrance will be reconstructed as part of the project. The entrance currently has an island with a facility entrance sign. The Island will be removed and curbing added to make the entrance safer and more efficient for trucks and passenger vehicles. The facility sign will be replaced and moved to the south of the entrance. A detail for the entrance improvements is provided in Figure 2-6 and on Sheet 7 of the Site Plan drawings.

A new sign is proposed internal to the site to direct truck drivers and visitors to either 20 Industry Drive or the adjoining 19 Industry Drive building south of the site. This sign on the eastern portion of Industry Drive will not be visible to drivers on local roads

The proposed expansion would improve the fire safety conditions for the entire 20 Industry Drive facility, including the existing portions of the warehouse. These improvements are further described in Section 3.9 Emergency Services of this DEIS. Improvements would include the construction of a new 250,000-gallon water tower at the southern edge of the property, the provision of new fire safety pumps and extending piping and sprinklers to all portions of the warehouse building both for the existing space and in the new addition. As described in Section 3.9, the fire safety improvements would be constructed to NYS Building Code standards. No changes or upgrades to the existing water supply well or the existing septic system are proposed.

The long-term maintenance of the shared facilities between the project sponsor (Star Warehouse) and the adjoining 19 Industry Drive property will continue to be subject to the filed "Reciprocal Easement, Right-of-way and Maintenance Agreement" described above and provided in Appendix B. The warehouse expansion does not change the access and maintenance agreements between the two properties. It is the intent of the applicant to construct upgraded emergency water supply storage with a new storage tank and pumping equipment to provide service for 20 Industry Drive. Current plans do not provide for fire service water supply to the adjacent 19 Industry Drive property.

2.1.3 Compliance with Town Zoning Code

The subject site is located in the PIO Planned Industrial / Office Zoning District. The PIO district allows a range of agricultural, community and recreational services, social halls automotive supplies, laboratories light manufacturing and office uses as of right. The Table of General Uses provides a range of uses permitted by Special Permit, including "Freight and Truck Transfer Terminal, General Warehousing" under Use Group C. The Town Zoning Code was amended by the Town in 2020 by Local Law No. 1-2020. The "General Warehousing" use was mistakenly deleted as a permitted use from the PIO Use Table in the revised e-code and General Code. The Town Attorney has looked into the matter and determined that this was an error in the General Code. It was not the intent of the Town, in its 2020 zoning amendments, to delete General Warehousing and the use remains permitted in the zone by Special Permit of the Planning Board subject to Use Group C, as was the case prior to 2020. A memorandum dated September 23, 2021 explaining this issue is provided in Appendix B – Correspondence.

The proposed warehouse expansion is considered an expansion of a Special Permit use in the PIO Zoning District, subject to the requirements of Zoning Code Use Group C, Special Permit, Freight and Truck Transfer Terminal, General Warehousing. The proposed expansion plan meets all of the dimension and bulk requirements of the PIO district, Use Group C, as shown on the Site Plan and in Table 2-1 Zoning Bulk Requirements.

As a use requiring a Special Permit, the proposed expansion is subject to Special Use requirements in the Zoning Code, as described in Article X Special Permit Uses, Sections 158-140 and 141. All Special Permit uses require site plan review and approval subject to Section 158-19 Site Development Plan Review (Chapter 158-40D). The proposed expansion is also subject to several Article VI Supplementary Regulations, as described below.

Chapter 158-16B of the Zoning Code provides the minimum requirements for off-street parking. According to 158-16B (38), minimum off-street parking for "wholesale establishments or warehouses" is one space for each two employees or every 1,000 square feet of floor area, whichever is greater.

According to Chapter 158-16 A(7)(b), the Planning Board may reduce the parking requirement, as follows:

> *At the time of site plan approval for nonresidential uses located in non-residential districts, the adequacy of accessory parking and truck loading spaces shall be subject to review and determination by the Planning Board. After consideration of an appropriate parking needs analysis for the proposed site use, the Planning Board may reduce the actual number of parking spaces and, if applicable, loading spaces that would otherwise be required by this section by up to 75% where it is demonstrated to the satisfaction of the Planning Board that the specific use or combination of uses on the site will require less parking than otherwise mandated by this section. A reference to this finding shall be included on the site plan as well as in the Planning Board's approval resolution and shall be filed with the Building Inspector. The Planning Board may require, at its option, that the site be capable of accommodating any portion of the reduced number of parking spaces and may require performance security for a period of three years to insure the installation of such additional parking. [Added 8-6-2007 by L.L. No. 1-2007]*

The existing and proposed parking, including the loading areas are described in Section 3.4 and in the Transportation Study (Appendix G). The proposed Site Plan includes 22 new parking spaces provided and 4 new loading areas, for the expansion. This will result in 110 paved parking spaces, 130 land-banked parking spaces and 15 total truck loading spaces.

Chapter 158-17 Dangerous and objectionable elements; performance standards describes measures to control dangerous and objectionable elements, such as fire hazards, air pollution, liquid and solid waste and noise. The proposed expansion will not result in new activities on the site. The proposed upgrades of fire safety equipment for the existing warehouse and expansion are intended to provide fire protection systems that meet the NYS State Fire Code Requirements and address concerns of the Town of Cornwall (see Chapter 3.9 Emergency Services).

Chapter 158-18 provides the requirements for supplementary signs. An entrance sign and an internal sign are proposed and details are shown in the attached Site Plan drawings. The proposed signs will meet the requirements of the zoning code.

Chapter 158-19 describes the process and requirements for Site Plan review. The applicant will provide the necessary plans and documents to meet the requirements for the Planning Board Site Plan review.

Chapter 158-20 provides the requirements for landscaping and environmental control. The proposed development will meet zoning code requirements for landscaping, and a landscaping plan has been provided (see attached).
Section 158-41-I describes buffer area requirements for all special permit uses which abut or are within 300 feet of any residential use or district. The Star Warehouse abut residential uses on Creamery Hill Road. The zoning code provides that the Planning Board may require a buffer

area or screening between the use and the surrounding area. The applicant has provided a landscape plan for Planning Board review.

2.1.4 Development Purpose, Needs, and Benefits

The proposed development will expand an existing commercial use and provide additional capacity for commercial activity in a portion of the Town where such activity is permitted. The proposed commercial space will add to the Town's business activity and expand employment opportunities within the community.

The proposed development will not disturb undeveloped land but instead will expand on previously cleared and disturbed land. The size, scale and architecture for the proposed warehouse building addition will be similar the existing building on the property.

Objectives of the Applicant

The Applicant's proposal intends to accomplish the following:

- To provide an expansion of an existing commercial use in an area of the Town zoned for and suited to support such land use, especially its location in relation to mass transportation within the Interstate 87, NYS Route 32 area in the Town of Cornwall. The warehouse has operated in its present location for more than 60 years.
- To improve the existing facilities including improvements to fire safety, including emergency water supply and pressure by the construction of a new water storage tanks and pumping system and sprinklers for the existing building. Improvements will be made to the facility entrance and shared access drive.
- To minimize the environmental impacts of the development by locating the expansion area to previously disturbed and the most level and suitable areas of the property. The expansion will not encroach upon existing wooded areas, wetlands or floodplains on the property.

The proposed warehouse addition will expand the capacity of an active, long-term commercial space in the Town of Cornwall. The addition will provide for the commercial success of the businesses and the continued tax revenue to the various tax jurisdictions in the Town and County.

The expansion of the existing warehouse space is consistent with the Town of Cornwall Comprehensive Plan Update (2019). The Comprehensive Plan Update only mentions the purpose of the PIO – Planned Industrial Office district as "designed to promote economic development with light industrial, office, warehousing, and research development uses". The expansion is consistent with the purpose of the PIO district.

The proposed action is also consistent with the Orange County Comprehensive Plan 2019 Update. The County Comprehensive Plan retains and references five supplemental chapters that were adopted as part of the 2010 Strategies for Quality Communities Plan. The chapter most relevant to the proposed expansion is the Economic Development Strategy (2015). The intent of the Strategy is to *"position the County to attract new businesses and investors to locate to Orange County, as well as support the businesses and entrepreneurs already within the County and allow them to expand and experiment*". One of the four Core Values in the 2019 Comprehensive Plan Update is Economic Prosperity, stating "*Orange County should work to*

attract good, stable, and growing jobs, employers and industries so that our residents are able to provide well for themselves and their families".

2.1.5 Construction

Construction of the proposed warehouse addition will be completed in a single stage and is expected to be completed in 12 to 16 months. Construction activity will be limited from 7:00 a.m. to 7:00 p.m. It is anticipated that the construction of the new water storage tank in the southeast portion of the site will occur during the construction of the warehouse addition and that the infrastructure and fire safety elements of the construction will be completed prior to the certificate of occupancy for the expanded space.

A natural gas pipeline crosses the site and is owned and operated by Central Hudson Gas & Electric Corp. The pipeline is located on the west side of the building, parallel to Interstate 87, and its location is shown on Drawing 3 of the Site Plans. The pipeline does not cross under the existing building or in the building footprint of the proposed expansion. Minor grading and the installation of pavement will occur over the pipeline.

The project engineer and the Town of Cornwall Planning Board consulting engineer met with Central Hudson staff on August 9, 2022 to discuss the proposed construction and grading in the area of the Central Hudson pipeline. The Central Hudson staff explained that the pipeline location in the area of construction will need to be field located prior to any ground disturbance. The project construction manager is required to notify Central Hudson when grading in the area of the pipeline is scheduled. Central Hudson staff will be present during any grading or ground disturbance in the area of the pipeline. Any excavation in the area of the pipeline will be completed with soil vacuum techniques such as a Hydrovac machine.

Construction erosion control details are provided on Drawing 4 – Erosion Control Plan of the Site Plan set. A construction entrance is proposed at the exiting Star Warehouse driveway on Creamery Hill Road. This construction entrance will separate construction vehicles and traffic from the routine deliveries and traffic for the operating portions of the warehouse. It is likely that deliveries of large construction materials such as steel beams will be routed through the main Industry Drive entrance.

The Erosion Control plan shows the locations of a soil stockpile (if needed), temporary stormwater diversion swales and silt fence for erosion and sediment control. The Erosion Control Plan notes provide construction sequencing and details for the installation and maintenance of erosion and sediment control measures. According to the plan, Prior to the commencement of construction, the limits of clearing and grading will be marked. Silt fence will be installed along the downgrade perimeter of the site and in other areas as shown on the plans.

The maintenance of erosion control devices will be the responsibility of the construction contractor. The contractor will maintain all erosion control devices in accordance with the approved plans and as directed by the design engineer, and Town of Cornwall representatives including Town Engineer, Highway Superintendent and Building Inspector.

Approvals, Reviews and Permits

Approvals, reviews and/or permits required for the implementation of this development are listed below by issuing agency. These agencies are called Involved Agencies under SEQRA, and have approval authority over one or more aspects of this application.

Site Plan, Special Use Permit Expansion
Town of Cornwall Planning Board
183 Main Street
Cornwall, NY 12518

SPDES General Permit for Stormwater, Wetland Permit
NYS Department of Environmental Conservation
21 South Putt Corners Road
New Paltz, NY 12561

Highway Permit
NYS Department of Transportation
4 Burnett, Boulevard
Poughkeepsie, New York 12603

In addition to the Involved Agencies, the following Interested Agencies will be included in the distribution for the DEIS.

- Orange County Department of Planning
- New York State Office of Parks, Recreation and Historic Preservation
- NYSDEC Department of Fish and Wildlife
- Palisades Interstate Parks Commission
- Town of Cornwall Fire Inspector
- Canterbury Fire District

Table 2-1 Zoning Bulk Requirements

BULK REQUIREMENTS

ZONE PIO (PLANNED INDUSTRIAL / OFFICE)
USE GROUP C, SPECIAL PERMIT 22
FREIGHT AND TRUCK TRANSFER TERMINAL, GENERAL WAREHOUSING

	MIN. REQUIRED	EXISTING CONDITION	PROPOSED CONDITION
GROSS LOT AREA (SQ.FT.)	80,000	1,607,000*	1,607,000*
NET LOT AREA (SQ.FT.)	80,000	1,130,000	1,130,000
LOT WIDTH (FT.)	400	1,307±	1,307±
ROAD FRONTAGE (FT.)	400	1832±	1832±
FRONT YARD (FT.)	100	258±	113±
REAR YARD (FT.)	50	271±	189±
SIDE YARD (FT.)	50	104±	104±
BOTH SIDE YARDS (FT.)	100	417±	417±
	MAX. PERMITTED	EXISTING CONDITION	PROPOSED CONDITION
DEVELOPMENT COVERAGE (%)	70	≤70	≤70
BUILDING COVERAGE (%)	35	12±	15±
BUILDING HEIGHT (FT.)	40	≤40	≤40
FLOOR AREA RATIO	0.70	0.12±	0.15±

* PER TAX MAP INFORMATION

Note: Table is reproduced from Star Warehouse, Warehouse Expansion Plan Cover Sheet (Drawing No. 1), by Pietrzak & Pfau Engineering & Surveying, PLLC, July, 2022.

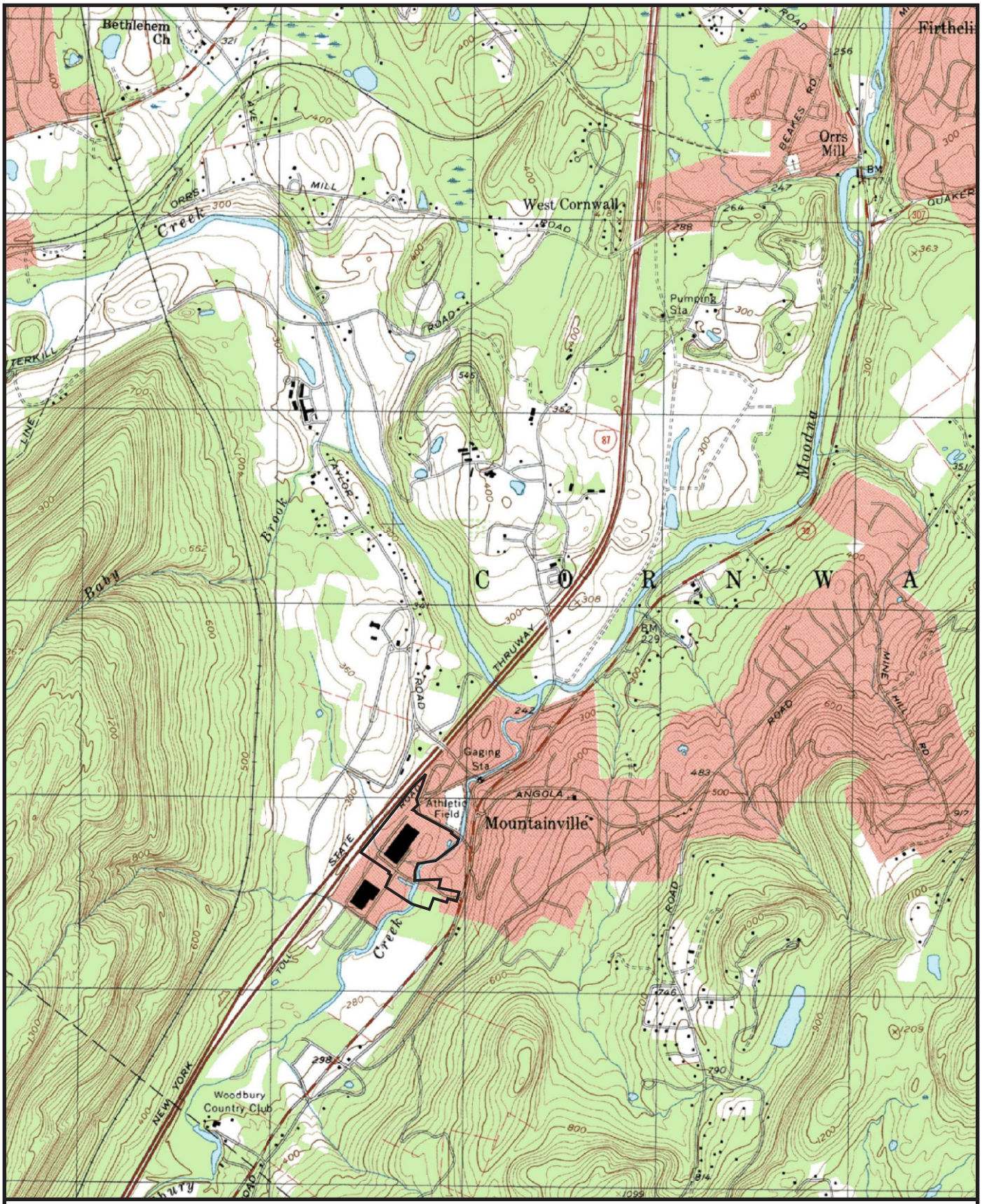

Figure 2-1: Location Map
Star Warehouse Property
Town of Cornwall, Orange County, New York
Base Map: USGS, Cornwall Quadrangle, 1994
Approx. Scale: 1 inch = 2,270 feet

File 20018 08-23-2021
TMA:\20018\Fig 2-1.cdr

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

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Figure 2-2: Aerial Photograph
Star Warehouse Property
Town of Cornwall, Orange County, New York
Base Map: NYS Clearinghouse Orthoimagery 2016

File 20018 08-23-2021
TMA:\20018\Fig 2-2.cdr

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

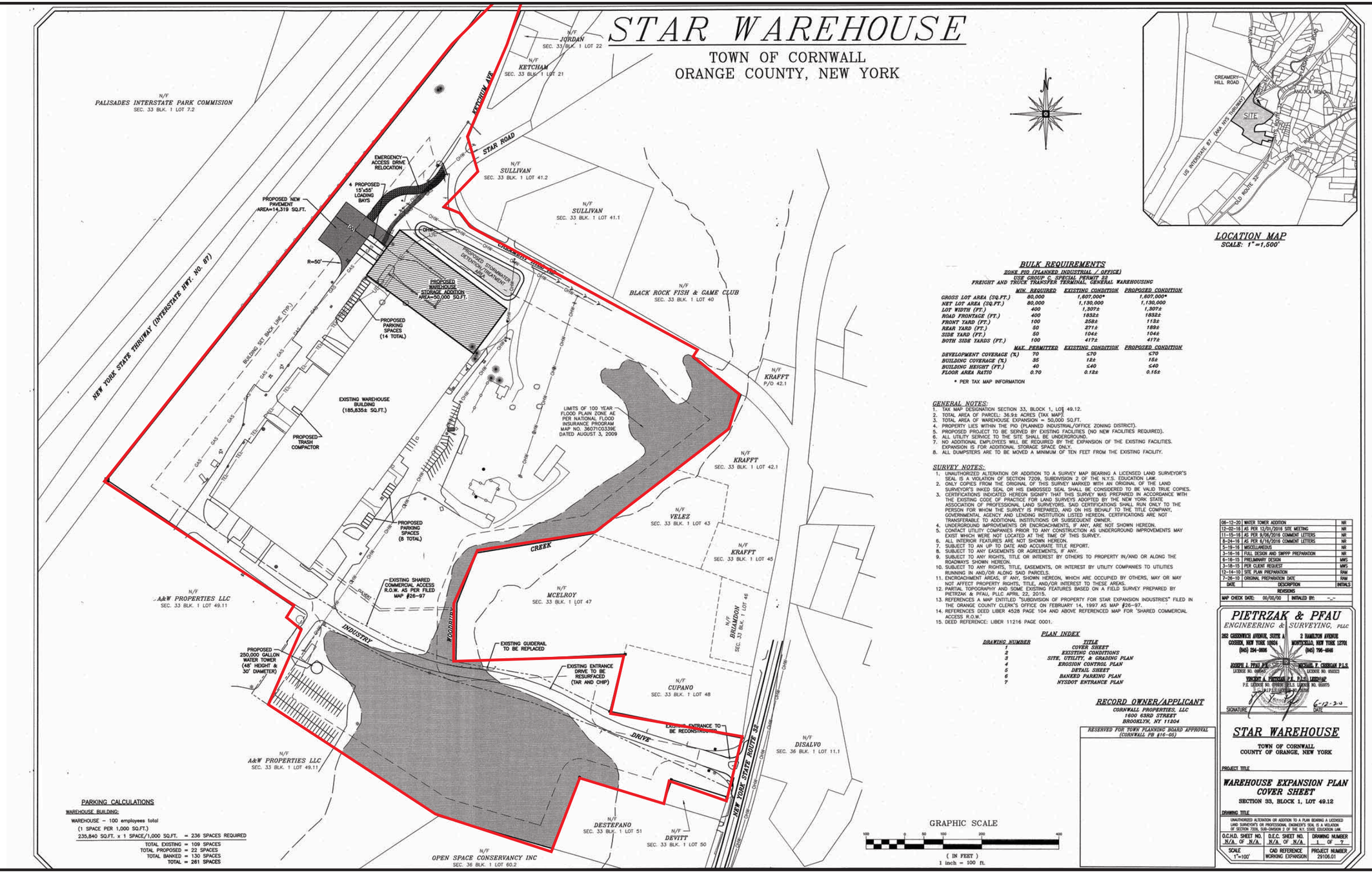

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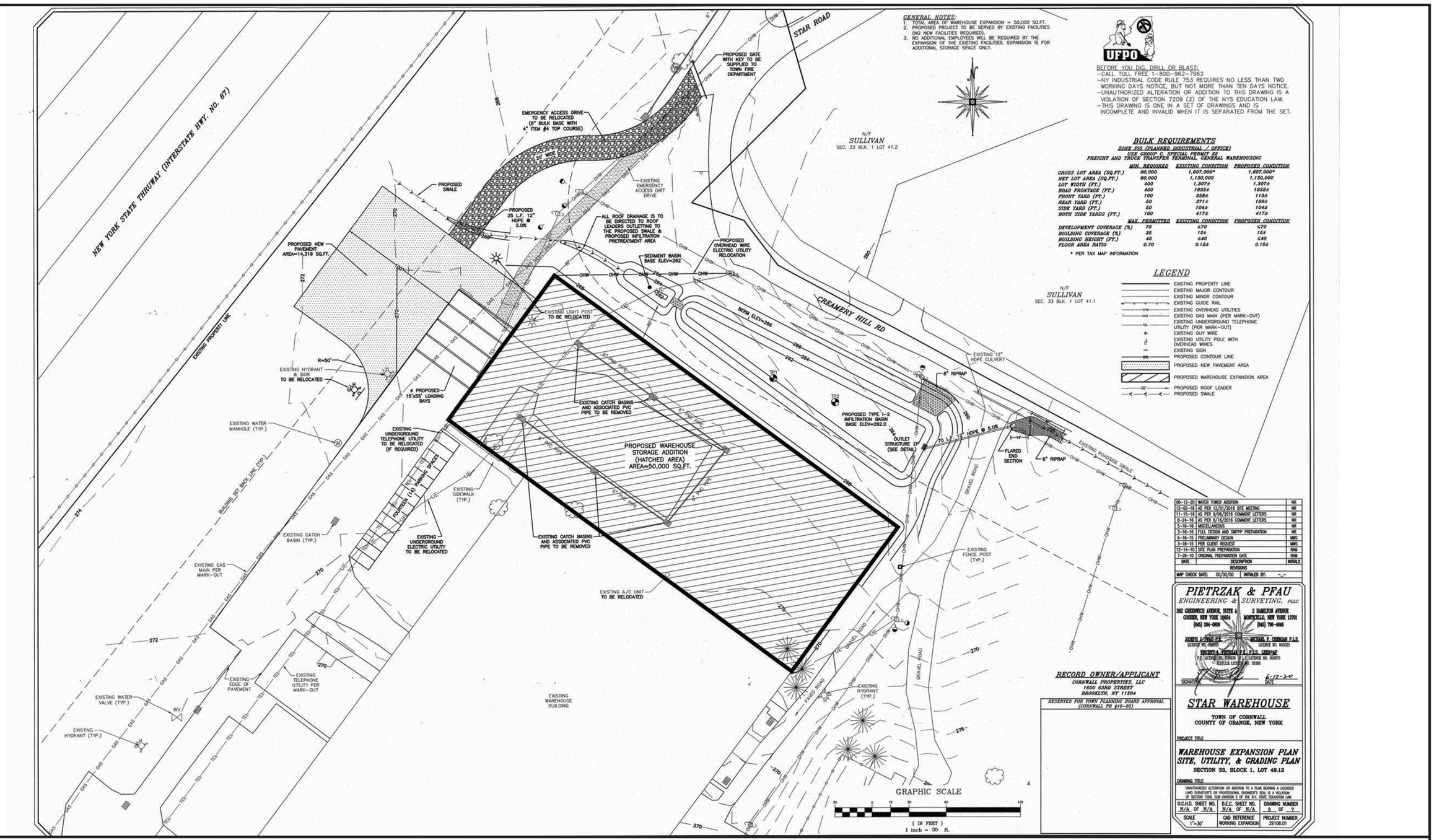
Figure 2-3: Warehouse Expansion Plan
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: Pietrzak & Pfau Engineering & Surveying, PLLC

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



GENERAL NOTES:

1. TOTAL AREA OF WAREHOUSE EXPANSION = 50,000 SQ.FT.
2. PROPOSED PROJECT TO BE SERVED BY EXISTING FACILITIES (NO NEW FACILITIES REQUIRED).
3. NO ADDITIONAL EMPLOYEES WILL BE REQUIRED BY THE EXPANSION OF THE EXISTING FACILITIES. EXPANSION IS FOR ADDITIONAL STORAGE SPACE ONLY.

UFPO

BEFORE YOU DIG, DRILL OR BLAST!
–CALL TOLL FREE 1–800–962–7962
–NY INDUSTRIAL CODE RULE 753 REQUIRES NO LESS THAN TWO WORKING DAYS NOTICE, BUT NOT MORE THAN TEN DAYS NOTICE.
–UNAUTHORIZED ALTERATION OR ADDITION TO THIS DRAWING IS A VIOLATION OF SECTION 7209 (2) OF THE NYS EDUCATION LAW.
–THIS DRAWING IS ONE IN A SET OF DRAWINGS AND IS INCOMPLETE AND INVALID WHEN IT IS SEPARATED FROM THE SET.

BULK REQUIREMENTS

ZONE PID (PLANNED INDUSTRIAL / OFFICE)
USE GROUP C SPECIAL PERMIT #2
FREIGHT AND TRUCK TRANSFER TERMINAL, GENERAL WAREHOUSING

	MIN. REQUIRED	EXISTING CONDITION	PROPOSED CONDITION
GROSS LOT AREA (SQ.FT.)	80,000	1,607,000*	1,607,000*
NET LOT AREA (SQ.FT.)	80,000	1,130,000	1,130,000
LOT WIDTH (FT.)	400	1,307±	1,307±
ROAD FRONTAGE (FT.)	400	1632±	1632±
FRONT YARD (FT.)	100	258±	113±
REAR YARD (FT.)	50	271±	189±
SIDE YARD (FT.)	50	104±	104±
BOTH SIDE YARDS (FT.)	100	417±	417±
	MAX. PERMITTED	EXISTING CONDITION	PROPOSED CONDITION
DEVELOPMENT COVERAGE (%)	70	≤70	≤70
BUILDING COVERAGE (%)	35	12±	15±
BUILDING HEIGHT (FT.)	40	≤40	≤40
FLOOR AREA RATIO	0.70	0.12±	0.15±

* PER TAX MAP INFORMATION

LEGEND

- EXISTING PROPERTY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING GUIDE RAIL
- OHW — EXISTING OVERHEAD UTILITIES
- GAS — EXISTING GAS MAIN (PER MARK–OUT)
- TEL — EXISTING UNDERGROUND TELEPHONE UTILITY (PER MARK–OUT)
- EXISTING GUY WIRE
- EXISTING UTILITY POLE WITH OVERHEAD WIRES
- EXISTING SIGN
- 270 — PROPOSED CONTOUR LINE
- PROPOSED NEW PAVEMENT AREA
- PROPOSED WAREHOUSE EXPANSION AREA
- RF — PROPOSED ROOF LEADER
- PROPOSED SWALE

DATE	DESCRIPTION	INITIALS
	REVISIONS	
06-12-20	WATER TOWER ADDITION	NR
12-02-16	AS PER 12/01/2016 SITE MEETING	NR
11-15-16	AS PER 9/06/2016 COMMENT LETTERS	NR
8-24-16	AS PER 6/16/2016 COMMENT LETTERS	NR
5-19-16	MISCELLANEOUS	NR
3-16-16	FULL DESIGN AND SWPPP PREPARATION	NR
6-16-15	PRELIMINARY DESIGN	MWS
3-18-15	PER CLIENT REQUEST	MWS
12-14-10	SITE PLAN PREPARATION	RAM
7-26-10	ORIGINAL PREPARATION DATE	RAM

MAP CHECK DATE: 00/00/00 INITIALED BY: –,–

PIETRZAK & PFAU
ENGINEERING & SURVEYING, PLLC
282 GREENWICH AVENUE, SUITE 1, GOSHEN, NEW YORK 10924, (845) 294-5600
2 HAMILTON AVENUE, MONTICELLO, NEW YORK 12701, (845) 796-4946
JOSEPH A. PFAU P.E. LICENSE NO. 058896
MICHAEL F. CORRIGAN P.L.S. LICENSE NO. 050323
ROBERT A. PIETRZAK P.E. P.P. L.S. LICENSE NO. 058896 P.L.S. LICENSE NO. 050075
JOHN J. KOLOMAY P.E. LICENSE NO. 35306
SIGNATURE 6-17-20 DATE

STAR WAREHOUSE

TOWN OF CORNWALL
COUNTY OF ORANGE, NEW YORK

PROJECT TITLE

WAREHOUSE EXPANSION PLAN
SITE, UTILITY, & GRADING PLAN
SECTION 33, BLOCK 1, LOT 49.12

DRAWING TITLE

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING A LICENSED LAND SURVEYOR'S OR PROFESSIONAL ENGINEER'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2 OF THE N.Y. STATE EDUCATION LAW.

O.C.H.D. SHEET NO.	D.E.C. SHEET NO.	DRAWING NUMBER
N/A OF N/A	N/A OF N/A	3 OF 7
SCALE 1"=30'	CAD REFERENCE: WORKING EXPANSION	PROJECT NUMBER 29106.01

RECORD OWNER/APPLICANT
CORNWALL PROPERTIES, LLC
1800 63RD STREET
BROOKLYN, NY 11204

RESERVED FOR TOWN PLANNING BOARD APPROVAL (CORNWALL PB #16-05)

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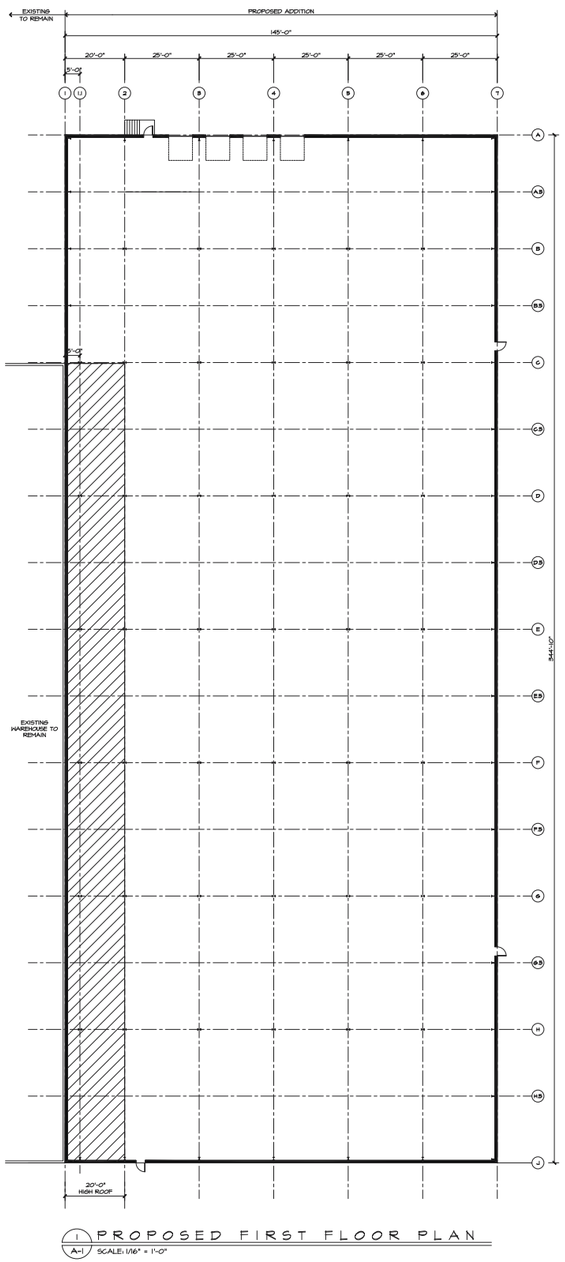
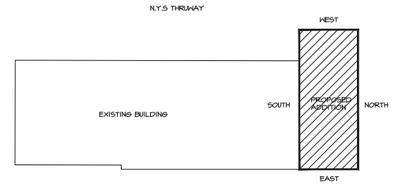
File 20018 Fig 2-4 TMA 08-18-2021

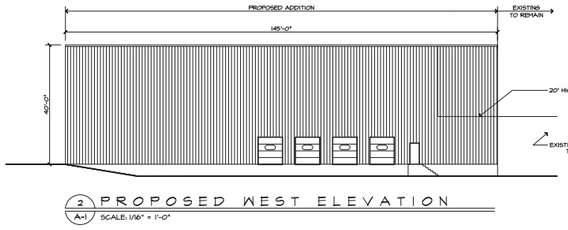
Figure 2-4: Warehouse Expansion Grading Plan
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: Pietrzak & Pfau Engineering & Surveying, PLLC



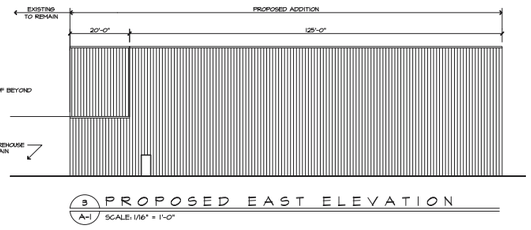
1 A-1 PROPOSED FIRST FLOOR PLAN
SCALE: 1/16" = 1'-0"



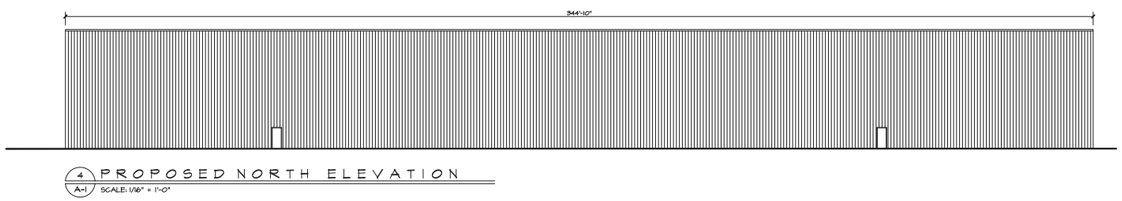
KP A-1 KEY PLAN
SCALE: N.T.S.



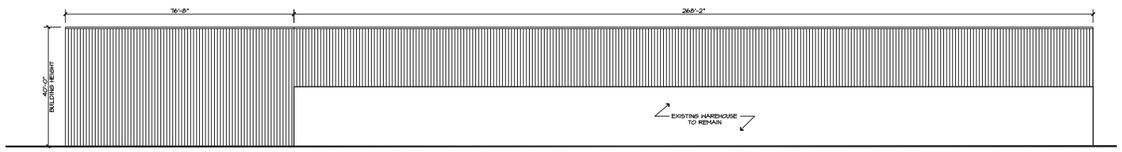
2 A-1 PROPOSED WEST ELEVATION
SCALE: 1/16" = 1'-0"



3 A-1 PROPOSED EAST ELEVATION
SCALE: 1/16" = 1'-0"



4 A-1 PROPOSED NORTH ELEVATION
SCALE: 1/16" = 1'-0"



5 A-1 PROPOSED SOUTH ELEVATION
SCALE: 1/16" = 1'-0"

BT ARCHITECT
9 Turner Road
Central Valley, New York 10917
ph. 845-928-3988 fax 845-928-3299

Seal

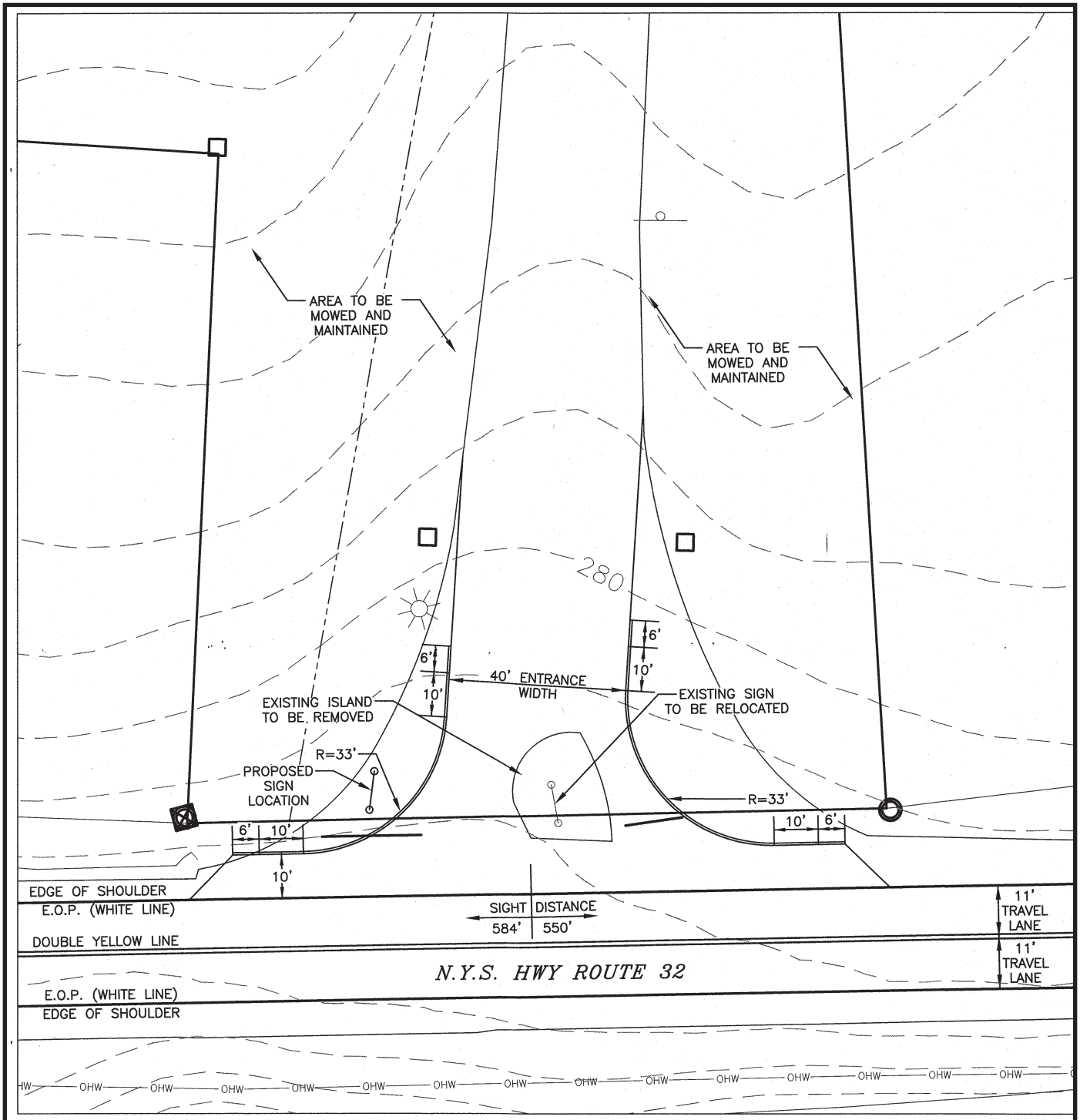
PROPOSED WAREHOUSE ADDITION FOR:
STAR WAREHOUSE
20 INDUSTRY DRIVE
TOWN OF CORNWALL, NEW YORK
ORANGE COUNTY

Revisions:

Project No. BRA 2109
Date: 03.12.2021
Drawn By: SPO
Reviewed By: BT

Sheet Number:
A-1

Figure 2-5: Warehouse Addition Elevations
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: Barry Terach Architect



ENTRANCE PLAN

SCALE: 1"=20'

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Figure 2-6: Industry Drive Entrance Plan

Star Warehouse Property

Town of Cornwall, Orange County, New York

Source: Pietrzak & Pfau Engineering & Surveying, PLLC

Approx. Scale: 1 in. = 33 ft.

File 21032 09-30-2021

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

3.1 SURFACE WATER AND WETLANDS

3.1.1 Existing Conditions

Surface Water Existing Conditions

The 36.9 acre subject site is the location of an existing warehouse facility. The site is bounded by the New York State Thruway to the west, another warehouse facility to the south, Woodbury Creek to the east, and private lands to Creamery Hill Road to the north. Vegetation on three sides of the existing building are maintained meadow typical of industrial locations. The eastern part of the property is a wooded stream corridor adjacent to the Woodbury Creek. Site observations were conducted by Steve Marino, PWS, of Tim Miller Associates in May and July of 2021. Mapped wetlands and watercourses are shown on the National Wetland Inventory mapping (Figure 3.1-1). No mapped DEC wetlands are identified on site.

The primary surface water feature on the site is the Woodbury Creek. The Woodbury Creek (DEC #862-97) is a Class C(TS) stream that is tributary to the Moodna Creek. Moodna Creek drains to the Hudson River 6.6 miles from the subject site at Newburgh Bay. The NYSDEC stream classification C, indicates that Woodbury Creek supports a fishery and non-contact recreation. The designation (T) indicates that it may support a trout population and (TS) indicates that it may support trout spawning.

There is a narrow fringe of wetland along the stream corridor, which was delineated by Tim Miller Associates in July of 2021. A tributary that drains Schunnemunk Mountain on the west side of the Thruway flows under the Thruway in a culvert, enters the site as a short channel before entering another culvert on site. This culvert flows underground (under the existing building) to a direct discharge to the Woodbury Creek.

A mapped FEMA floodplain (with base flood elevations between 251’ and 255’ msl) is associated with the Creek, and is depicted on the attached site plans. No part of the existing or proposed development area occurs with in the mapped 100 year floodplain, or would have a direct impact on the Woodbury Creek or its adjacent wetlands. A NYSDEC stormwater pollution prevention plan (SWPPP) is required in compliance with the SPDES General Permit #GP-0-20-001.

Wetlands Existing Conditions

No regulated wetlands were observed on or adjacent to the proposed development site.

A narrow wetland fringe on the west side of the Woodbury Creek was delineated in June of 2021. Based primarily on vegetation and hydrology, the line was generally within 3 - 4 feet of the high water line of the Creek. At the southern end of the corridor the stream bank is made up of large stones and old fill acting as a retaining wall, likely part of an historic disturbance in this area. Further north the streambank becomes more natural. The wetland vegetation along this segment would serve to slow floodwaters during extreme rain events.

A small pocket of wetland was observed in the field area between the existing building and the stream corridor. A mix of native and invasive species, this small depressional area function to store some runoff but otherwise is limited by its size for any habitat or vegetative diversity function.

3.1.2 Potential Impacts

The existing drainage area at the location of the proposed expansion is a small catchment of 3.76 acres that drains from the embankment of the New York State Thruway, through the northern part of the site and into an existing swale at Creamery Hill Road. This swale flows to the Woodbury Creek.

The proposed warehouse expansion would increase the amount of impervious surface within the drainage area from approximately 0.61 acres to 1.72 acres. This increase has a potential to increase the volume and flow rate of runoff leaving the site, as well as potential water quality impacts. Therefore the project engineer has designed a stormwater pollution prevention plan (SWPPP) to mitigate these potential impacts. The SWPPP is provided as Appendix C of this DEIS.

The proposed warehouse expansion involves no direct impacts to the wetlands identified on the property including the wetland fringe found along Woodbury Creek.

3.1.3 Mitigation Measures

A stormwater infiltration pond will be constructed on the north side of the warehouse expansion, and runoff form the new area and expanded parking/driveway will also be routed to this basin. Runoff form the roof will be conveyed directly to a pre-treatment sediment basin. Runoff from the proposed driveway expansion will be conveyed to the same basin via a grass lined swale. An infiltration basin is an especially efficient means of stormwater volume capture and treatment, and on site testing has demonstrated that the soils in the proposed basin have suitable infiltration capacity. Table 3.1-1 lists the pre- and post-development flow rates.

Table 3.1-1
Pre- and Post-Development Peak Flow Rates
Star Warehouse Expansion

Storm Event	Pre-developed Peak Flow (cfs)	Post-developed Peak Flow (cfs)	Change (cfs)	Change (%)
1 Year	0.03	0.00	-0.03	-100.00
2 Year	0.19	0.19	0.00	0.00
10 Year	1.42	1.40	-0.02	-1.41
25 Year	2.85	2.38	-0.47	-16.49
100 Year	8.66	8.61	-0.05	-0.58

Source: Pietrzak and Pfau Engineering and Surveying, PLLC

The infiltration basin will allow the majority of stormwater to infiltrate into the shallow groundwater underlying the site and eventually discharge to Woodbury Creek over a distance of approximately 550 feet. The proposed infiltration and groundwater discharge will provide thermal protection for stormwater run-off from the developed portion of the site to Woodbury Creek. The temperature of groundwater is generally equal to the mean air temperature above the land surface[1]. Groundwater temperatures are typically in the range of 52 degrees Fahrenheit in the Hudson Valley.

[1] Groundwater Hydrology for Water Well Contractors, National Ground Water Association, 1999.

No activities are proposed within or adjacent to the mapped FEMA floodplain. The stormwater management plan will reduce the volume and rate of runoff leaving the site, and therefore will not have a cumulative effect on the floodplain.

The stormwater management basins will be planted with wetland vegetation (both woody and herbaceous) and overseeded with seed mixes appropriate for the transitional nature of the hydrology associated with storm basins.

An erosion and sedimentation control plan has been prepared as part of the SWPPP. The entire development area is flat, and therefore erosive velocities are not likely to occur. During construction, silt fence, stone check dams and a temporary diversion swale will be implemented to keep clean water clean and protect adjacent areas form possible siltation. If temporary soil stockpiles are used, the stockpile will be ringed with silt fence and seeded if it will remain in place for more than 14 days. Regular inspections will occur during construction, and the limited areas of exposed soil will be permanently stabilized with perennial ryegrass.

Since no disturbance will occur within or adjacent to the wetland/watercourse corridor, no permits for the proposed activities are required and no wetlands mitigation necessary.

Environmental Resource Mapper

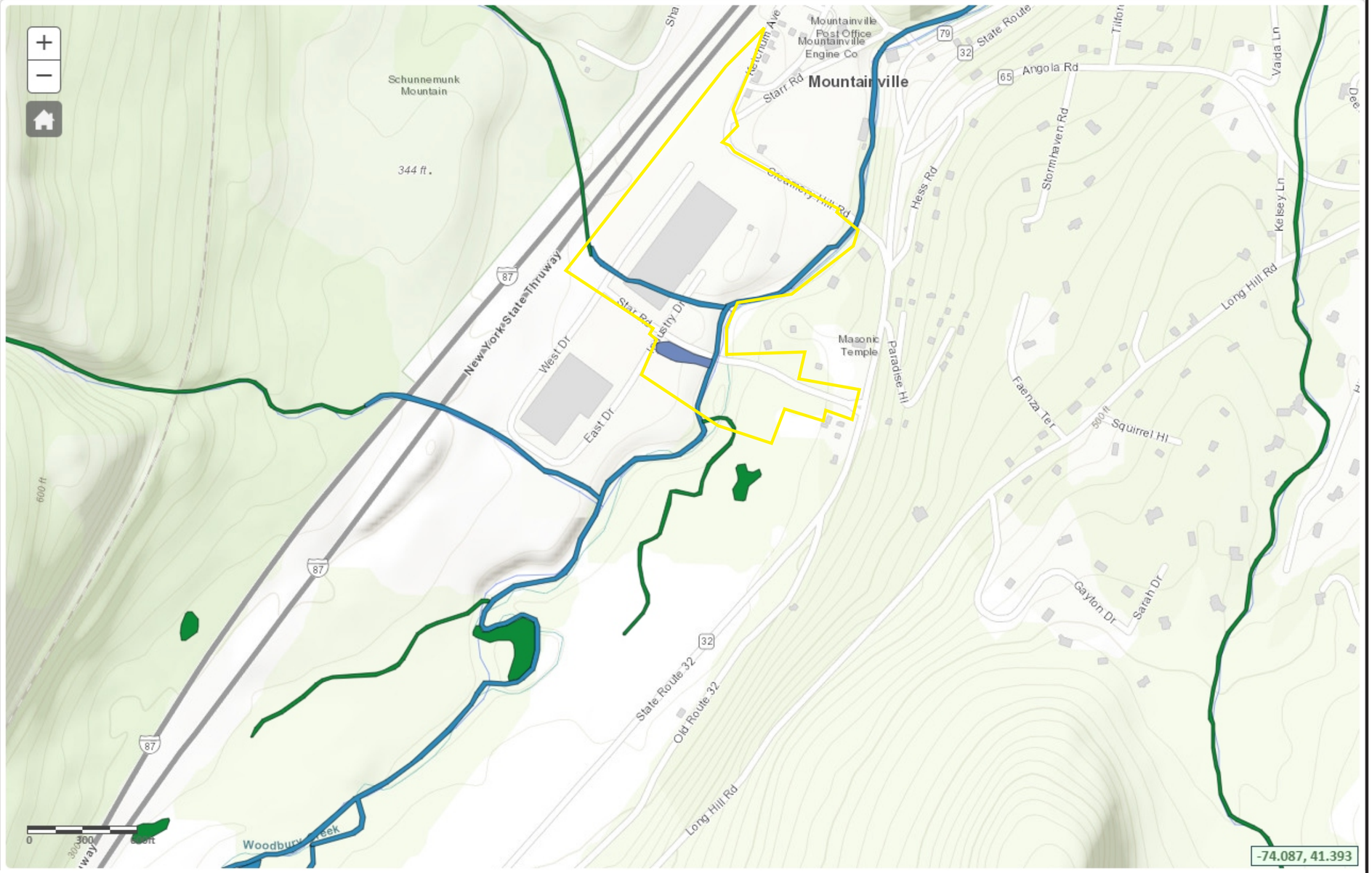
Base Map: Topographical — Using this map

- Search
- Tools
- Layers and Legend

Other Wetland Layers

- [x] National Wetands Inventory
  - Estuarine and Marine Deepwater
  - Estuarine and Marine Wetland
  - Freshwater Emergent Wetland
  - Freshwater Forested/Shrub Wetland
  - Freshwater Pond
  - Lake
  - Other
  - Riverine

- Reference Layers
- Tell Me More...
- Need A Permit?
- Contacts



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File 20018 Fig 2-3 TMA 08-18-2021

Figure 3.1-1: National Wetland Inventory Mapping
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: New York State Environmental Resource Mapper

3.2 GROUNDWATER RESOURCES

3.2.1 Existing Conditions

The development site is located in a rural suburban setting with surrounding properties a mix of low density residential properties and a commercial warehouse to the south. The property is approximately 35.4 acres in size and located between NYS Route 32 to the east and borders Interstate 87 to the west.

Municipal water and sewer is not available to the property or nearby properties. Therefore, the project site and nearby residences and businesses are served by private wells. The subject property is a Class 2 Inactive Hazardous Waste Disposal Site (IHWDS) and has been assigned NYSDEC Site No. 336008. Environmental consultants, TRC Engineers, Inc. completed a *Remedial Investigation Report* for the property in September 2020[1]. The report investigated and describes groundwater conditions for the site. The description of existing conditions for site geology and hydrogeology are summarized from the *Remedial Investigation Report*.

Site Geology

The Site is located in the geologic provence known as the Hudson Highlands. The area geology consists of glacial and fluvial deposits overlying Ordovician age dolomite bedrock. Studies of the local geology have shown the unconsolidated glacial-fluvial sediments to be heterogeneous, varying from relatively impermeable lacustrine clays to permeable outwash sands and gravels. The unconsolidated deposits generally thicken to the north, reflecting the bedrock surface that dips in that direction. Prior studies have also shown that the thickest of unconsolidated deposits appears to be confined within a bedrock trough that begins east of the onsite warehouse building and extends northward offsite. The bedrock occurs just beneath ground surface near the west central portion of the site near Woodbury Creek and outcrops to the east of the site in Woodbury Creek.

Local Aquifers and Site Hydrogeology

The two principal Site aquifers are an unconsolidated aquifer (sand and gravel) in glacial overburden deposits, and a bedrock aquifer in the underlying, dolomite bedrock. The project site is located in the Woodbury Creek basin of the larger Moodna Creek watershed[2]. According to the Moodna Creek Watershed Atlas (May, 2008) the project site is located in an area identified as an "important groundwater resource". A graphic from the Moodna Creek Watershed Atlas is provided as Figure 3.2-1. The Figure shows the mapped area of groundwater resource in the area of the site as generally in the Woodbury Creek floodplain between NYS Route 32 and Interstate 87. According to the Atlas, "important groundwater resources" are the result of geologic data locating sand and gravel deposits and other glacial geologic features in relation to the water table. In general, sand and gravel aquifers can provide good well yields, but can be more susceptable to contamination from surface spills and releases.

According to a hydrogeology evaluation prepared by others, there is no extensive confining unit between the overburden deposits and bedrock aquifer. Depth to groundwater in the overburden deposits ranges from 4 to 18 feet below ground surface (bgs) across the Site, and groundwater flow is predominately to the east, toward Woodbury Creek, with a southeast flow component in

[1] Remedial Investigation Report; Former Star Anchors and Fasteners (a.k.a. Star Expansion) Site, TRC Engineers, Inc. September 16,2020.

[2] Moodna Creek Watershed Atlas, Orange County Watershed Authority, May, 2008

the southern part of the Site. The reported flow velocity in the overburden aquifer based upon slug tests performed by others is approximately 0.07 feet per day.

Existing Local Groundwater Wells

Two potable water supply wells serve the property. A single well serves the existing Warehouse building and is located at the south east corner of the building near Industry Drive. The depth and construction of the well is not known. Information regarding the installation and yield testing of the project water supply well was not found in recent water supply permitting information from 2009 and 2015 (see Appendix D). According to the project engineer, Pieterzak & Pfau Engineers, and a report by MJS Engineering, the well has a capacity of 7.5 gallons per minute[3] (see Appendix D).

A second well services the existing residence in the northeast portion of the site. the depth and construction of the residential well is not known. Several shallow and deeper bedrock groundwater monitoring wells are located on the property and were installed during environmental investigations for the property.

An environmental database identifies local wells that are listed in the federal US Geologic Survey database and the NYS well database. A total of 23 wells were identified within a one-mile radius from the project site. The owners from most of the wells are not identified in the database. Cornwall-on-Hudson municipal wells are located approximately one-half mile northwest of the site on Taylor Road and across Interstate 87.

Existing Water Usage

Water usage information for the existing warehouse was documented in the *Existing Water System Modification* report prepared by Pietrzak & Pfau Engineering & Surveying, PLLC, revised July 2015. The report was prepared for Orange County Department of Health (OCDOH) to modify the facility water supply system approval, which is a Non-Transient Non-Community Water System (ID #3530250).

Due to an increase in the average daily and peak day rates of treated water, the project engineer proposed the installation of two 5,000 gallon water storage tanks in series. The storage tanks are located inside the warehouse building and allow for water storage to meet peak water demands. The well pump for the warehouse has a capacity of 7.5 gallons per minute and the water treatment system is rated at 15 gallons per minute. The well pump has the capacity to pump up to 10,800 gallons per day. Average daily water usage from January 2013 to November 2014 is provided in the *Existing Water System Modification Report* (see Appendix D). The average daily water usage for that period, based on daily water usage logs, is 2,308 gallons per day.

3.2.2 Potential Impacts

Development Water Demand

The project engineer indicates that the proposed warehouse addition will not require additional water demand. The applicant has indicated the expansion will add needed storage space and that the space will not require the adding of additional employees. The proposed 50,000 square

[3] Engineer's Report Water Treatment Modifications, MJS Engineering & Land Surveying, PC, August, 2009.

feet of storage space is an increase of approximately 27 percent of the existing warehouse space. If the current water usage were to be increased proportionally to the building square footage, then a 27 percent increase in average daily water usage would be an additional 623 gallons per day. The total estimated future average water usage would be 2,931 gallons per day. This volume is well below the existing well capacity of 10,800 gallons per day.

The continued use of an existing long-term water supply well at its current location and pumping rate will not impact nearby water supply wells.

Petroleum Leaks and Spills

Petroleum leaks and spills have the potential to impact both surface water and groundwater (aquifer) resources. The Star Warehouse currently does not have underground or aboveground petroleum storage tanks and therefore, petroleum leaks and spills are limited to cars and trucks accessing the property. The proposed warehouse expansion is likely to include an emergency service fuel storage tank to service fire safety pumps, in the event that electrical power is lost at the warehouse. The size and location of the storage tank has not been determined. It will likely be located in the area of the proposed new water storage tank in the southwest portion of the site, near Industry Drive. Any on-site fuel oil tank will have secondary containment and be installed according local and NYSDEC petroleum storage tank regulations. Depending upon the size of any future petroleum storage tank, the tank may require Petroleum Bulk Storage registration with the NYSDEC, per 6 NYCRR Part 613. If the total storage capacity of on-site aboveground tanks is greater than 1,100 gallons, the tanks will be registered with the NYSDEC.

Petroleum leaks or spills from vehicles typically occur during vehicle accidents where fuel storage tanks are damaged. These spills would be responded to by emergency service responders including The Town of Cornwall Fire Department and the spill would be contained to the pavement to the extent possible. Minor leaks of petroleum onto pavement is designed to be treated in the proposed stormwater management facilities. The proposed expansion of the warehouse is not expected to increase the risk to local aquifers from petroleum leaks and spills.

3.2.3 Mitigation Measures

As described above, the average daily water withdrawal rate following the warehouse expansion is not expected to change from existing withdrawal rates. The actual measured average daily withdrawal rates are well below the rates permitted by Orange County Department of Health in the water treatment system permit (# 3530230). The water treatment system was approved to treat the water at a rate of 15 gallons per minute (GPM) with a pumping rate of 7.5 gpm or 10,800 gallons per day. The average daily usage rate in 2013 and 2014 was 2,308 gallons per day.

No petroleum or hazardous materials will be stored in the existing or proposed warehouse expansion space, with the potential to impact the underlying shallow or bedrock aquifers. The fire safety consultant has recommended an emergency service fuel oil storage tank to service fire safety pumps. Any on-site fuel oil tank will have secondary containment and be installed according local and NYSDEC petroleum storage tank regulations.

The proposed stormwater management facilities for the expanded warehouse space and parking areas are designed to treat the stormwater run-off from new pavement, including minor leaks of petroleum from vehicles onto pavement.

No further groundwater mitigation measures are required or proposed for the planned warehouse expansion.

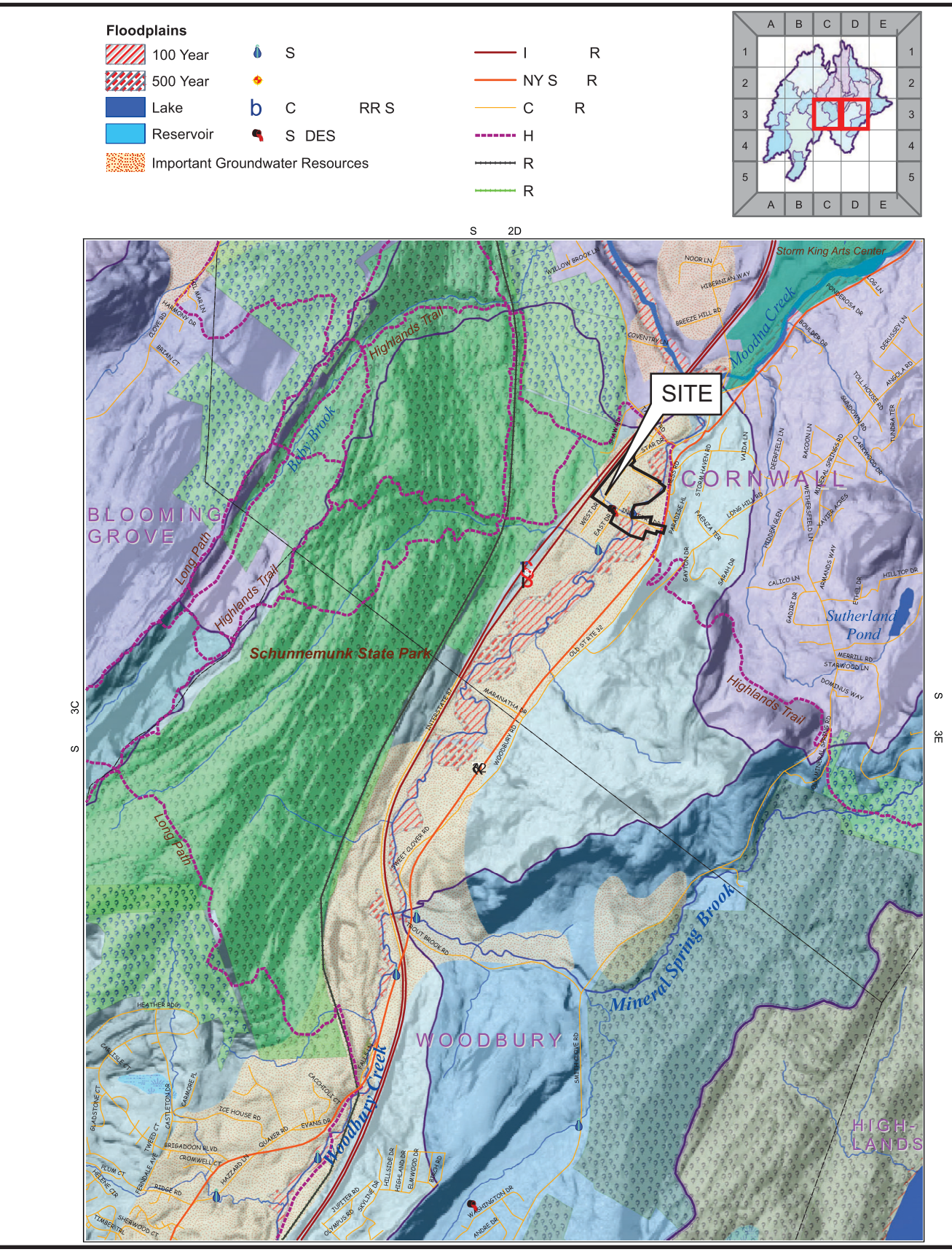

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Figure 3.2-1: Groundwater Resource Map

Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: Moodna Creek Watershed Atlas, 2008

File 20018 Figure 3.1-2

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

3.3 ECOLOGY (FLORA AND FAUNA)

The 36.9 acre subject site is the location of an existing warehouse facility with associated parking and outbuildings. The eastern boundary is the relatively undisturbed Woodbury Creek corridor. South of the site is another warehouse facility, to the north is a residential development. The New York State Thruway forms the western boundary of the site, separating it from the natural lands associated with Schunnemunk Mountain to the west. According to the NYSDEC database (EAF Mapper) no portion of the property is a designated significant natural community, and no rare or threatened plants are known to occur in the area.

3.3.1 Existing Conditions

Vegetation Existing Conditions

Site observations were conducted by Steve Marino, PWS of Tim Miller Associates in May and July of 2021. Dedicated wildlife and vegetation inventories were conducted on July 25, 2021. The inventory date included five hours of time in the field. The investigation employed a series of random/zig-zag transects with observation, listening, and/or ground searches being conducted as site specific features changed along the walking transect route. The random nature of these transects allowed the investigator to observe and actively investigate features of interest along the way. This tactic also allowed data to be collected from a greater variety of micro-habitats. The following conditions were noted.

The site is relatively flat from west to east and north to south throughout development area, with a hillock to the east of the existing building. This hill contains an existing residence and a cell tower enclosure. Along the eastern edge the property slopes down steeply to the stream corridor. The majority of the development area is maintained as managed lawn, with sparse landscaping around the existing building (see Aerial Photo, Figure 3.3-1). Vegetation outside of the development area is characterized by a wooded fringe along the edges of grass areas east of the site access road. Trees along this wooded edge include black walnut, mulberry, black locust, Norway maple and occasional oaks and red maple. Grasses and forbs are dominated by clover, lesser celendine, plantain, and several species of wildflowers. The 1994 infrared aerial photo (Figure 3.3-2) shows the extent of the managed landscape and previously disturbed areas of the site. This photo also clearly shows the wooded area in the northeast corner of the site. It also shows a former parking lot southeast of the existing building, which is now lawn area.

The location of the proposed building extension is currently maintained as a gravel parking area (Figures 3.3-1, 3.3-2 and the attached photos). A few small trees along the north side of the existing building will be cut to connect the new extension. No other trees are expected to be cut for this proposal. The location of the proposed stormwater treatment basin is maintained as lawn/meadow.

The stream corridor along the eastern boundary of the site has similar woody vegetation along its banks. Site observations and historic aerial photos show that much of the stream corridor was filled, resulting in steep banks and opportunistic vegetation growing in this area. The rapid flow of water in the stream prevents any vegetation from growing within the channel itself.

A table of those plant species that were observed on the site is provided below.

Table 3.3-1 Project Site Vegetation	
Common Name (*Scientific name*)	
TREES	**SHRUBS**
Red oak (*Quercus rubra*)	Buckthorn *(Rhamnus cathartica)*
Pin oak (*Quercus palustris*)	Multiflora rose (*Rosa multiflora*)
Mulberry *(Morus alba)*	
Sycamore *(Platanus occidentalis)*	**FORBS AND VINES**
Magnolia *(Magnolia acuminata)*	Mugwort (*Artemisia vulgaris*)
Red maple (*Acer rubrum*)	Celendine *(Ranunculus ficaria)*
Norway maple *(Acer platanoides)*	Broadleaf plantain *(Plantago major)*
Japanese yew *(Taxa baccata)*	Narrowleaf plantain *(Plantago lanceolata)*
Catalpa *(Catalpa speciosa)*	Bachelor's button *(Centaurea cyanus)*
Black walnut *(Juglans nigra)*	Grape (*Vitis spp.*)
Black locust (*Robinia pseudoacacia*)	Pokeweed *(Phytolacca americana)*
Eastern cottonwood (*Populus deltoides*)	Queen Anne's lace *(Daucus carota)*
Black cherry (*Prunus serotina*)	Poison ivy *(Toxicodendron radicans)*
Slippery elm *(Ulmus rubra)*	Cow parsnip *(Heracleum maximum)*
Eastern hemlock *(Tsuga canadensis)*	Bittersweet *(Celastrus orbiculatus)*
Green ash *(Fraxinus pennsylvanica)*	Virginia creeper *(Parthenocissus quinquefolia)*
Tree of Heaven (*Ailanthus altissima)*	Dandelion (*Taraxacum officinale)*
	Red clover *(Trifolium pratense)*
GRASSES AND SEDGES	White clover *(Trifolium repens)*
Cattail *(Typha latifolia)*	Yarrow (*Achillea millefolium*)
Barnyard grass *(Echinocloa crus-galli)*	Goldenrod species (*Solidago* spp.)
Redtop *(Agrostis gigantea)*	Bedstraw species (*Galium* spp.)
Fescue *(Festuca spp)*	Curly leaf dock *(Rumex crispus)*
	Butter and eggs *(Linaria vulgaris)*
	Daisy fleabane *(Erigeron strigosus)*
	Milkweed *(Asclepsias syriaca)*
	Purple loosestrife *(Lythrum salicaria)*
	Lamb's quarters *(Chenopdium album)*
Note: Species observed during site visits - 5/25/21 and 7/26/21	

Wildlife Existing Conditions

No rare or unusual wildlife species were observed on the site. During the two days of observations, only eastern gray squirrels (*Sciurus carolinensis*), chipmunk (*Tamias striatus*), woodchuck (*Marmota monax*) and common resident bird species were observed. This is not unusual considering the site's current use and the amount of managed landscape surrounding the existing building. The area of the proposed warehouse expansion does not provide any wildlife habitat value.

The level of past site disturbance is reflected in the habitat potential and number of species that are expected to be observed on these parcels. Green frogs, American toads, raccoons, garter snakes and other small mobile species may utilize the wetland corridor system. Some of the smaller bird species (wrens, sparrows, bluebirds) likely feed on the seeds of the grasses and wildflowers that are found on the site.

Regarding threatened or endangered species, the DEC Environmental Resource Mapper identifies one reptile species (timber rattlesnake, *Crotalus horridus*) and two bat species (northern long-eared bat (*Myotis septentrionalis)* and Indiana bat (*Myotis sodalis*)) as being known to occur in the area of the site.

Timber rattlesnake (*Crotalus horridus*). The timber rattlesnake utilizes several different habitat types during its annual lifecycle. Because timber rattlesnakes must hibernate in order to survive the winter months, the hibernacula or den is a particularly crucial habitat component. Dens are typically located in very mountainous or hilly regions. Reported elevations from known dens range between 500 and 1640 feet above sea level. Most dens in the northeast occur in steep rock outcrops, talus slopes, cliff and ledge communities and along rocky crests. Fissures and crevices in the exposed bedrock create underground chambers that extend down below the average frost line. Timber rattlesnake dens generally have a southern, southwestern, or southeastern exposure. This is thought to create a more favorable thermal environment by maximizing the amount of solar radiation that the den receives.

Transient habitat is generally defined as the rough and rocky terrain that is within approximately 650 feet of the den. A considerable portion of this habitat is covered by scattered rock outcrops, slab rocks and/or talus rock. These rocky conditions favor a plant community that is particularly open and sparsely forested. Common species include various grasses, sedges and low herbs, as well as several shrubs like mountain laurel (*Kalmia latifolia*), blueberry (*Vaccinium* spp.) and huckleberry (*Gaylussacia baccata*). One researcher has described these areas as grassy mixed-hardwood knolls.

Males and non-gravid females typically leave the transient habitat in early summer to move into their summer foraging habitat. Movement through this foraging habitat appears to be continuous throughout the remainder of the active season and frequently encompasses large areas of the landscape surrounding the den.

As noted above, the NYSDEC indicated that rattlesnakes have been recorded within some distance of the subject property. Based on an analysis of existing aerial photography and existing on site conditions the elevation, landscape, and geologic conditions do not meet the requirements for snake habitat. The undisturbed forest and rocky terrain west of the Thruway, associated with Schunnemunk Mountain (see Figure 3.3-3) are the likely location of the rattlesnake observations, but the presence of the New York State Thruway would prevent the movement of snakes east to the subject property. While it is possible that snakes could move through the existing culvert system under the thruway as part of annual foraging movement, it is unlikely given the lack of suitable habitat waiting on the east side of the highway.

Indiana and northern long-eared bats. The New York State DEC fact sheet for Myotis bats describes the habitat requirements as follows:

The myotis bats (Northern long-eared and Indiana) “spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems

opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures like barns and sheds."

This type of habitat does not exist in the area of the proposed site improvements. No hibernacula are available on the site, and no significant trees meeting the description of the summer roosting trees will be cut for the proposed building extension.

3.3.2 Potential Impacts

The proposed area of warehouse expansion and ground disturbance, including for the warehouse, parking areas, emergency access and stormwater basin currently consists of previously disturbed lawn area or gravel or asphalt parking lots. These areas currently provide no significant habitat for local flora or fauna. No trees will be removed for the proposed development. The existing wooded fringe and stream corridor habitat in the eastern portion of the site will remain undisturbed by the proposed development.

3.3.3 Proposed Mitigation

Since no undisturbed habitat or areas of significant vegetation or potential habitat value will be disturbed by this proposal, no mitigation for potential adverse impacts to vegetation or wildlife is proposed is required.

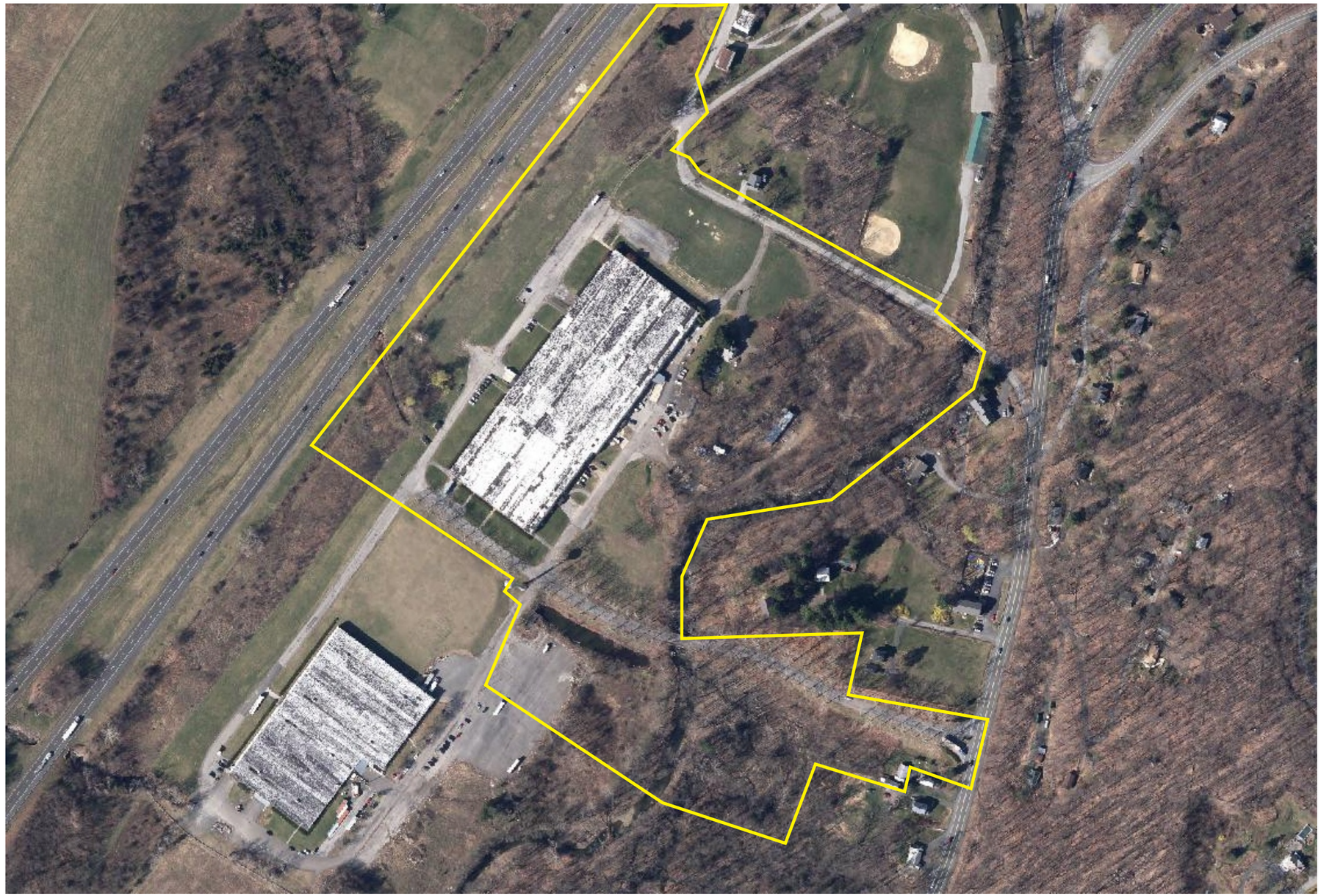

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Figure 3.3-1: 2016 Aerial Photo
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: New York State GIS Orthoimagery

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Figure 3.3-2: 1994 Infrared Aerial Photo
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: New York State GIS Orthoimagery

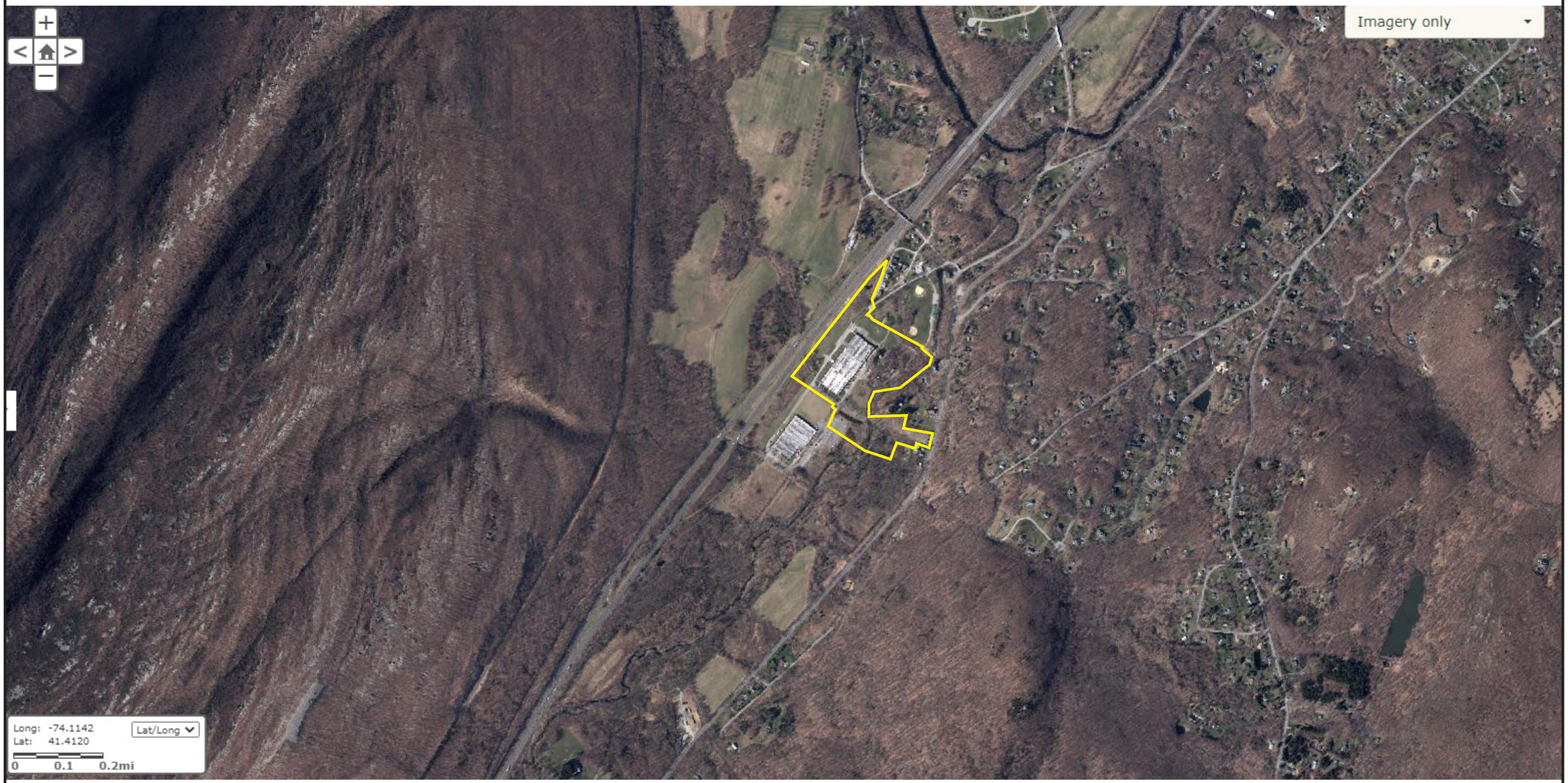

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Figure 3.3-3: 2016 Aerial Photo, Wider Shot
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: New York State GIS Orthoimagery

3.4 TRANSPORTATION

This transportation section provides a summary of the Transportation Study for the Star Warehouse expansion, June 28, 2022. The full Transportation Study and technical documents were completed in 2022 and are provided as Appendix G of this DEIS.

3.4.1 Existing Conditions

The subject property contains an existing 184,835 square foot warehouse located at 20 Industry Drive. The subject site is located off of Industry Drive, a private road, which also services the adjacent 19 Industry Drive with 129,000 Square feet of warehouse space, which is not part of this project. The combined square footage of the two properties is approximately 314,835 square feet. An existing single family residence and a cellular telephone tower near Creamery Hill Road are also located on the subject property.

The project site is located off of NYS Route 32 in the southern portion of the Town of Cornwall, Orange County, New York. The location of the site is shown on maps in Figures 1 and 2. The project site has parking on the east and west sides of the building.

NYS Route 32 is a two lane road paralleling Interstate 87 (The Thruway) in eastern Orange County. NYS Route 32 is classified by New York State Department of Transportation (NYS DOT) as a urban minor arterial and has one eleven foot travel lane in each direction. The speed limit on NYS Route 32 is 55 miles per hour in the area of the project site.

Interstate 87 (The Thruway) parallels NYS Route 32 with interchanges at Interstate 84 in Newburgh and Route 17 (Soon to be Interstate 86) Harriman interchange. The Thruway provides for regional north south travel in this section parallel to NYS Route 32. With the presence of Interstate 84 most regional traffic does not use NYS Route 32 between the City of Newburgh and Harriman in this area. NYS Route 32 widens out near Woodbury Commons in southern most part of the Town/Village of Woodbury.

The project site has a single primary access point onto NYS Route 32, from Industry Drive. Industry Drive is a private road, approximately 30 feet in width, which provides access to the site (20 Industry Drive) and an adjoining warehouse property to the south at 19 Industry Drive. The subject property has a second access drive to Creamery Hill Road to the north, which also accesses NYS Route 32. The Creamery Hill driveway is typically not used by employees, visitors or deliveries to and from the site.

Existing Peak Hour Volumes

Traffic counts were collected at the single studied intersection, NYS Route 32 and Industry Drive. Hourly volume data was obtained on April 6, 2022, 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. at NYS Route 32 and Industry Drive as shown in Appendix G, Attachment B. The traffic analyses is based upon traffic flow rates that are represented by the fifteen minute flow rates in the peak hours. Peak hour factors are adjustments to increase traffic flows to the 15 minute peaking characteristic of the location. Existing peak hour turning movement volumes at the intersection of Industry Drive and NYS Route 32 are shown in Appendix G, Attachment A Figure 2.

Effects of Covid-19 Pandemic

Traffic data from the New York State Department of Transportation's count station on NYS Route 32 pre Covic-19 were compared to more recent data in the same section of roadway to determine the impact of the Covid-19 pandemic on 2022 traffic counts. This Covid-19 pandemic review is provided in Appendix G, Attachment C with background data in Appendix D. The review concluded that no adjustment was needed for the existing April 2022 traffic.

Accident Data

Region 8 Orange County data covering 2016 and 2017, the most recent data available, was examined for High Accident Locations (HAL) extending into Route 32 within one- half mile of the site (Stations 32 83011066 to 32 83011075) in either direction. HAL locations include Priority Investigation Locations (PIL) Safety Deficient Locations (SDL) and Priority Investigation Intersections (PII) locations. The 2017 data showed no PIL, SDL, nor PII locations in this mile section of road.

Accident data from 2016 to 2021 was review for the three tenth miles sections at the Industry Drive intersection with NYS Route 32. Appendix G, Table 2 provides a summary of vehicle collisions near the Industry Drive intersection and causes. The three tenth of a mile sections had on average one (1) vehicle collision with another vehicle per year and none reported with trucks. Of 20 collisions reported over a five year period, 15 were with animals or off road objects.

NYS Route 32 Road Speed Study

The speed of vehicles traveling on NYS Route 32 is important for assessing the safety of future vehicles entering and exiting the project site. The speed limit on NYS Route 32 is 55 miles per hour in vicinity of the Industry Drive.

A speed survey was conducted on NYS Route 32 approaching Industry Drive. The 85th percentile speeds (the speed at which 85 out of every 100 vehicles are driven at or under) is typically considered as the design speed

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Vehicle speeds approaching Industry Drive during clear, daylight, uncongested conditions are 59 miles per hour northbound and 56 miles per hour southbound.

Industry Drive Sight Distance

Sight distance is typically defined as the distance a motorist can see objects or approaching vehicles before their line of sight is blocked by an obstruction. Stopping sight distance is defined as the distance needed for drivers to see an object on the roadway ahead and bring their vehicles to a complete stop before colliding with the object. Stopping sight distance is derived using vehicle speed and also accounts for the vertical geometry of the road (grades). While stopping sight distance is "*fundamental to intersection operation*"[1], "*To enhance traffic operation, intersection sight distance that exceed stopping sight distances are desirable along the major road*".[2] The speed data near the Industry Drive driveway, described above was used for the estimation of stopping sight distance and intersection sight distance.

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[1] American Association of Transportation and State Highway Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, 7th Edition, 2018, page 9-35.

The project engineer (Pietrzak & Pfau, PLLC) surveyed the sight distance at the Industry Drive shared driveway and found the distance to be 550 feet to the north and 585 feet to the south. These distances meet the stopping sight distance criteria for the "all conditions" 85th percentile speeds for both northbound and southbound traffic (see Appendix G -Table 4).

3.4.2 Future No-Build Traffic Conditions

Typically a project's traffic impact is determined by comparing future traffic conditions without the project's traffic (the 2024 No-Build Condition) to traffic conditions with project-generated traffic (the 2024 Build Condition).

No-Build traffic conditions are ascertained based on a number of factors: (1) improvements in the local road network that are planned or underway; (2) traffic from general population growth in the local area and, (3) traffic from identified development projects in the project site vicinity excluding the Star Warehouse project. The two future conditions, No Build Condition and Build Condition, provides for identification of both the cumulative impact and the specific impacts of the Project, as required by SEQR.

The Orange Country Transportation Council Federal Fiscal years 2020-2024 Transportation Improvement Program did not list any proposed projects on NYS Route 32 in the Town of Cornwall.

Background growth of 0.5 percent annually over three years was added to the No-Build and Build volumes to account for local growth and other projects not included in the list of No-Build projects.

The Town of Cornwall was contacted with regard to proposed projects before the Town Planning Board and the projects included the Storm King Art Center expansion and the Treetop Warehouse. These two projects and the background growth factor were used to establish the No-Build traffic conditions for the intersection of Industry Drive and NYS Route 32 (see Appendix G, Attachment A Figure 3).

3.4-3 Future Build Traffic Conditions

Project Trip Generation and Distribution

The Applicant, proposes a 50,000 square foot expansion of the existing warehouse building, which has 185,835 square feet of space. Industry Drive is used by the 185,835 square foot existing Star warehouse and by the adjacent warehouse with approximately 131,500 square feet of space. The total warehouse space currently utilizing Industry Drive is 317,335 square feet. The trip generation rates during the peak hour are shown in Appendix G - Table 9. The actual trip rate is based on the total square footage of all the buildings using Industry Drive and traffic using Industry Drive, as counted in April 2022. The actual counted trips rates more closely match the rates for typical "Warehouse" as opposed to "Light Industrial use".

The Light Industrial use rates were included to provide a sensitivity analysis, as requested by the Town of Cornwall. The trip generation rates for Light Industrial uses are higher than for Warehouse uses (see Appendix G - Table 9). These rates were used to both generate traffic for

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[2] Ibid.

the site, and to analyze the future level of service at the studied location. The use of Light Industrial rates provides a "worst case" traffic generation scenario. Future Parking and Loading

Future Loading

The number of loading areas required is based on discussions between the Planning Board and Applicant, according to the Town Code (158-16B (38). There are currently 11 tractor trailer loading bays at the warehouse and four (4) new loading bays are proposed.

Future Parking

The estimates for the required number of proposed parking spaces are based on the newly proposed warehouse square footage and not on employees. Proposed future parking is discussed in Section 5.0 of the Transportation Study (Appendix G).

The Parking Generation Manual (Institute of Transportation Engineers 5th Edition, January 2019) provides estimates for parking based upon Warehouse studies (ITE Code 150). The Parking Generation Manual indicates an average parking rate of 0.39 spaces per 1000 square feet and 0.47 spaces per 1000 square feet at the upper 95% confidence level. These rates equate to 93 spaces on average and 111 for the 95th percentile. A total of 110 parking spaces are proposed. The proposed parking meets the existing rate of parking per 1000 square feet and is nearly double the minimum rate allowable.

3.4-4 Level of Service Conditions

Existing Conditions Level of Service

Level of service is a grade descriptor A to F, of how well intersection movements work using delay as the primary operating characteristic. As delays increase so does driver frustration. Volume to capacity ratio is also used as determinate of level of service. Level of service criteria is described in Appendix G - Attachment H.

The level of service was determined for Industry Drive at NYS Route 32 for the Existing condition. The level of service analyses for this location is provided in Appendix G Attachment I.

All of the studied intersection lane groups operate with additional available capacity and operate at the most efficient levels of service A to B during the a.m. peak hour and level of service A to C in the p.m. peak hour. Level of service is summarized in the Transportation Study (Appendix G - Table 14).

No-Build Level of Service

In the No-Build condition, the level of service at the studied intersection can be expected to remain at efficient levels of service A to C with no change in level of service from the Existing Condition (see Appendix G - Table 14).

Build Condition and Sensitivity Analysis at Industry Drive and US Route 32

The Project site is projected to add 10 trips in the a.m. peak hour and 11 trips in the p.m. peak hour. The sensitivity analysis using light industrial for the expansion would add 38 trips in the a.m. peak hour and 24 trips in the p.m. peak hour.

The level of service will remain unchanged from the Existing Condition through both the Build condition (proposed Warehouse use) and Sensitivity Build Condition (treating the 50,000 square feet as light industrial) (See Appendix G - Table 14).

3.4-5 Mitigation

The proposed project will result in the reconstruction of the site access including the removal of an existing island. A replacement sign will be placed further from the travel lanes and out of the state right-of-way. These site access changes are subject to New York State Department of Transportation Highway Permit Approval. These improvements are intended to improve safety. As part of the proposed expansion, Industry Drive would be resurfaced in its existing footprint. The existing guiderail that runs along Industry Drive near Woodbury Creek will be replaced.

New wayfaring signs are proposed primarily to help new truck drivers, new employees, and package mail delivery drivers and will include direction to 19 Industry Drive not only at the entrance but at the two junctions as vehicles traverse Industry Drive.

The proposed parking and loading is more than adequate to meet zoning requirements. The land banking of 130 spaces provides assurance that the facility parking needs can be met in the future. The newly proposed parking and loading areas will be delineated with pavement markings as part of the construction process. Land banking of spaces is an environmental mitigation to reduce impervious pavement when applicable. Land banking can be permitted under 158-16 A (7)(c) of the Cornwall Town Code.

The emergency access at the northwest corner of the property connecting to Star Road will be improved. This emergency access is currently an unpaved road with no controls. The drive will be paved and will be gated and locked to prevent unauthorized use. A standard Town of Cornwall emergency service lock box will be used at the emergency access.

A number of accidents near the site involved vehicles running off the road, and the cause of those accidents is unknown. The Applicant will work with NYSDOT for the removal of any vegetation in the NYS Route 32 right-of-way near the site entrance, which may improve safety.

The applicant will work with the NYSDOT regarding any necessary driveway warning signs and associated TRUCK or other auxiliary plates as part of the Highway Work Permit.

3.5 HISTORICAL AND ARCHEOLOGICAL RESOURCES

3.5.1 Existing Conditions

As described herein, the 35.4 acre subject site has been developed with a warehouse since the late 1950's. The single residence on the property is shown in a 1940 aerial photograph and likely dates from the early 1900's, similar to nearby homes and structures in the hamlet of Mountainville. The aerial photo from 1940 shows fields and an orchard on the property as well as woods surrounding Woodbury Creek.

The project site is near two properties listed on the National Register of Historic Places: the Elias Hand House and the Mountainville Grange. This information is based upon a resource review and information provided by the NYS Office of Parks Recreation and Historic Preservation (OPRHP).

The Elias Hand House is a historic home located adjacent to the subject property, directly north of Industry Drive and west of the Woodbury Creek. It was built about 1830 and is a one and one-half story, clapboard-sided wood-frame dwelling in the Greek Revival style. Also on the property is a contributing wood-frame barn. It was listed on the National Register of Historic Places in 1998[1].

The Mountainville Grange Hall is located on Route 32, between Creamery Hill Road and Industry Drive. It is a two-story wood framed meeting hall built in 1904. The property was added to the National Register in June, 1996. It was a meeting place for the local Mountainville Grange chapter and as an informal community center until the 1960's[2]. It was used by the Masonic Lodge in the 1980's and 1990's and is currently used as a day care center.

The NYS Office of Parks Recreation and Historic Preservation (OPRHP) provided a letter dated September 22, 2016, that the proposed project will have "No Adverse Impact upon adjacent historic properties. In addition, there are no archeological concerns associated with this project". This letter was in response to a site plan and information provided by the project engineer in 2016 (see Appendix B - Correspondence).

3.5.2 Potential Impacts

The proposed building expansion will involve the grading of approximately 2.6 acres of mostly disturbed land. The grading and excavation has the potential to disturb archeological cultural resources, should they be present on the property. Two properties on the National Register of Historic Places are located near the property: the Elias Hand House and the Mountainville Grange Hall.

After reviewing the proposed warehouse expansion site plan in 2016, the NYS OPRHP found the project to have "No Adverse Impact" to both archeological and historic resources. The current site plan and photos of the area of proposed disturbance were recently submitted to the OPRHP for a confirmation of their 2016 determination.

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[1] National Register of Historic Places; Elias Hand House, NYS OPRHP, May, 1998

[2] National Register of Historic Places, Mountainville Grange Hall, NYS OPRHP June, 1996

The OPRHP recently provided two letters of determination in response to TMA's request for comments on the proposed Site Plan. The letter from August 16, 2021 acknowledged that the project area is adjacent to the Elias Hand House, which is listed in the State and National Registers of Historic Places. Based upon a review of recently submitted information the OPRHP, the Technical Preservation Unit "has no concerns regarding above ground / architectural resources". The letter dated August 17, 2021, indicates it is the opinion of the OPRHP "that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project". The letters from OPRHP are provided in Appendix B - Correspondence.

3.5.3 Mitigation Measures

Based on the determination by OPRHP, the project will have no adverse impact to archeological or historic resources. Therefore, no mitigation measures are warranted or proposed.

3.6 COMMUNITY FACILITIES AND SERVICES

3.6.1 Existing Public Services

The proposed warehouse expansion would involve the construction of a 50,000 square foot addition to the existing 185,835 square foot warehouse, resulting in a total square footage of 235,835 square feet. This is an increase in square footage of approximately 27 percent. The nature and schedule of site operations is not expected to change from the existing operations. In general, the warehouse facility stores and distributes dry goods that are manufactured off-site.

The warehouse expansion will create an incremental increase in the demand for community services, specifically by emergency services, including police, fire protection and emergency medical services. Since the project is not residential, the on-site facilities create no demand for school services and will not in the future.

Police Department

The Town of Cornwall Police Department serves the Town to provide peace and security for Town residents. The Department operates 24-hours per day out of 183 Main Street, Cornwall, New York. According to the Town website the Department has a staff of 20 officers and civilian employees. The Chief of Police is responsible for the operation of the department. The Department works closely with other law enforcement agencies on the Local, County, State and Federal levels, including the Orange County Sheriffs Department and the New York State Police.

Fire Department

The Star Warehouse site is served by the Cornwall Fire Department and the Cornwall Volunteer Ambulance Corps. The Cornwall Fire Department is a volunteer department that serves the residents of the Town of Cornwall, Mountainville and Salisbury Mills. The Department, providing 24-hour per day coverage has three companies and respective firehouses and equipment to serve the Town. Highland Engine Company #1 is located at 1 Quaker Avenue in the Town of Cornwall. Mountainville Engine Company #3 is located at 10 Star Road in the Hamlet of Mountainville, approximately 700 feet north of the subject property on Star Road.

Ambulance and Health Services

The Cornwall Volunteer Ambulance Corps. provides emergency medical service to the residents of the Town of Cornwall, Village of Cornwall-On-Hudson, Mountainville and Salisbury Mills. The Ambulance Corps has a combination of both volunteer and career staff to provide 24 hour coverage to the service area. The Corps has offices at 1 Clinton Street in the Town of Cornwall.

According to the facility manager, approximately 3 emergency service calls havee been made for 20 Industry Drive over the past five years, including traffic accidents, medical emergencies or fire calls.

Solid Waste

Currently, solid waste generated at the Star Warehouse facility is regularly collected and disposed of by a commercial waste contractor, County Waste of Montgomery. Designated waste collecting containers are located near entrances around the building. The waste generated at the warehouse is generally commercial packaging waste. No hazardous waste is generated at the warehouse facility.

3.6.2 Potential Impacts to Public Services

The proposed warehouse expansion will increase the storage space and capacity at the warehouse, incrementally increasing the need for emergency services, as compared to existing conditions. As described, the expansion would increase warehouse space by 50,000 square feet or by approximately 27 percent. According to the applicant, the expansion is not expected to increase employees at the warehouse facility. Increased traffic may result in accidents either on-site or potentially off-site for facility related vehicles traveling to or from the site. The 2022 Transportation Study indicates that the expansion will result in an increase in all traffic of 11 vehicles in the a.m. and p.m. peak hours (including trucks). This is a relatively low increase in traffic and therefore, emergency calls related to project traffic are also anticipated to be low. Emergency medical or fire emergency calls are expected to remain infrequent for the warehouse, based upon the no specific changes in the use or operation of the warehouse, with the exception of expanded storage space.

Solid waste will continue to be collected on a regular basis by County Waste of Montgomery following the warehouse expansion. A designated area and containers for waste collection will be provided for the new space.

Overall, the warehouse addition is not expected to substantially increase emergency calls or the demand for public services.

3.6.3 Mitigation Measures

Section 3.11 Emergency Services provides and discussion of Emergency Services and proposed improvements to the site's overall emergency services infrastructure, including: a new 250,000 gallon water storage tank for fire protection water service, new fire pumps to provide adequate pressure to fire hydrants and the new building sprinkler system, and a fire protection sprinkler system to serve the proposed addition as well as the existing warehouse space.

In addition, a new paved emergency access will be provided from Star Road, at the north end of the site. The site entrance at Industry Drive and NYS Route 32 will be reconstructed to remove an island and relocated the entrance sign. These improvements to the entrance are expected to improve access and safety for all vehicles, including emergency service vehicles accessing the site.

The above facility improvements will enhance the ability of the Town emergency response agencies, especially the Town of Cornwall Fire Department to respond to any emergency or fire incident at the Star Warehouse facility.

3.7 VISUAL RESOURCES

3.7.1 Existing Conditions

Development Site Location - Visual Context

The Star Warehouse property site is located in the west central portion of the Town of Cornwall, between NYS Route 32 to the east and Interstate 87 to the west. Interstate 87 carries regional traffic northeast to southwest through the Town, while NYS Route 32 carries more local traffic in generally the same corridor. These roads parallel Woodbury Creek and Moodna Creek to the north which form a river valley containing the property. Woodbury Creek runs through the subject site. The property is in a rural mixed use area containing residential, commercial and parkland uses and the adjacent hamlet of Mountainville to the north.

The subject property site is located in a mixed-use area of commercial, industrial and low-density residential development, undeveloped land and transportation uses, as shown in Figure 2-2 Aerial Photo. The land uses in the area are predominantly low density residential, although the subject site has supported manufacturing and warehouse uses since the 1950's. The adjoining 19 Industry Drive property was developed with similar warehouse space in the 1960's. The subject property is located in the Planned Industrial Office (PIO) Zoning District. This district is located between NYS Route 32 and Interstate 87.

The property is currently developed with the existing warehouse building, approximately 185,355 square feet in size. Driveways and parking areas are located on the east and west sides of the building and a gravel parking area and a grassed lawn are located in the area of the proposed warehouse addition. A single-family residence and a cell tower are located in the northeastern portion of the site, along with wooded land. Industry Drive, a parking lot and a water tower are located in the southern portion of the site.

The subject property is located in a river valley occupied by Woodbury Creek with the topographic ridge of Schunnemunk Mountain to the west and the Cornwall Highlands to the east. Topography on the project site is relatively level with the lowest elevations near Woodbury Creek at approximately 240 feet. Elevations near NYS Route 32 are at approximately 300 feet and slope gradually to the Creek and then rise to the area of the warehouse building at approximately 270 feet. A low hill is located directly east of the warehouse, the location of the cell tower. Interstate 87 is approximately 10 feet higher than the elevation of the warehouse elevation, in the vicinity of the building.

Views of the site would be experienced predominantly by occupants in vehicles using the nearby roadways in routine daily travel, such as to and from work. Viewers on Interstate 87 would be traveling at highway speeds and viewers on NYS Route 32 would also be traveling at moderate speed.

The visual character of the NYS Route 32 corridor is rural residential and mostly wooded with limited commercial businesses along the road. Drivers on Interstate 87 have greater views of the surrounding mostly rural landscape with scenic views of Schunnemunk Mountain to the west and the Cornwall highlands to the east. The Star Warehouse building and the adjoining 19 Industry Drive building to the south may appear incongruous in the mostly rural landscape, but as described, the two large buildings have been part of the local landscape since the 1950's and 1960's. The round silver water tower on the property can be seen as a local visual landmark.

Views in the vicinity of the project site are depicted in photographs presented in Figure 3.7-1 Photographs. A key to the locations of the local viewpoints are shown in Figure 3.7-2. A key to the two viewpoints from Storm King Art Center are shown in Figure 3.7-3.

Views of the project site from nearby streets and public vantage points were reviewed during several site visits. The key views were selected to characterize views from nearby public roads and specifically from two nearby properties where scenic views of the landscape are important: Schunnemunk Mountain State Park to the west and the Storm King Art Center to the north of the site.

Schunnemunk Mountain State Park

Schunnemunk Park contains over 3,300 acres and includes the highest point in Orange County. The park is managed by the Palisades Interstate Park Commission and their non-profit partners, the Palisades Parks Conservancy. Hikers encounter elevations up to 1664 feet and views of adjacent valleys, portions of the distant Hudson River and surrounding forest and farm lands.

- Location 1 – This location is on the Sweet Clover trail which contains areas of unobstructed views of the Woodbury Creek / Moodna Creek valley, Interstate 87 and the Star Warehouse. Looking to the northeast, the Hudson River is visible in the distance from this vantage point. The Star Warehouse building is clearly visible in views toward the east but part of a vast valley landscape. A photo from Location 1 is provided in Figure 3.7-1, Photo 1.
- Location 2 – This location is from the Jessup / Sweet Clover trail which crosses a meadow with elevations above Interstate 87 and the Star Warehouse property. Similar to the views for drivers on Interstate 87, the existing Star warehouse building and water tower is a prominent feature in the views towards the southeast from this location. Opposite Creamery Hill Road, the Jessup /Sweet Clover trail turns toward the northeast away from Interstate 87 and views of the Star Warehouse property. A photo from Location 2 is provided in Figure 3.7-1, Photo 2.

Views from Local Roads

- Location 3 – This location is at the intersection of Taylor Road and NYS Route 32 facing in a southwest direction. For drivers on Route 32, the warehouse building is partially visible through trees during periods when leaves are not on the trees (late fall through early spring), although the building is mostly obscured by intervening vegetation. NYS Route 32 is at a higher elevation than the building floor elevation and therefore viewers look down across Woodbury Creek at the building. A photo from Location 3 is provided in Figure 3.7-1, Photo 3.
- Location 4 – Location 4 provides views of the property and building from Long Hill Road, a residential street located on the hillside directly east of the site. This location is approximately 2,000 feet from the building. Views of the building are largely obscured by intervening vegetation, although the water tower was visible through the trees. A photo from Location 4 is provided in Figure 3.7-1, Photo 4.
- Location 5 – Location 5 provides the most direct public views of the Star Warehouse building from local roads (northbound Interstate 87 provides direct views of the building). The southbound view from Location 5 shows the north side of the building and the field where the warehouse expansion is proposed. This view has no

intervening vegetation or screening. Photos from Location 5 are provided in Figure 3.7-1, Photos 5 and 6.

Storm King Arts Center

Storm King Art Center is a 500-acre outdoor museum located northeast of the Star Warehouse property, where large-scale sculpture and site-specific commissions from prominent national and international artists are placed in the landscape. According to the Storm King Art Center, the Center "has been dedicated to stewarding the hills, meadows, and forests of its site and surrounding landscape", since 1960. Therefore, the visual landscape near the Storm King Art Center is critical to its mission.

- Location 6 This location provides views from a hillside near the museum building. The topographic hill is identified as Museum Hill and the location provides open direct views towards the southwest across "South Fields" and towards the Star Warehouse property. The cell tower on the Star Warehouse property is visible on the horizon, but the warehouse building is obscured by intervening topography and vegetation. A photo from Location 6 is provided in Figure 3.7-1, Photo 7.
- Location 7 This location provides views from a low hill directly above the artist Maya Lin's Storm King Wave Field. The Wave Field is southwest of this location and further to the southwest are fields. The Wave Field is the southernmost art installation at the Storm King Art Center, and therefore the closest to the warehouse property. The cell tower on the Star Warehouse property is visible on the horizon from this vantage point, but the warehouse building is obscured by intervening topography and vegetation. A photo from Location 7 is provided in Figure 3.7-1, Photo 8. A topographic profile from this location towards the Star Warehouse site was created using GoogleEarth, and is provided as Figure 3.7-4.

3.7.2 Potential Impacts

The proposed warehouse expansion will introduce an addition to an existing warehouse building expanding the footprint of the building approximately 120 feet to the north. The building height in the new space will be increased from 20 to 40 feet. The grey metal siding will be similar in color and appearance to the existing building. Drivers on Interstate 87 who are familiar with the existing warehouse building will likely notice a change from the original building but not a significant alteration of local views or the landscape. The expansion will not introduce a new visual feature into the landscape, but rather expand upon a feature that has been part of the local landscape since the 1950's.

Development of the project will alter the visual character of a short portion of Star Road and Creamery Hill Road with a higher and more prominent building, closer to Creamery Hill Road. These views of the building will be limited to local residents and visitors to the Hamlet of Mountainville traveling on Creamery Hill Road.

Potential change in views from the seven key views identified above, are described as follows.

Schunnemunk Mountain State Park

- Location 1 – The expanded warehouse building will be visible for hikers on the Sweet Clover trail from vantage points that have direct views of the Woodbury Creek/Moodna Creek valley. As shown in Photo 2 the warehouse building is visible but part of a large landscape and at a distance of approximately 1.2 miles. From this vantage point, and similar points from the eastern ridge line of Schunnemunk Mountain the expansion is expected to be barely noticeable.
- Location 2 – The expanded building will be noticeable in the views towards the southeast from this location, but will be an extension of the existing large building and warehouse roof. The higher building roof line will be a change from existing views, but not a significant change from the views of the existing building and water tower, beyond Interstate 87 and below the rising elevations of Cornwall ridge to the east.

Views from Local Roads

- Location 3 – Views of the expanded building for drivers on NYS Route 32 from this vantage point will continue to be partially obscured by existing woods, between NYS Route 32 and the warehouse building. The proposed construction will not remove any existing vegetation.
- Location 4 – Views of the expanded building from this vantage point on Long Hill Road will remain largely unchanged due to the distance, intervening woods and topography. The building is generally not visible from this vantage point.
- Location 5 – Drivers on Star Road and Creamery Hill Road will observe a higher and more prominent building, closer to Creamery Hill Road. As indicated, existing views of the building are direct, across an open field. These views of the building will be limited to local residents and visitors to the Hamlet of Mountainville traveling on Creamery Hill Road.

Storm King Arts Center

Locations 6 and 7. The warehouse building addition is not expected to be visible from any vantage point at Storm King Art Center, based upon the distance and intervening topography and vegetation. Figure 3.7-4 shows a profile from a hill in the southern portion of the Storm King Art Center to the warehouse building. The proposed increase in building height from 20 to 40 feet will not be visible from the Art Center.

Signage

The proposed development will include the reconstruction of the site entrance at Industry Drive and NYS Route 32. An island will be removed and an entrance sign replaced and relocated to the south side of the entrance. The sign location is shown on Figure 2-6 Entrance Plan. The replacement entrance sign will be of similar size and construction as the existing sign but will be slightly further from NYS Route 32. This relocation will not be a significant visual change for drivers on NYS Route 32.

A new sign is proposed internal to the site to direct truck drivers and visitors to either 20 Industry Drive or the adjoining 19 Industry Drive building south of the site. This sign on the eastern portion of Industry Drive will not be visible to drivers on local roads.

3.7.3 Mitigation Measures

The proposed building expansion will result in a modest change in the views of the existing building from local vantage points, most prominently from Interstate 87, from the Jessup / Sweet Clover trail in the meadow above Interstate 87, and for drivers on Star Road and Creamery Hill Road adjacent to the property. The building addition will require an increase in height due to current warehouse storage practices. The location of the expansion is limited to the north end of the building by the configuration of the existing building and the property. The expansion will not introduce a new visual feature into the landscape, but rather expand upon a feature that has been part of the local landscape since the 1950's.

Landscaping may provide a limited softening of the building addition, but the building cannot be practically screened due to its size. Tree landscaping near the building is limited by proposed stormwater detention and treatment basin at the north side of the addition, near Creamery Hill Road. The applicant will develop an appropriate landscaping plan in consultation with the Planning Board during the site plan review process.

Figure 3.7-1 Existing Conditions Photographs
Star Warehouse Expansion, Town of Cornwall, NY

1) Location 1 - View towards project site from a vantage point on the Sweet Clover Trail, Schunnemunk Mountain State Park. Star Warehouse is the building left of the water tower, facing northeast.

2) Location 2 - View of Star Warehouse building from the Jessup / Sweet Clover Trail, Schunnemunk Mountain State Park. Interstate 87 is in foreground and the proposed expansion area is visible at the left end of the building, facing southeast.

Figure 3.7-1 Existing Conditions Photographs
Star Warehouse Expansion, Town of Cornwall, NY

3) Location 3 – View in direction of the Star Warehouse building, largely obscured by trees. The building is in the photo middle-ground below the horizon, facing southwest.

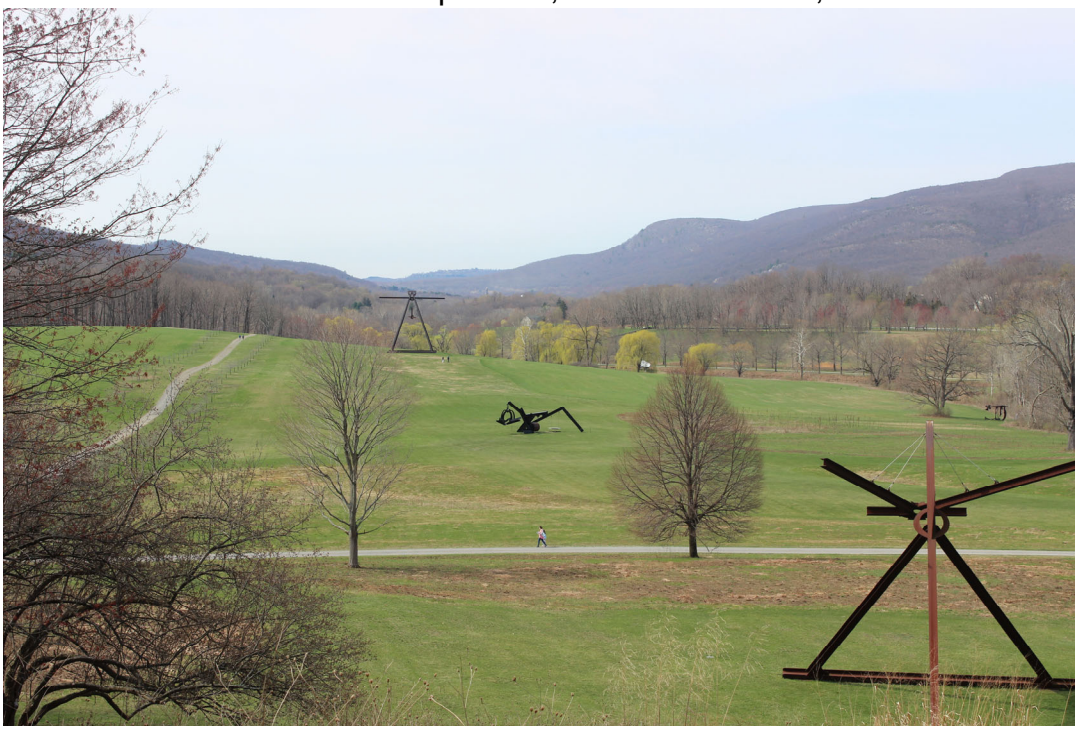
4) Location 4 – View towards project site from Long Hill Road with the Star Warehouse building in the middle-ground of photo. The silver water tower is visible at center left, facing northwest.

Figure 3.7-1 Existing Conditions Photographs
Star Warehouse Expansion, Town of Cornwall, NY

5) Location 5 View towards Star Warehouse from Star Road and Creamery Hill Road, facing south. The proposed expansion area includes the gravel area in photo, facing south.

6) Location 5 – Panoramic view of Star Warehouse and expansion area from Star Road and Creamery Hill Road, facing south.

Figure 3.7-1 Existing Conditions Photographs
Star Warehouse Expansion, Town of Cornwall, NY



7) Location 6 – View towards site from Storm King Art Center towards the south. The cell tower and water tank on the property are visible above the tree line at center of photo.

8) Location 7 – View towards project site from Storm King Art Center Wave Field. The cell tower on the property is visible at center of photo in tree line, facing south.

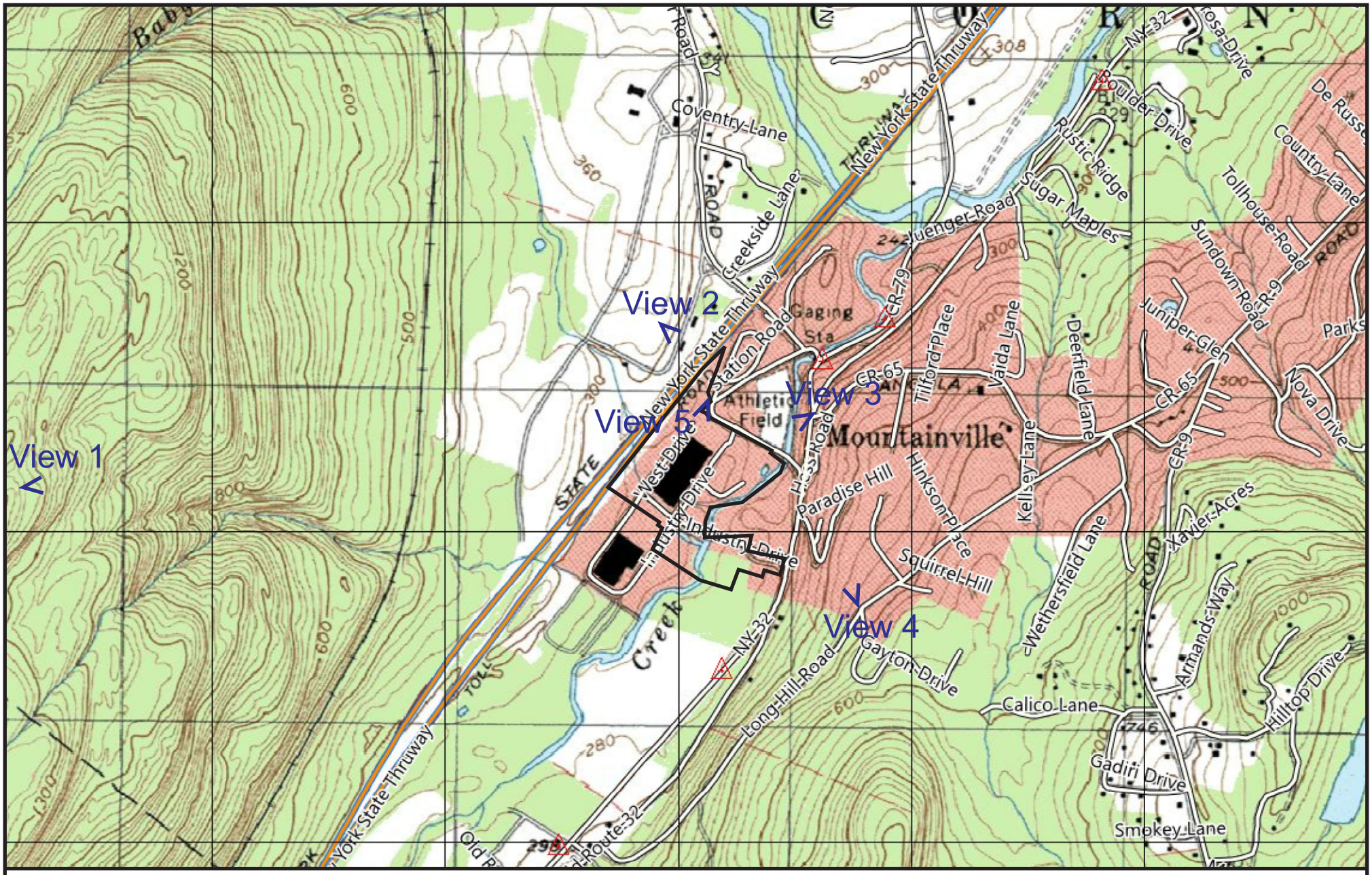


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Figure 3.7-2: Viewpoint Key - Local Views
Star Warehouse Property
Town of Cornwall, Orange County, NY
Base Map: USGS Cornwall Quad.

File 20018 Fig 3.7-2 08/23/2021

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

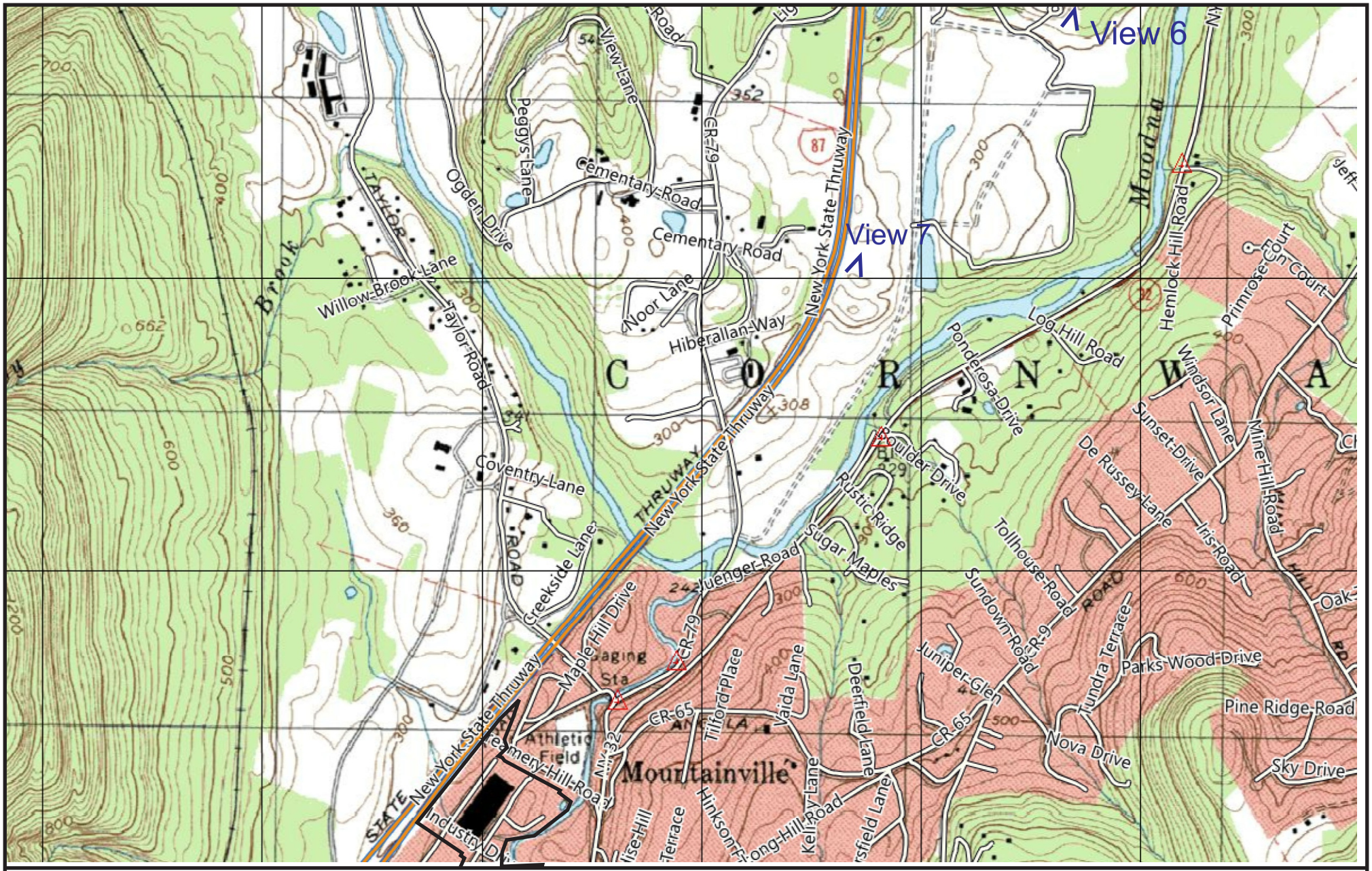

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Figure 3.7-3: Viewpoint Key - Storm King Art Center
Star Warehouse Property
Town of Cornwall, Orange County, NY
Base Map: USGS Cornwall Quad.

File 20018 Fig 3.7-3 08/23/2021

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

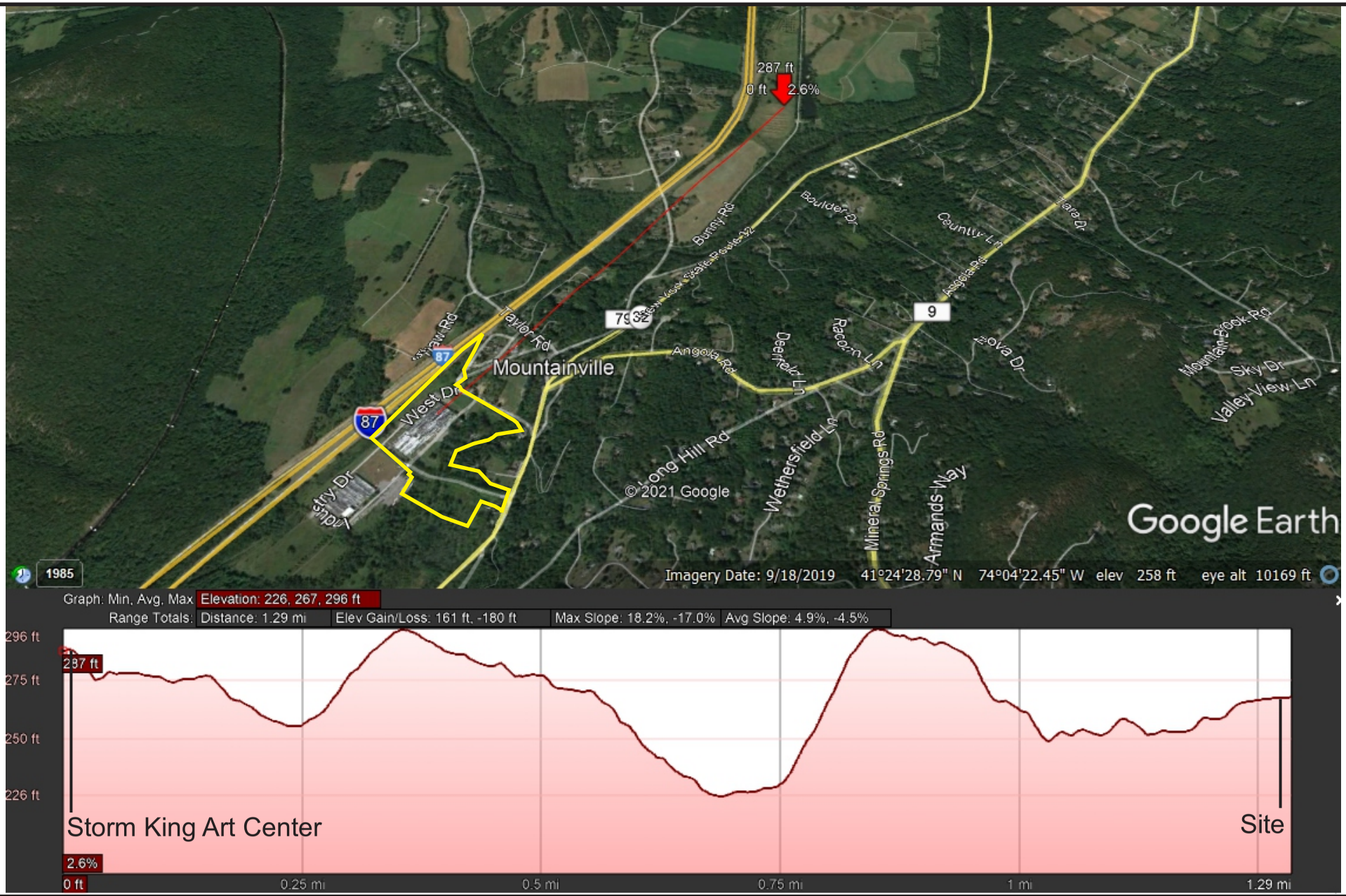

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Figure 3.7-4: Profile - Storm King Art Center to Site
Star Warehouse Property
Town of Cornwall, Orange County, NY
Source: Google Earth

File 20018 Fig 3.7-4 08/23/2021

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

3.8 HUMAN HEALTH

3.8.1 Existing Conditions

The subject property is a Class 2 Inactive Hazardous Waste Disposal Site (IHWDS) and has been assigned NYSDEC Site No. 336008. Environmental consultants, TRC Engineers, Inc. recently completed a *Remedial Investigation Report* for the property in September 2020[1]. The report investigated and describes soil, groundwater and soil vapor conditions for the site. The following description of site history, existing environmental characteristics and concerns are summarized from the *Remedial Investigation Report*.

A copy of the Remedial Investigation Report is provided in Appendix F.

According to the applicant, no petroleum or hazardous materials are currently stored at the project site. No petroleum storage tanks are registered for the property, according to the NYSDEC petroleum bulk storage and aboveground and underground petroleum storage tank databases.

Background

The existing conditions on the property and the local setting are described in Section 2.0 Project Description. The Site is currently utilized to store and distribute various dry goods manufactured off-site. The following summary of the historic site use is based TRC Engineers, Inc review of the Eder Associates *January 1995 Comprehensive Resource Conservation and Recovery Act (RCRA) Facility Investigation Work Plan* and available information on the NYSDEC IHWDS database. The historic use information provided below is summarized from the *Remedial Investigation Report*.

The Star Expansion Company (Star), the former occupant and owner, began operations in 1954 and manufactured a broad line of fasteners for residential, commercial and building industries. In 1997 Star Expansion Company filed for bankruptcy and abandoned the site. Star NewCo purchased the site out of bankruptcy in 1997 and entered into a Consent Order (D3-0001-96-12) with the NYSDEC to perform specific remedial work. In 1997 Star NewCo also filed for bankruptcy. The Site was then resold in 2004, again out of bankruptcy, to the current owner, Cornwall Properties, LLC.

Previous manufacturing activities performed at the site included metal cold forming, die casting, plastic injection molding, heat-treating, zinc plating, assembly, and packaging. Offsite supply wells provided both potable water and for manufacturing. Currently all water is obtained by on-site wells. A former waste water treatment plant (WWTP) discharged treated industrial waste water directly to the Woodbury Creek pursuant to a NYSDEC State Pollutant Discharge Elimination System (SPDES) permit.

Several environmental studies have been conducted for the property based upon former activities and uses from 1994 through 2020. These studies are summarized in the Remedial Investigation Report. Studies have identified elevated levels of VOCs in onsite soil, soil vapor, and groundwater. The NYSDEC has indicated that VOCs are the primary contaminants of

[1] Remedial Investigation Report; Former Star Anchors and Fasteners (a.k.a. Star Expansion) Site, TRC Engineers, Inc. September 16, 2020.

concern (COCs). Historically, metals have also been detected in soil and groundwater in limited areas.

In 1997 Innovative Recycling Technologies (IRT) and Hopekins Environmental Management, Inc. completed remediation activities of the most serious Areas of Concern on the property, including removing underground tanks and filterbeds associated with the former wastewater treatment plant, excavation and off-site disposal of soils related to waste lagoons, excavation and off-site disposal of former landfill materials and soil, capping of a former waste area, and the installation of monitoring wells. Since 2006 TRC Engineers, Inc has been involved with further site assessment and monitoring, including the completion of field pilot tests for a sub-slab depressurization system to reduce the potential for soil vapor migration into the warehouse building (2008). The 2020 *Remedial Investigation Report* provides the NYSDEC with a summary of previous work completed at the site and an assessment of overall environmental conditions at the property.

Site Areas of Concern

Previous environmental studies and the 2020 *Remedial Investigation Report* describe eight (8) Areas of Concern on the site. Table 3.8-1 is provided from the Remedial Investigation Report and summarizes the Areas of Concern and these areas are shown in Figure 3.8-1.

Table 3.8-1
Areas of Concern (AOC) Summary

Area of Concern No.	Nature of Concern	Current Status
AOC No. 1: FormerLandfill (SWMU-1)	Elevated metals and VOCs in soil; elevated VOCs in groundwater.	Soil remediation (excavation and offsitedisposal) was previously performed by others.
AOC No. 2: Former Waste Pile Area (SWMU-2)	Elevated VOCs in groundwater.	Soil remediation (grading and capping) waspreviously performed by others in this AOC.
AOC No. 3: Former Wastewater Treatment Area (SWMU-3)	Elevated VOCs and total petroleum hydrocarbons(TPH) in soil; elevated VOCsin groundwater. PotentialVOCs and SVOCs in soil and groundwater.	Soil remediation (tank decommissioning and excavation and offsite disposal) was previously performed by others in this AOC.
AOC No. 4: FormerScrap Metal/Waste Oil Storage Area	Potential elevated VOCs and metals in soil.	Prior to this RI, extent of VOC contamination,if any, was unknown.
AOC No. 5: Former Wastewater Treatment Area – East	Elevated TPH in soil. Potential VOCs and SVOCs in soil and groundwater.	Soil remediation was previously performed byothers in this AOC.
AOC No. 6: Former Solvent RecoveryStill/Oil Water Separator Area	Elevated VOCs in groundwater.	At the time of this RI, extent of VOC impactedgroundwater unknown.
AOC No. 7: Onsite Main Warehouse Building	Elevated VOCs in sub-slab vapor and indoor air.	First phase of SSDS design completed. NYSDEC comments regarding the December2008 preliminary design have not been received to date.
AOC No. 8: Onsite Residential Structure	VOCs in sub-slab vapor.	Additional sampling of this structure has been requested by the NYSDEC and NYSDOHduring this RI.

As indicated on Figure 3.8-1 -Remedial Investigation Sample Location Map, six of the identified Areas of Concern (AOC's) are located east of the warehouse building, in the area between the building and Woodbury Creek to the east. None of the AOC's are located in the area of the proposed warehouse expansion. AOC No. 6 is at the east central edge of the building and is identified as a former solvent recovery still / oil water separator area. Sampling in the area of AOC No. 6 indicates shallow soil and groundwater impact from volatile organic compounds (VOC's).

Area of Concern No. 7 is the on-site main warehouse building related to volatile organic compounds found at elevated levels in sub-slab vapor samples. Samples of air (vapor) were collected below the concrete building slab and all of the samples collected contained elevated concentrations of chlorinated volatile organic compounds (cVOC's) predominantly tricholoroethene (TCE) an industrial solvent commonly used in the 1950's and 1960's.

According to the *Remedial Investigation Report*, elevated concentrations of volatile aromatic compounds including; acetone, methyl-ethyl-ketone, ethanol and others were detected in indoor air samples in the warehouse. As further described in Section 3.8.3 Mitigation Measures, it is likely that site remediation measures will include a sub-slab depressurization system to address soil vapor under the building.

The area of the warehouse expansion at the north (northeast) side of the warehouse, was not identified as an Area of Concern, since this area was historically not used for industrial processes or waste disposal. Soil and groundwater samples were collected in this area during the installation of monitoring wells MW-111S and MW-111D. The location of the samples is just beyond the footprint of the building, but in the area of the proposed stormwater basin, as shown in Figure 3.8-1. A single soil sample was collected and identified as TRC-MW-111. This sample was analyzed for volatile organic compounds (VOC) and contained no constituents above the laboratory detection limit. The groundwater sample, identified as STAR-MW-111S contained no VOC compounds above the laboratory detection limit, with the exception of acetone. The level of acetone was below the NYSDEC groundwater quality standard. The sampling results are provided in Tables 7 and 9 in Appendix E - Remedial Investigation Report.

The sampling results from a single soil sample in the area of the proposed expansion do not show any indication of contamination related to former industrial activity in soil.

3.8.2 Potential Impacts

The proposed warehouse expansion is not contingent upon nor is it constrained by the implementation and completion of any future site remediation. Following discussions with Mr. Jeff LaRock, the TRC environmental project manager, the NYSDEC and the NYS Department of Health will likely require additional groundwater sampling and soil vapor intrusion (SVI) air sampling prior to the preparation of a Focused Feasibility Study (FFS) to develop remedial action alternatives which will be used for site clean-up[2]. The NYSDEC and the NYSDOH are currently reviewing the results of a June 2022 report on the most recent soil vapor intrusion testing (see Appendix F).

It is noted that site remediation options or the extent of clean-up have not yet been determined by NYSDEC and NYSDOH, since the investigation data is still under review by those agencies.

[2] Telephone conversation on August 10, 2021.

The proposed area of warehouse expansion, including the proposed stormwater management areas are not identified as Areas of Concern (AOC) in the Remedial Investigation Report. The limited grading, excavation for the building foundations and grading for the stormwater management facilities and expanded loading dock area are not expected to encounter contaminated soils. The proposed warehouse expansion will not affect the health and safety of construction workers building the expanded space.

The warehouse expansion will not involve the storage of petroleum or hazardous materials. Emergency generators for proposed fire response pumps may be supplied by natural gas or propane. If diesel fuel is necessary for new emergency generators the tanks would be provided secondary containment in compliance with all Town and NYSDEC regulatory requirements.

3.8.3 Mitigation Measures

The subject property is a Class 2 Inactive Hazardous Waste Disposal Site (IHWDS) and the results of an extensive Remedial Investigation characterizing on-site soil, groundwater and soil vapor is currently under review by the NYSDEC. The property owner (applicant) is committed to the continued and expanded warehouse use on the property, and thereby committed to the necessary remediation of the property. According to Mr. Jeff LaRock, of TRC Engineers, Inc., it is likely that a sub-slab depressurization system will be installed under the existing warehouse building to reduce the potential for soil vapor intrusion. Any selected remedial actions will be designed to protect human health and the environment and will ensure the continued safe operation of the warehouse.

LEGEND (SYMBOLS NOT TO SCALE):

- BUILDING BOUNDARY
- PROPERTY BOUNDARY LINE
- APPROXIMATE EXTENT OF AOC (BASED ON REPORTS BY OTHERS)
- APPROXIMATE EXTENT OF AOC-5 (BASED ON REPORTS BY OTHERS)
- LF-1 — GROUNDWATER MONITORING WELL
- MW-3 — GROUNDWATER MONITORING WELL (NOT FOUND DURING DECEMBER 2015 AND/OR DECEMBER 2016 INSPECTION)
- MW-10XS/D — SHALLOW AND DEEP MONITORING WELL CLUSTER (INSTALLED APRIL TO MAY 2019)
- SB/BMW-XXX — BEDROCK MONITORING WELL (INSTALLED APRIL TO MAY 2019)
- SB-XXX — SOIL BORING TO BEDROCK ((INSTALLED JANUARY 2018 AND APRIL TO MAY 2019)
- SSVP/IA-XXX — SUB-SLAB VAPOR / INDOOR AIR SAMPLE LOCATION (SAMPLED MARCH 2017)
- AA-101 — OUTDOOR AMBIENT AIR SAMPLE LOCATION (SAMPLED MARCH 2017)
- SURFACE WATER SAMPLE LOCATION (SAMPLED SEPTEMBER 2018)

NOTES:

1. THE PHYSICAL FEATURES AND PROPERTY BOUNDARIES SHOWN ARE FROM A SCANNED SURVEY MAP PREPARED BY JOHN A. McGLOIN DATED JULY 29, 1996. LOCATIONS AND DIMENSIONS OF PHYSICAL FEATURES AND PROPERTY BOUNDARIES ARE APPROXIMATE.
2. SURVEYED MONITORING WELL INFORMATION REFERENCED HORIZONTALLY TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83) PROJECTED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM (EAST ZONE) BASED ON THE GPS SURVEY COMPLETED ON NOVEMBER 5, 2019 BY SUSAN M. ANACKER, PLLC.
3. AOC - AREA OF CONCERN
4. SWMU - SOLID WASTE MANAGEMENT UNIT

0 60 120
SCALE: 1" = 60'
SHEET SIZE: 24" X 36"

PROJECT: FORMER STAR ANCHORS AND FASTENERS
NYSDEC SITE NO. 336008
MOUNTAINVILLE, NEW YORK

TITLE: REMEDIAL INVESTIGATION SAMPLE LOCATION MAP

DRAWN BY:	H. DELGADO	PROJ. NO.:	336744
CHECKED BY:	J. KING		FIGURE 2
APPROVED BY:	J. LAROCK		
DATE:	AUGUST 2020		

TRC
10 Maxwell Drive, Suite 200
Clifton Park, NY 12065
Phone: 518.888.3154
www.TRCcompanies.com

FILE NO.: Figure 2 - RI Sample Location Map (Finr. Star A&F).dwg

Figure 3.8-1: Remedial Investigation Sample Location Map
Star Warehouse Property
Town of Cornwall, Orange County, New York
Source: TRC Engineers, Inc.

3.9 EMERGENCY SERVICES

3.9.1 Existing Conditions

The proposed warehouse expansion would involve the construction of a 50,000 square foot addition to the existing 185,835 square foot warehouse that has been in operation since the 1990's. From the 1950's through the late 1990's the building and site were used for manufacturing. The proposed expansion includes the design and construction of adequate fire safety provisions for the new warehouse space, but also needed upgrades to the fire safety and emergency response capabilities for the existing building. The proposed improvements are intended to address concerns by the Town of Cornwall Planning Board to provide adequate fire protection system that meets the NYS State Fire Code requirements (2020 Fire Code of NYS).

The proposed warehouse addition is proposed to expand the use of the existing building as a warehouse for the storage and distribution of dry goods and commodities. The commodities proposed to be stored in the expanded space include low-hazard storage (Group S-2) and moderate hazard storage (Group S-1). A list of commodities is provided at the end of Appendix F - Fire Safety Design. The proposed addition will have a construction classification of "Type 1 and 2", according to Chapter 6 of the Building Code of NYS. The occupant load has not yet been calculated by the project engineer, but will be provided as part of the detailed Site Plan and fire safety design. The warehouse currently operates from 8:00 a.m. to 5:30 p.m. Monday through Friday and 8:00 a.m. to 12:00 p.m. on Sundays. The warehouse will continue to operate during the same hours following the proposed expansion.

Existing Emergency Services

The Star Warehouse site is served by the Cornwall Fire Department and the Cornwall Volunteer Ambulance Corps. The Cornwall Fire Department is a volunteer department that serves the residents of the Town of Cornwall, Mountainville and Salisbury Mills. The department has two companies and respective firehouses and equipment to serve the Town. Highland Engine Company #1 is located at 1 Quaker Avenue in the Town of Cornwall. Mountainville Engine Company #3 is located at 10 Star Road in the Hamlet of Mountainville, approximately 700 feet north of the subject property on Star Road. It is anticipated that the Mountainville Engine Company #3 will provide the first response to any fire emergency at the Star Warehouse site.

The Cornwall Volunteer Ambulance Corps. provides emergency medical service to the residents of the Town of Cornwall, Village of Cornwall-On-Hudson, Mountainville and Salisbury Mills. The Ambulance Corps has a combination of both volunteer and career staff to provide 24 hour coverage to the service area. The Corps has offices at 1 Clinton Street in the Town of Cornwall.

Site Access

The subject property currently has three access points for emergency access. The main access drive is from NYS Route 32 into Industry Drive, which accesses driveways on both the east and west (southeast and northwest) sides of the warehouse building. The driveways on both sides of the building provide access to the full length of the building.

The second access is from the southeast driveway's connection to Creamery Hill Road. Creamery Hill Road runs east-west at the northern edge of the property, in the vicinity of the proposed expansion area. The driveway from Creamery Hill Road also provides access to the single family home on the property.

The third site access is from an existing emergency access drive from Star Road at the northwest corner of the property. This emergency access drive is unpaved and in need of upgrade. The proposed expansion would relocated and improve this emergency access, as further described below.

Existing Emergency Water Service

The existing warehouse building is served by a single well located at the south (southwest) end of the building. According to a water systems report by the project engineer Pietrzak & Pfau Engineering and Surveying, PLLC, the well has a pump rate of 7.5 gallons per minute. Potable water service capacity is accomplished by water storage. The existing water storage tank that is visible from Interstate 87 and local roads is not in service. According to the project fire safety consultant, a lagoon located next to Industry Drive is the current source for fire safety water supply. A pump house to provide fire protection water service is located near the water tank and Industry Drive. The current condition and capacity of the fire service pumps is not known. The existing lagoon is not proposed as a future source of fire protection water. The proposed fire service upgrades, described below, include a new 250,000-gallon water storage tank for fire safety service.

Existing 8-inch ductile iron pipe serves the five fire hydrants at the sides and end of the building. Two hydrants are located on each side (northwest and southeast) sides of the building and a single hydrant is located at the southern side of the building. The existing water lines and other utilities are shown on Drawing 2 - Existing Conditions of the Site Plans. Improvements to water storage, pumping and building service are proposed as part of the warehouse expansion, as further described below.

3.9.2 Potential Impacts

Emergency Services

The proposed warehouse expansion will create additional warehouse space that has the potential to increase the need for emergency service calls in the Town. The Star Warehouse is an existing long-standing commercial space in the Town and therefore, an expansion would only incrementally increase potential emergency service calls. The Town of Cornwall has a 100 foot aerial ladder truck that can currently service the existing warehouse building and the proposed addition. The proposed addition meets the Town Code requirement for building height. It is not anticipated that the Town Fire Department will require any new equipment to serve the proposed addition.

Emergency Access

The three existing emergency access locations will remain the same, although improvements will be made to the emergency access drive in the northwest corner of the site and to the main access at Industry Drive and Route 32. The emergency access drive to connect the site to Star Road will be relocated slightly to the west of the existing location and will be fully paved with a 20-foot width. A locked gate with a key provided to Town emergency service will limit use to emergency response. The proposed emergency access gate will comply with the requirements of D103.5 of the 2020 Fire Code of NYS. The improvements are shown on site plan Drawing 3.

The Industry Drive entrance at NYS Route 32 will be improved providing a curbed radius, a 40-foot width and an existing island will be removed. The entrance upgrades will improve safety for trucks, including emergency access vehicles, entering and exiting the site.

The project engineer has prepared a Fire Apparatus Turning Analysis to demonstrate the adequacy of site entrances and driveways to accommodate emergency vehicles, including the largest truck in the Town Fire Department fleet, the 100-foot aerial ladder truck. Two fire truck turning analyses are provided: one showing a Star Road / emergency access entrance and a Creamery Hill Road exit, and a second showing a Route 32 entrance and a Star Road exit. The turning analysis demonstrates adequate site driveway and entrance geometry to allow emergency service vehicle access. The Fire Apparatus Turning Analysis sheet is provided with the site plan drawings.

The 2020 Fire Code of NYS requires a minimum road width of 26 feet, exclusive of shoulders, where a fire hydrant is located on a fire apparatus access road (Section D103.1). The majority of existing Star Warehouse on-site access roads in the vicinity of hydrants meet the 26-foot minimum width requirement, but certain sections of road do not. Aerial fire apparatus access will be required, based upon the 2020 Fire Code of NYS, D103.5, and the proposed building height of 40 feet. The project engineer will coordinate with the Town of Cornwall Fire Department and Building Inspector to ensure adequate access in compliance with the Code.

Proposed Emergency Water Service

Fire safety improvements for the proposed and existing warehouse space have been prepared by Active Fire Protection, Inc. of Monroe New York. The following is a summary of the proposed improvements. Preliminary design specifications for fire water demand and pressures, sprinkler specifications and locations, and flow and pressure calculations are attached in Appendix F - Fire Safety Design. The fire flow design was based on ISO methods for the sprinklers based on riser demand. The improvements are designed to meet NY State Fire Code requirements for the proposed and existing space (2020 Fire Code of NYS).

Fire safety water demand will be provided by a new 250,000 gallon water storage tank. The tank will be located southeast of the existing water tank, at the edge of an existing parking lot. The preliminary design for the tank is 48-feet in height and 30-feet in width. The height of the storage tank is primarily determined by the needed water pressure. The final design of the water storage tank will be completed during the site plan review process and will include final height and paint surface color to minimize visual impacts. Currently, the applicant is exploring options for the existing water tank with construction firms, which may include its demolition and removal.

Initial calculations show that 1520 GPM will be required for internal sprinkler system and 250 GPM for outside hose demand for up to 60 minutes. The total water needed would be 106,200 gallons. The proposed 250,000 gallon storage tank is more than adequate to provide fire safety supply. According to the Applicant, the proposed 250,000 gallon tank will provide service to Star Warehouse (20 Industry Drive) and will not serve 19 Industry Drive.
Water will be distributed by a diesel fuel supplied fire pump rated at 1,500 GPM at 150 PSI. The water will be distributed to the sprinkler system and hydrants by the existing 8-inch ductile iron pipes resulting in a approximate static pressure of 170 PSI at the hydrants. The existing 8" ductile iron pipes and existing hydrants will be inspected and tested according to NFPA 25, prior to being put into service with the new water supply. The pipes and hydrants will be maintained

according to NFPA following the start of service. The Fire Department connections will be approved by the Cornwall Fire Department.

The proposed sprinkler system is designed to meet National Fire Protection Association (NFPA) warehouse rack storage space specifications. Based upon the 2020 Fire Code of NYS, the requirements for "high-piled combustible storage" apply to this project since storage of combustible material will exceed 12 feet (Section 3206). The applicant anticipates that the design of the proposed fire safety improvements will require review by and consultation with the Town Fire Inspector and the Lead Agency, the Town of Cornwall Planning Board.

The proposed fire safety improvements will enhance safety at the warehouse and ensure that any potential fire at the facility can be addressed.

3.9.3 Mitigation Measures

The proposed warehouse expansion plan includes improvements to the facilities overall fire safety and emergency response capacity. Access to the facility by the Town Fire Department and Volunteer Ambulance Corps will be improved by relocating and paving the emergency access drive on Star Road and by improving the site entrance at NYS Route 32 and Industry Drive.

Fire safety for the building will be improved by constructing a new 250,000 gallon water storage tank, providing a new fire pump system and by installing a sprinkler system in the existing warehouse space and in the proposed addition, to provide fire safety features that meet current NY State Fire Code requirements (2020 Fire Code of NYS).

4.0 UNAVOIDABLE ADVERSE IMPACTS

The development of the proposed project will result in some adverse environmental impacts which cannot be avoided. Although these impacts cannot be avoided, they can be mitigated as noted in each of the preceding chapters. Some of these impacts will be temporary or short-term impacts associated with the construction phase of the project, while others will be long term impacts associated with occupancy of the residences.

Short Term Impacts

- presence of construction and delivery vehicles on the site and on surrounding roads
- localized increase in noise due to operation of construction vehicles and equipment
- increased potential for on-site soil erosion and downstream sedimentation impacts

Long Term Impacts

- need to maintain stormwater quantity and quality management facilities
- An increase in activity and light on the project site
- Increase in local area traffic
- Potential increase in demand for emergency services with the new space

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5.0 ALTERNATIVES

The proposed warehouse expansion, as discussed throughout the DEIS, involves a 50,000 square foot addition to an existing 185,835 square foot warehouse. This is the applicant's preferred development project and meets the goals of the commercial warehouse business at the property. An addition with greater or less square footage would not meet the business requirements of the applicant.

The Scoping Document for this DEIS only contemplated the No Action Alternative, as further described below.

5.1 No Action Alternative

In accordance with SEQRA regulations, the No Action alternative must evaluate the adverse or beneficial impacts that would occur in the reasonably foreseeable future in the absence of the proposed action. For purposes of this analysis, the No Action alternative assumes that the proposed project site would remain with the existing warehouse building containing 185,835 square feet and a single existing residence.

The No Action alternative would be inconsistent with the objectives of the applicant/property owner. Under the No-Action alternative, none of the impacts identified in this report, whether adverse or beneficial, would occur.

Surface Water Resources: Like the proposed action, the No Action alternative would not result in any disturbance to the on-site wetland / watercourse corridor. The No Action alternative would not result in the alteration of drainage patterns on the project site nor the introduction of up to 1.11 acres of impervious surfaces that would increase stormwater runoff rates. The No Action alternative would not result in any increase in nutrient loading beyond what currently results from overland flow carrying nutrients from the existing vacant land. There would be no construction of a stormwater infiltration basin to recharge the local aquifer.

Groundwater Resources: Similar to the proposed action, the water demand for the warehouse would remain at 7.5 gallons per minute drawn for an existing well. The proposed expansion involved no petroleum or hazardous materials are stored at the site and that is consistent with existing conditions.

Ecology: No disturbance to the development area would occur, and the existing lawn and gravel parking areas at the north side of the warehouse would remain under the No Action alternative. The wooded portions of the site outside of the development area would continue to provide habitat and cover for local wildlife.

Traffic and Transportation: There would be no improvements made to the Industry Drive entrance and to the emergency access drive at the northwest corner of the property near Star Road. The slight increase in peak hour trips, including trucks and passenger vehicles would not occur under the No Action alternative.

*Historic and Archaeological Resources: T*he No Action Alternative would involve disturbance to the project site. Since the proposed action would involve no impacts to historic or archeological resources, the same results would occur, with or without the project.

Visual Resources: The site would remain developed with the existing warehouse and water tank, mostly visible for drivers on Interstate 87 (NY Thruway). Existing views of the site from Star Road / Creamery Hill Road and other viewing locations would remain unaltered. The views of the site from the Schunnemunk Mountain State Park would remain the same.

Human Health: Without the development, the NYSDEC managed environmental investigation and remediation would continue. As described, it is likely that mitigation measures will be completed to address the potential for soil vapor migration. The proposed development would not alter the investigation and remediation process.

Emergency Services: The improvements proposed as part of the project, such as a new water tank, fire supply pumps, sprinkler system and improved emergency access would likely be completed without the project since they are necessary, but possibly over a longer time frame.

6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed project would commit a portion of 36.9 acres of land to 50,000 square feet of new warehouse space on property that is currently being used for that purpose. Once committed to warehouse-use, that portion of the site would be unavailable for other uses for the foreseeable future.

The finite resources that would be irretrievably committed by the proposed action would be materials and energy required to construct and maintain the warehouse upon completion. Construction would involve the commitment of resources associated with the use of concrete, asphalt, steel, lumber, paint products, and other building materials.

The operation of construction equipment would result in consumption of fossil fuels and other finite energy sources. When completed, the new warehouse space would require electricity and the use of fossil fuels indirectly as electricity. Fuel would be used to transport goods to and from the warehouse space for the foreseeable future.

7.0 GROWTH INDUCING IMPACTS OF THE PROPOSED ACTION

As indicated in previous sections of the document, the proposed project will increase the square footage of the existing warehouse space by 50,000 square feet.

The project site is to be served by the existing private well and sewer system. The project will not create any new districts or introduce any new infrastructure that could induce future growth. No new roads are being constructed as part of the project that may induce future growth.

The project will promote increased construction employment and, on a cumulative basis, an increase in long term demand for goods and services that will have a steady multiplier effect in the Town of Cornwall.

Construction of the building addition would require a commitment of person hours of labor, which can be viewed as beneficial to the community, the local economy, and the construction industry with respect to the generation of jobs.

It is anticipated that a number of construction workers would come from Orange County and nearby New York counties in the lower Hudson River valley. These workers are expected to have a positive impact on existing local businesses that provide such services as food convenience shopping, gasoline, etc.

8.0 EFFECTS UPON THE USE AND CONSERVATION OF ENERGY RESOURCES

As described, the proposed project will increase the square footage of the existing warehouse space by 50,000 square feet.

The existing warehouse space was originally constructed as manufacturing space in the 1950's and was converted to warehouse space in the 1990's. It is likely the existing building is not efficient to heat, cool or to provide lighting. Heating, mechanical equipment and lighting systems have been upgraded in the building over time.

The new building addition will be constructed of current materials and insulation standards and new heating and colling systems will be much more efficient than older equipment. New Lighting will be energy efficient and require much less energy resources than older fixtures and equipment.

Regardless of efficiency, the proposed new warehouse space will require heating, cooling and lighting, all requiring an added demand for energy resources.

The transportation section of this DEIS described a slight increase in traffic related to the new warehouse space as compared to existing conditions. The added trips to and from the warehouse space will require an increased use of fossil fuels or increased electricity use by electric vehicles.

9.0 CLIMATE CHANGE

As described, the proposed project will increase the square footage of the existing warehouse space by 50,000 square feet.

The project site is located in a river valley formed by Woodbury Creek and Moodna Creek. The property is not directly affected by the Hudson River or coastal areas. A floodplain is mapped on the property associated with Woodbury Creek. The flood plain is shown on the attached site plan drawings. The proposed warehouse addition is approximately 300 feet from the currently mapped floodplain.

Climate change will result in larger and more intense storms increasing the risk for flooding, even in areas that are not mapped in flood zones at the current time. The warehouse addition is being constructed with ground floor elevation to match the existing warehouse space. This proposed construction allows for the movement of materials between the spaces and it would be inefficient and impractical to raise the proposed warehouse floor elevation above the current elevation.

The warehouse addition will be constructed of new materials and will be built to withstand wind and storm damage, consistent with all required NYS and local building codes and standards.

Current NYS Building Code requirements result in more energy efficient buildings than when the Star Warehouse was initially constructed in the 1960's, including the requirements for building insulation, windows, HVAC systems and energy efficient lighting. The construction of the addition with current building materials and standards will improve the energy efficiency of the addition, as compared to the existing space. The use of current materials and standards will reduce the need for energy, and the long-term creation of greenhouse gases, to the extent practical.

APPENDIX A

SEQRA Documents

TOWN OF CORNWALL PLANNING BOARD
NOTICE OF DETERMINATION OF ACCEPTANCE OF
DRAFT ENVIRONMENTAL IMPACT STATEMENT
AND NOTICE OF PUBLIC HEARING

Determination: A Draft Environmental Impact Statement (DEIS) has been submitted by the project applicant, Cornwall Properties, LLC for the project further described below. This document was prepared in accordance with Article 8 of the Environmental Conservation law and upon review by the Town of Cornwall Planning Board, as Lead Agency, in accordance with provisions of Title 6 of the New York State Code of Rules and Regulations, Part 617, the Planning Board has determined that the DEIS is adequate for public review.

The applicant will provide for the placement of digital copies the DEIS at: http://timmillerassociates.com/star-warehouse-expansion/ and full copies of the DEIS will be made available at the Town Building Department located 183 Main Street during normal business hours.

A public hearing on the DEIS, as well as the proposed Site Plan and Special Permit will be held on **January 3, 2023 at 7:00** pm or shortly thereafter at Munger Cottage, 40 Munger Drive, Cornwall, New York. Comments may be made in person at the public hearing and written comments will be received at any time during the comment period in the Town Building Department. The comment period will extend for a minimum for 10 days following the closing of the public hearing.

Name of Project:	Star Warehouse Expansion
Location:	20 Industry Drive
Date of Action:	August 1, 2022
SEQR Status:	Type 1
Lead Agency:	Town of Cornwall Planning Board
Contact Person/Address:	Town of Cornwall Building Department 183 Main Street Cornwall, New York 12518 (845) 534-9429 Dhines@cornwallny.gov

Project Description: The applicant proposes a 50,000 square foot addition to an existing 185,835 square foot warehouse building and other site improvements including four new loading docks, modifications to parking, drainage, signage and emergency access. The Project Site consists of 36.9 acres with access to NYS Route 32 via a private shared drive and emergency access to Star Road/ Creamery Hill Road. The site is served by private well and septic.

This Notice has been circulated to the following Agencies.

Involved Agencies:

NYS Department of Environmental Conservation
Division of Environmental Permits
625 Broadway
Albany, New York 12233-1750

NYS Department of Environmental Conservation – Region 3
21 South Putt Corners Road
New Paltz, New York 12561

New York State Department of Transportation, Region 8
4 Burnett Boulevard
Poughkeepsie, New York 12601

Interested Agencies:

New York State Office of Parks, Recreation and Historic Preservation
Post Office Box 189, Peebles Island
Waterford, New York 12188

Orange County Department of Planning
1887 County Building
124 Main Street
Goshen, New York 10924

Palisades Interstate Park Commission
Administration Building
3006 Seven Lakes Drive
Bear Mountain, New York 10911-0427

Canterbury Fire District
1 Quaker Avenue
Cornwall, NY 12518

LEGAL NOTICE

Notice is hereby given that the Planning Board of the Town of Cornwall, County of Orange, State of New York will hold a public hearing on the proposed amended Site Plan, Special Permit and Draft Environmental Impact Statement for a project known as Star Warehouse. The application involves a 50,000 square foot addition to an existing 185,835 square foot warehouse building and other site improvements including four new loading docks, modifications to parking, drainage, signage and emergency access on a 36.9 acre property located at 20 Industry Drive off NYS Route 32 in the Town's Planned Industry/Office (PIO) Zone. The public hearing will be held at **Munger Cottage, 40 Munger Drive Cornwall, New York on January 3, 2023 at 7:00 pm** or shortly thereafter.

Anyone wishing to speak on this matter is invited to be present at the meeting or may submit written comments to the Town Building Department via email at **dhines@cornwallny.gov**. The comment period will extend for a minimum of 10 days following the closing of the public hearing. Plans and supporting documents are on file and may be inspected at the Town Clerk's office, Town Hall, 183 Main Street, Cornwall, New York 12518 during regular business hours or at the following website: http://timmillerassociates.com/star-warehouse-expansion/

The property is designated on the tax map as Section: 33 Block: 1 Lot: 49.12

By Order of Town of Cornwall Planning Board
Neil Novesky, Chairman

NOTICE OF INTENT TO DECLARE LEAD AGENCY
APPLICATION OF STAR WAREHOUSE/CORNWALL PROPERTIES
TOWN OF CORNWALL PLANNING BOARD, COUNTY OF ORANGE

P/H
16-05

Please take notice that, according to the provisions of Article 8 of the Environmental Conservation Law and the New York Code of Rules and Regulations Part 617.6, the Town of Cornwall Planning Board has resolved to seek Lead Agency status for purposes of Coordinated Review of the project named and described below:

Name of Project: Star Warehouse/Cornwall Properties Expansion

Action Type: Type I

Location: Town of Cornwall, County of Orange

Location: 20 Industry Drive, Mountainville, NY

Zoning District: PIO

Tax Map Parcel: Section 33 Block 1 Lot 49.12

Summary of Action:

The action involves an application for site plan approval for an expansion of a special permit use, namely a requested 50,000 square foot expansion to an existing 185,835 square foot structure, described as a warehouse storage addition with four additional loading bays. The site is the northerly parcel of the two created when the Star Mountainville property was subdivided. Access to the site is provided by way of Industry Drive, a shared access way to NYS Route 32.

Date of Intent to Seek Lead Agency Resolution: September 6, 2016

Date of Mailing: September 8, 2016

Agency Address: Town of Cornwall Planning Board

Town Hall – 183 Main Street

Cornwall, New York 12518

Tel.(845) 534-9429

Contact Person: Neil Novesky, Planning Board Chairman

Attachments: Full EAF Part I from EAF Mapper, Sheet 1 of plan

Involved and Interested Agencies to receive this mailing and relevant SEQR documentation:

NYS DEC Region 3
21 South Putt Corners Road
New Paltz, NY 12561

NYS OPRHP
Field Services Bureau – Peebles Island
PO Box 189
Waterford, NY 12188-0189

SEQR Unit
Traffic Engineering & Safety Division
NYS Department of Transportation – Region 8
4 Burnett Boulevard
Poughkeepsie, NY 12603

Orange County Department of Planning
124 Main Street
Goshen, NY 10924

Palisades Interstate Park Commission
James Hall, Executive Director
Park Administration Bldg
Bear Mountain, NY 10911-0427

Town of Cornwall Fire Inspector (notice only)
Town Hall – 183 Main Street
Cornwall, NY 12518

NOTICE OF POSITIVE DECLARATION

APPLICATION OF STAR WAREHOUSE/CORNWALL PROPERTIES

TOWN OF CORNWALL PLANNING BOARD, COUNTY OF ORANGE

Please take notice that, according to the provisions of the New York Code of Rules and Regulations Part 617.6, the Town of Cornwall Planning Board, acting as SEQR Lead Agency for Coordinated SEQR review of the following Type I Action, hereby issues notice that it has adopted a Positive Declaration pursuant to Article 8 of the State Environmental Conservation Law for SEQR Review of the action listed below:

Name of Project: Star Warehouse/Cornwall Properties Expansion

Action Type: Type I

Location: Town of Cornwall, County of Orange

Location: 20 Industry Drive, Mountainville, NY

Zoning District: PIO

Tax Map Parcel: Section 33 Block 1 Lot 49.12

Summary of Action:

The action involves an application for site plan approval for an expansion of a special permit use, namely a requested 50,000 square foot expansion to an existing 185,835 square foot structure, described as a warehouse storage addition with four additional loading bays. The site is the northerly parcel of the two created when the Star Mountainville property was subdivided. Access to the site is provided by way of Industry Drive, a shared access way to NYS Route 32.

Reasons Supporting This Positive Declaration:

The Planning Board adopted a Positive Declaration due to concerns that the subdivision might create significant adverse environmental impacts in the following areas:

- Information provided by the New York Natural Heritage Program has indicated the presence of rare, threatened and endangered species, including the Timber Rattlesnake, the Indiana Bat and the Northern Long-eared Bat, as well as the vascular plant species Glaucous Sedge and Black-edged Sedge in the site vicinity.
- The Full EAF indicates that the site may contain archeological resources which may be impacted by the proposed development.
- Potential visual impacts on Storm King Art Center. Due to the proposed construction , the project could potentially damage the viewshed of the landmark Storm King Art Center, which is one of the most important visual resources in the Hudson Valley.

Date of Adoption of Positive Declaration: January 3, 2017

Date of Mailing: January 4, 2017

Agency Address: Town of Cornwall Planning Board
Town Hall – 183 Main Street
Cornwall, New York 12518
Tel.(845) 534-9429

Contact Person: Neil Novesky, Planning Board Chairman

Involved and Interested Agencies to receive this mailing and relevant SEQR documentation:

NYS DEC Region 3
21 South Putt Corners Road
New Paltz, NY 12561

NYS OPRHP
Field Services Bureau – Peebles Island
PO Box 189
Waterford, NY 12188-0189

SEQR Unit
Traffic Engineering & Safety Division
NYS Department of Transportation – Region 8
4 Burnett Boulevard
Poughkeepsie, NY 12603

Orange County Department of Planning
124 Main Street
Goshen, NY 10924

Palisades Interstate Park Commission
James Hall, Executive Director
Park Administration Bldg
Bear Mountain, NY 10911-0427

Town of Cornwall Fire Inspector (notice only)
Town Hall – 183 Main Street
Cornwall, NY 12518

State Environmental Quality Review Act (SEQR)

ADOPTED SCOPING DOCUMENT

Star Warehouse Expansion
Town of Cornwall, Orange County, NY
Adopted November 2, 2020

SEQR CLASSIFICATION: **TYPE 1**

LEAD AGENCY: **Town of Cornwall Planning Board**
183 Main Street
Cornwall, NY 12518
(845) 534-9429
Contact: dhines@cornwallny.gov

LIST OF INVOLVED/INTERESTED AGENCIES

Involved Agencies

- New York State Department of Transportation, Region 8
- New York State Department of Environmental Conservation, Region 3

Interested Agencies

- Orange County Department of Planning
- New York State Historic Preservation Office
- NYSDEC-Department of Fish & Wildlife
- Town of Cornwall Fire Inspector
- Palisades Interstate Park Commission

INTRODUCTION

This Scoping Document is intended to comply with New York State Environmental Quality Review (SEQR) as provided in 6 NYCRR Part 617. Updated SEQR regulations were adopted by New York State June 2018. According to the SEQR regulations, the primary goals of scoping are to focus the EIS on potentially significant adverse impacts and to eliminate consideration of those impacts that are irrelevant or not significant. This Scoping Document is intended to serve as the foundation for the identification of all potentially significant adverse impacts pertinent to the proposed action and appropriate mitigation measures. The potentially significant adverse impacts identified in Scoping are to be addressed in the draft Environmental Impact Statetment (DEIS).

A DEIS provides a means for agencies, project sponsors and the public to systematically consider significant adverse environmental impacts, alternatives and mitigation. A DEIS facilitates the weighing of social, economic and environmental factors early in the decision-making process.

On January 3, 2017, the Town of Cornwall Planning Board, acting as SEQR Lead Agency for Coordinated review of the Type I Action, adopted a Positive Declaration for the Star Warehouse Expansion site plan application. The Notice of Positive Declaration was circulated to involved and interested agencies at that time. Limited review of the application has occurred since 2017.

DESCRIPTION OF THE PROPOSED ACTION

The action involves an application for site plan approval for the expansion of a special permit use, specifically a requested 50,000 square foot expansion to an existing 185,835 square foot warehouse, on a 36.9-acre lot located 20 Industry Drive, in the Town of Cornwall, New York. The subject property is comprised of tax lot Section 33, Block 1, Lot 49.12. Access to the site is from Industry Drive, a shared access drive to NYS Route 32. The proposed expansion will include the addition of four new truck bays and the construction of a new 250,000-gallon water storage tank. Parking, landscaping and stormwater management facilities will be provided in support of the building addition. The subject property is located in the Planned Industrial Office (PIO) zoning district.

POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS

The proposed action may have potentially significant environmental impacts on:

- ***Stormwater***
- ***Wetlands***
- ***Groundwater Resources***
- ***Ecological Resources***
- ***Transportation***
- ***Historic and Archeological Resources***
- ***Community Facilities and Resources***
- ***Visual Resources***
- ***Human Health***
- ***Emergency Services***

GENERAL SCOPING CONSIDERATIONS

The applicant will prepare a Draft Environmental Impact Statement (DEIS) addressing the items described in this Scoping Document.

The applicant will follow the SEQR regulations for direction on the required content of a DEIS. The DEIS will assemble relevant and material facts, and evaluate reasonable alternatives. It will be clearly and concisely written in plain language that can be easily read and understood by the public. Highly technical material will be summarized and, if it must be included in its entirety, it will be referenced in the DEIS and included in an appendix.

The DEIS will be written in the third person without use of the terms I, we, and our. Narrative discussions will be accompanied to the greatest extent possible by illustrative tables and graphics. All graphics will clearly identify the project area. The DEIS will group each issue identified into one Existing Conditions, Impacts, and Mitigation section to permit more efficient review. Opinions of the applicant that are unsupported by evidence will be identified as such.

Full scale plans will accompany the DEIS as an appendix and reduced copies of pertinent plan sheets will be included in the text of the DEIS. The documents shall contain, as attachments, plans, reports, and studies meeting prevailing Federal, State and Town criteria with respect to all disciplines of study as well as applicable site plan and subdivision criteria.

DEIS Contents

Cover Sheet listing preparers, title of project, DEIS identification, location, Lead Agency, and relevant dates (i.e. date of acceptance, date of public hearing, final date for acceptance of comments).

Table of Contents including listings of tables, figures, maps, charts, and any items that may be submitted under separate cover.

I. EXECUTIVE SUMMARY

The Executive Summary will include a brief description of the proposed action and a listing of all potential environmental impacts and proposed mitigation measures. A summary will be provided of the approvals and permits required, and of the alternatives to the proposed action that are evaluated in the DEIS.

II. DESCRIPTION OF THE PROPOSED ACTION

This chapter of the DEIS will describe the project site and its location, the proposed project, the public need and objectives of the project sponsor, and list required approvals, reviews, and permits.

A. Site Location and Description

1. A written and graphic description of the location of the project site in the context of the Town of Cornwall.

2. Brief description of the environmental setting of the site, its historic use, and the natural resources identified thereon and in the adjoining area.

3. Identification of any easements, rights-of-way, restrictions, special district boundaries or other legal devices affecting the subject properties' development potential.

4. Identify the existing zoning and describe existing land uses for the project site, adjoining properties, and nearby properties.

5. Description of the existing infrastructure serving the project site and/or its immediate environs, including existing site access and road network.

B. Description of the Proposed Action

1. Written and detailed description of the proposed action and potential implementation, including the proposed use, design, layout, phasing and construction schedule.

2. Discuss proposed modifications to parking, loading, utilities and changes to number of employees.

3. Discuss agreements or legal instruments to assure the long-term maintenance of all shared facilities, such as access drive, fire protection water system, and signage, between Cornwall Properties LLC (Star Warehouse) and the adjoining 19 Industry Way property. The shared use of such improvements is likely to involve the shared maintenance of the improvements.

C. Discuss compliance with all zoning and Site Plan approval standards and other criteria set forth in the Town of Cornwall Code, including 2020 revisions to the Zoning Code (Chapter 158). The DEIS will indicate the extent to which any modifications or waivers of such standards and other criteria or any variances from such regulations would be required to carry out the project as proposed.

D. Project Purpose and Need

1. Discuss the purpose or objective of the project sponsor.

2. Identify the public need for the proposed action, including consideration of consistency with adopted policies and/or plans as set forth within adopted community land use and development plans, including the Town of Cornwall Comprehensive Plan 2019 Update and the Orange County Comprehensive Plan 2018 Update.

E. Approvals, Reviews and Permits

1. List and describe all required approvals, reviews, and permits, by agency, to implement the proposed action.

2. List all Involved and Interested Agencies for DEIS distribution.

III. ENVIRONMENTAL SETTING, IMPACTS, MITIGATION

The format or organization of this section will include the following subsection headings for each topic or impact issue:

Existing Conditions
Potential Impacts
Mitigation Measures

This format provides for a more meaningful presentation of the environmental issues that allows the reader to focus on individual impact issues.

A. Surface Water and Wetlands

1. Surface Water Resources

a. Surface water features will be mapped and described, including stream classification, drainage areas, existing mapped floodplains, and downstream tributaries.

b. Describe the proposed development's potential impact to surface water features, including Woodbury Creek, existing floodplains and any permits or approvals to implement the project.

c. A drainage study or Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the development in compliance with current NYSDEC Design Standards. The study will include pre-development and post-development peak rates of stormwater runoff. The results of this study will be summarized in the DEIS text and all supporting calculations will be presented in the appendix to the DEIS. The study will consider potential drainage effects to adjoining properties.

d. Pre- and post-development stormwater runoff quality and outline of treatment methods per current NYS DEC Design Standards shall be presented.

e. Mitigation measures for impacts to surface water resources, including Woodbury Creek and floodplains will be described, including a description of both short-term (construction related) and permanent erosion and sediment control plans. The proposed on-site stormwater management system and features will be described.

2. Wetlands

a. Delineate in the field and survey the boundary of on-site Town of Cornwall and Federal Jurisdictional Wetlands, based on Town of Cornwall Code (Chapter 90) and ACOE methodologies. Describe the function, value and characteristics of on-site wetlands and waters.

b. Calculate and show in graphic form the area of wetland disturbance, if applicable.

c. Assess potential impacts on identified functions and values.

d. Discuss any mitigation measures that will be implemented to prevent soil erosion and sedimentation to wetlands during construction.

e. Identify and describe the permits required from the Army Corps of Engineers, and/or the Town of Cornwall to implement the proposed project.

f. Describe wetland mitigation proposals including plantings and plans.

B. Groundwater Resources

1. Existing groundwater conditions will be described including sand-and-gravel aquifer conditions, nearby water supply wells and local water demand from groundwater sources.

2. The location of the existing wells on the site will be described. The existing water demand and well capacity (if available) will be described. Future water demand, related to the warehouse expansion, including fire protection capacity will be described. The basis for the calculation for water demand will be provided.

3. The potential on-site storage of petroleum or chemical products will be described. The potential impacts of petroleum/ chemical storage to the local aquifer will be

described. Discuss the potential for vehicle-based leaks or spills to impact the local groundwater.

4. Discuss the existing wastewater management system and the potential effects of the facility expansion on that system, including the potential for groundwater contamination from the existing onsite sanitary disposal system.

5. Mitigation measures for the above listed potential impacts, if required, will be described.

C. Ecology (Flora and Fauna)

1. The possible presence of unique, rare, threatened and/or endangered species (vegetation and wildlife), for both on-site and nearby properties will be described. The following species, as identified by the NYSDEC, will be discussed; timber rattlesnake, northern long-eared bat, Indiana bat.

2. Conduct an ecological field survey to determine existing vegetation and wildlife and provide a description of the findings. The DEIS text will provide a summary of the ecological survey, while the technical report will be provided as an Appendix.

3. Evaluate the potential impacts on the resources identified and describe mitigation measures if necessary.

D. Transportation

1. Discuss existing truck traffic volumes and routing. Describe existing deliveries and timing during the day to and from the site.

2. Describe additional truck trips anticipated as a result of the warehouse expansion and potential changes in delivery routes and timing.

3. Discuss internal site circulation, the proposed loading bays and access, and new parking stalls.

4. Discuss the improvements to curb cuts, the commercial access driveway, NYS Route 32, traffic signage and modifications to site access. These improvements will consider the total development site, including the adjoining 19 Industrial Way property.

5. Describe mitigation, if necessary, including the potential for adjustment of truck delivery timing or routing to avoid peak traffic periods on NYS Route 32.

E. Historic and Archaeological Resources

1. The New York State Office of Parks, Recreation and Historic Preservation (OPRHP) will be contacted to determine the potential impact on historic and archaeological resources that may be located on, or near the project site.

2. Any structures listed on the National Register of Historic Places located adjacent to or near the project site will be described, and potential impacts to the historic resources described.

3. If requested by OPRHP, a Phase 1A/1B archeological investigation will be performed in compliance with OPRHP requirements. A summary of the Phase 1A/1B investigation will be provided in the DEIS text and the full report attached.

4. Describe mitigation measures if necessary

F. Community Facilities and Services

1. The proposed project will create the need for additional community services including police and fire protection, and emergency services. Existing public service entities will be described as to their general existing capacity.

2. The impact of the proposed project on each service entity will be estimated, according to generally accepted practices.

3. Discuss existing solid waste management for the facility and the potential impact on waste management by the expansion.

4. Mitigation measures, if necessary, will be discussed.

G. Visual Resources

1. A visual impact analysis will be conducted consistent with SEQRA regulations and in accordance with NYSDEC guidance. The visual survey and impact analysis will include photos of the project site in its existing condition taken from surrounding vantage points. The development's potential visibility from public vantage points, including trails, scenic overlooks and specifically, the Storm King Art Center and Schunnemunk Mountain State Park will be described.

2. The warehouse building additions' architecture and massing will be described in the context of the existing warehouse building and setting. Describe and provide graphics to show how the warehouse addition will alter public views of the subject site.

3. A conceptual landscaping plan will be provided and described. The landscape plan's conformance to the Town of Cornwall Code for Landscaping and Environmental Control (Section 158-20) will be described.

4. Proposed changes to facility signage and related visual impacts will be described.

5. The potential need to screen the project from nearby residential uses or public vantage points will be assessed.

H. Human Health

1. The existing on-site storage of petroleum and/or hazardous materials will be described. Any storage areas will be discussed in relation to proximity to Woodbury Creek and its floodplain.

2. Describe any addition or expansion of storage for petroleum and/or hazardous materials, specifically related to proximity to Woodbury Creek and its floodplain.

3. The status of the NYSDEC supervised clean-up on the subject site will be discussed, including a summary of: regulatory status, background, the nature of the clean-up, areas involved and schedule.

4. Mitigation measures for hazardous materials, if necessary, will be described.

I. Emergency Services

1. Describe the proposed improvements to the fire protection system (water storage tank and distribution system), necessary to address the total site development (including the adjacent 19 Industry Drive property), to include all existing and proposed buildings and uses. The evaluation will include preliminary calculations for fire load (building fire protection demand for sprinklers and standpipes), site hydrants, flow and pressures, water distribution, and feed supply system sizing, etc. The calculations and layout will be prepared by a licensed professional and will provide adequate information to demonstrate that the improved system will comply with all State Fire Code requirements. The information should be used as the basis for the improvements depicted on the site plan drawings.

2. Provide an emergency services access evaluation to determine access routes and locations of access. Demonstrate that emergency access is adequate for fire apparatus to gain access to all necessary portions of the site and each building, in conformance applicable State Codes. The analysis should demonstrate compliance with needed dead-end turnarounds, as required by Code. The Cornwall Fire Inspector will be consulted regarding the emergency access evaluation.

3. The Cornwall Fire Inspector will be consulted regarding emergency response as it relates to the Site Plan.

4. Water demand and current on-site capacity, specifically for fire protection will be estimated and potential impacts will be discussed. The proposed new water storage tank as it relates to fire protection will be discussed.

5. Mitigation measures for emergency services, if necessary, will be described

IV. UNAVOIDABLE ADVERSE IMPACTS

This section of the DEIS will identify impacts that are likely to occur despite mitigation measures, and will compare the beneficial and adverse implications of these unavoidable impacts.

V. ALTERNATIVES

This section of the DEIS will evaluate and compare alternatives to the proposed action, which are listed below. The evaluation and comparison will include a conceptual site plan and a tabular comparison of quantified impacts, including trip generation comparisons with the proposed action. The following alternatives will be studied:

A. The "No Action" Alternative as required under 6 NYCRR 617.9.b.5.

B. (To be Determined)

The proposed levels of disturbance for each alternative will be quantified.

VI. Irreversible and Irretrievable Commitment of Resources

Identification of those natural and man-made resources consumed, converted or otherwise made unavailable for future use as a consequence of the proposed action.

VII. Growth Inducing Aspects

Potential growth-inducing aspects, including short and long term, generated by the project will be described.

VIII. Effects on the Use and Conservation of Energy Resources

A description of the effect of the proposed action on the short- and long-term use and conservation of energy resources will be provided

IX. Climate Change

Provide a discussion of measures to avoid or reduce both the action's potential impacts on climate change and associated impacts due to the effects of climate change on the project, such as flooding.

XI. Appendices

The appendices will include a list of all underlying studies and reports relied upon in preparing the DEIS, technical exhibits and studies background information relevant to the proposed action such as this Scoping Document and other relevant SEQR documents, a list of involved and interested agencies, and relevant correspondence with involved agencies and persons. These include but are not limited to:

1. SEQRA Documentation
2. Correspondence
3. Stormwater Management Report
4. Utility Report (water and sewer calculations)
5. Ecological Report (including wetlands assessment)
6. Archeological Phase 1A/1B

APPENDIX B

Correspondence

jdahlgren timmillerassociates.com

From: jdahlgren timmillerassociates.com
Sent: Monday, June 27, 2022 3:22 PM
To: Tpalmer@cenhud.com
Cc: Nick Rugnetta; Pietrzak Pfau
Subject: Star Warehouse Expansion
Attachments: 29106.01 Star Warehouse Site Plan 2022-04-07.pdf

Tom: It was good speaking with you today. Attached, please see the latest Site Plan drawings for the proposed construction at Star Warehouse. The Central Hudson pipeline is shown on the plans identified as “gas”. The pipeline is located between the existing building and Interstate-87.

Following your review, please e-mail or call me at the number below and I can arrange a site visit with the project engineer. Nick Rugnetta from Pietrzak & Pfau Engineering is copied on this e-mail.

Thanks. Jon

Jon P. Dahlgren
Senior Geologist

Tim Miller Associates, Inc.
Planning · Traffic · Wetlands & Ecology
Economics · Project Management · Permitting
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10 North Street, Cold Spring, N.Y. 10516
Office: 845.265.4400
url: www.timmillerassociates.com
email: jdahlgren@timmillerassociates.com

LANC & TULLY
ENGINEERING AND SURVEYING, P.C.

John J. O'Rourke, P.E., Principal
David E. Higgins, P.E., Principal
John Queenan, P.E., Principal

Rodney C. Knowlton, L.S., Principal
Jerry A. Woods, L.S., Principal

John D. Russo, P.E., Principal
John Lanc, P.E., L.S.
Arthur R. Tully, P.E.

TOWN OF CORNWALL
PLANNING BOARD REVIEW

#16-05

Project Name: Star Warehouse

Town Project No. 16-05

Project Location: 20 Industry Drive / SBL: 33-1-49.12

Reviewed by: Kristen O'Donnell

Date of Review: September 23, 2021

Plans Reviewed: No new plans submitted, status update only

Project Summary and status update: The applicant proposes a 50,000 square foot addition on an existing warehouse building and other site improvements including modifications to parking, drainage, signage and emergency access. The Project Site is located off NYS Route 32 in the Planned Industrial and Office (PIO) Zoning District. The applicant submitted a Draft Environmental Impact Statement (DEIS) in August which was deemed incomplete in terms of content and consistency with the approved scoping document and they are currently in the process of amending this document for resubmittal to the Board.

In our initial review of the DEIS, we brought up a concern regarding the current PIO zoning. Upon review of e-code and the General Code printed zoning tables, it appeared "General Warehousing" had been deleted as a permitted use from the PIO Use Table. The Town Attorney has looked into this matter further and determined this was an error by General Code. It was not the intent of the Town, in its 2020 zoning amendments, to delete General Warehousing and the use remains permitted in the zone by Special Permit of the Planning Board subject to Use Group C as was the case prior to 2020.

If you have any questions please contact our office.

NEW YORK STATE OF OPPORTUNITY. Parks, Recreation, and Historic Preservation

ANDREW M. CUOMO
Governor

ERIK KULLESEID
Commissioner

August 17, 2021

Maureen Fisher
Tim Miller Associates, Inc.
10 North Street
Cold Spring, NY 10516

Re: DEC
Star Warehouse Expansion, Loading Dock, Emergency Access Road & Stormwater Management Facility Construction Project
20 Industry Drive, Cornwall, Orange County, NY
21PR05277

Dear Maureen Fisher:

Thank you for requesting the comments of the Division for Historic Preservation of the Office of Parks, Recreation, and Historic Preservation (OPRHP). We have reviewed the provided information in accordance with the New York State Historic Preservation Act of 1980 (section 14.09 of the New York Parks, Recreation, and Historic Preservation Law). These comments are those of the Division for Historic Preservation and relate only to Historic/Cultural resources.

Based upon this review, and a discussion with Jon Dahlgren, it is OPRHP's understanding that this project was previously reviewed by our office in 2016 under project number 16PR05976, and for which a No Adverse Impact effect finding letter was issued. OPRHP has re-examined the project and rescinded our previous recommendation for a Phase I Archaeological survey for this project. It is thus the opinion of OPRHP that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project. This recommendation pertains only to the Project Area examined during the above-referenced investigation. It is not applicable to any other portion of the project property. Should the project design be changed OPRHP recommends further consultation with this office.

If you have any questions, I can be reached via e-mail at Josalyn.Ferguson@parks.ny.gov.

Sincerely,

Josalyn Ferguson, Ph.D.
Scientist Archaeology

via email only

c.c. Diane Hines, Town of Cornwall
c.c. Jon Dahlgren, Tim Miller Associates

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation, and Historic Preservation

ANDREW M. CUOMO
Governor

ERIK KULLESEID
Commissioner

August 16, 2021

Maureen Fisher
Tim Miller Associates, Inc.
10 North Street
Cold Spring, NY 10516

Re: DEC
Star Warehouse Property, 20 Industry Drive, Cornwall, New York
20 Industry Dr, Cornwall, NY 10930
21PR05277

Dear Maureen Fisher:

Thank you for requesting the comments of the Division for Historic Preservation of the Office of Parks, Recreation and Historic Preservation (OPRHP). We have reviewed the submitted materials in accordance with the New York State Historic Preservation Act of 1980 (section 14.09 of the New York Parks, Recreation and Historic Preservation Law). These comments are those of the Division for Historic Preservation and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8) and its implementing regulations (6NYCRR Part 617).

The project area is adjacent to the Elias Hand House, which is listed in the State and National Registers of Historic Places. Our office has reviewed the proposed warehouse addition received on August 5, 2021. From our review the Technical Preservation Unit has no concerns regarding above ground / architectural resources. Please note however, that our Archaeology Unit has concerns and has requested additional information that must be fulfilled before an impact finding can be rendered.

If you have any questions, I am best reached by email.

Sincerely,

Derek Rohde
Historic Site Restoration Coordinator
e-mail: derek.rohde@parks.ny.gov

via e-mail only

NEW YORK
STATE OF
OPPORTUNITY.

Parks, Recreation, and Historic Preservation

ANDREW M. CUOMO
Governor

ROSE HARVEY
Commissioner

September 22, 2016

Ms. Terri Panico
Pietrzak & Pfau Engineering & Surveying
262 Greenwich Avenue
Goshen , NY 10924

Re: DEC
Star Warehouse Expansion
20 Industry Drive, Cornwall, NY
16PR05976

Dear Ms. Panico:

Thank you for requesting the comments of the Division for Historic Preservation of the Office of Parks, Recreation and Historic Preservation (OPRHP). We have reviewed the submitted materials in accordance with the New York State Historic Preservation Act of 1980 (section 14.09 of the New York Parks, Recreation and Historic Preservation Law). These comments are those of the Division for Historic Preservation and relate only to Historic/Cultural resources. They do not include potential impacts that must be considered as part of the environmental review of the project pursuant to the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8) and its implementing regulations (6NYCRR Part 617).

We have received your submission dated August 26, 2016 for the Star Warehouse Expansion project. We note that the project is located near two National Register listed properties; the Elias Hand House and the Mountainville Grange building. We understand that the proposed project will include construction of a 50,000sf building addition along the north side of the warehouse.

Based on this review, it is the opinion of the SHPO that the proposed project will have No Adverse Impact upon adjacent historic properties. In addition, there are no archaeological concerns associated with this project.

If you have any questions, I can be reached at (518) 268-2164.

Sincerely,

Weston Davey
Historic Site Restoration Coordinator
weston.davey@parks.ny.gov

via e-mail only

ORANGE COUNTY CLERK'S OFFICE RECORDING PAGE
THIS PAGE IS PART OF THE INSTRUMENT – DO NOT REMOVE

TYPE NAME(S) OF PARTY(S) TO DOCUMENT: BLACK INK

Star Expansion Compan

TO

Star Newco, Inc.

SECTION 33 BLOCK 1 LOT 19.1

RECORD AND RETURN TO:
(Name and Address)

Ronald S. Rossi Esq.
402 East Main Street
P.O. Box 548
Middletown, NY 10940

THERE IS NO FEE FOR THE RECORDING OF THIS PAGE

ATTACH THIS SHEET TO THE FIRST PAGE OF EACH RECORDED INSTRUMENT ONLY

DO NOT WRITE BELOW THIS LINE

INSTRUMENT TYPE: DEED ____ MORTGAGE ____ SATISFACTION ____ ASSIGNMENT ____ OTHER R+W

PROPERTY LOCATION

___ 2089 BLOOMING GROVE (TN)
___ 2001 WASHINGTONVILLE (VLG)
___ 2289 CHESTER (TN)
___ 2201 CHESTER (VLG)
X 2489 CORNWALL (TN)
___ 2401 CORNWALL (VLG)
___ 2600 CRAWFORD (TN)
___ 2800 DEERPARK (TN)
___ 3089 GOSHEN (TN)
___ 3001 GOSHEN (VLG)
___ 3003 FLORIDA (VLG)
___ 3005 CHESTER (VLG)
___ 3200 GREENVILLE (TN)
___ 3489 HAMPTONBURGH (TN)
___ 3401 MAYBROOK (VLG)
___ 3689 HIGHLANDS (TN)
___ 3601 HIGHLAND FALLS (VLG)
___ 3889 MINISINK (TN)
___ 3801 UNIONVILLE (VLG)
___ 4089 MONROE (TN)
___ 4001 MONROE (VLG)
___ 4003 HARRIMAN (VLG)
___ 4005 KIRYAS JOEL (VLG)
___ 4289 MONTGOMERY (TN)
___ 4201 MAYBROOK (VLG)
___ 4203 MONTGOMERY (VLG)
___ 4205 WALDEN (VLG)
___ 4489 MOUNT HOPE (TN)
___ 4401 OTISVILLE (VLG)
___ 4600 NEWBURGH (TN)
___ 4800 NEW WINDSOR (TN)
___ 5089 TUXEDO (TN)
___ 5001 TUXEDO PARK (VLG)
___ 5200 WALLKILL (TN)
___ 5489 WARWICK (TN)
___ 5401 FLORIDA (VLG)
___ 5403 GREENWOOD LAKE (VLG)
___ 5405 WARWICK (VLG)
___ 5600 WAWAYANDA (TN)
___ 5889 WOODBURY (TN)
___ 5801 HARRIMAN (VLG)

CITIES

___ 0900 MIDDLETOWN
___ 1100 NEWBURGH
___ 1300 PORT JERVIS

___ 9999 HOLD

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PAYMENT TYPE: CHECK X
CASH ____
CHARGE ____
NO FEE ____

CONSIDERATION $ ____
TAX EXEMPT ____

MORTGAGE AMT $ ____
DATE ____

MORTGAGE TYPE:
___ (A) COMMERCIAL
___ (B) 1 OR 2 FAMILY
___ (C) UNDER $10,000.
___ (E) EXEMPT
___ (F) 3 TO 6 UNITS
___ (I) NAT.PERSON/CR.UNION
___ (J) NAT.PER-CR.UNI OR 2
___ (K) CONDO

Joan A. Macchi

JOAN A. MACCHI
Orange County Clerk

RECEIVED FROM: Lawyers Title

LIBER 4528 PAGE 103

LIBER 4528 PAGE 104

ORANGE COUNTY CLERKS OFFICE 8418 MRL
RECORDED/FILED 02/20/97 10:13:07 AM
FEES 52.00 EDUCATION FUND 5.00
SERIAL NUMBER: 005481
DEED CNTL NO 51765 RE TAX .00

RECIPROCAL EASEMENT, RIGHT-OF-WAY AND MAINTENANCE AGREEMENT

This Reciprocal Easement, Right-of-Way and Maintenance Agreement made this 14th day of February, 1997, between STAR EXPANSION COMPANY, a Debtor-in-Possession, a Delaware corporation, with its principal place of business and offices located at Route 32, Mountainville, New York (hereinafter referred to as "Star"), party of the first part, and STAR NEWCO, INC., a Delaware corporation, with its principal place of business and offices located at 1629 Locust Street, Philadelphia, Pennsylvania (hereinafter referred to as "Newco"), party of the second part.

W I T N E S S E T H

WHEREAS, Newco will be, upon the consummation of the transactions contemplated by the Asset Purchase and Liability Assumption Agreement between Newco and Star dated August 14, 1996 (the "Agreement"), the Owner of premises known as Lot B as shown on a Subdivision of Property for Star Expansion Industries dated July 29, 1996 filed in the Orange County Clerk's Office on February 14, 1997 as Map No. 21-97 (hereinafter referred to as "Subdivision Map") and more particularly described in Schedule "A" attached hereto and made a part hereof (hereinafter referred to as "Lot B"); and

WHEREAS, Star is the owner of Premises known as Lot A as shown on a Subdivision of Property for Star Expansion Industries dated July 29, 1996 filed in the Orange County Clerk's Office on February 14, 1997 as Map No. 20-97 and more particularly described in Schedule "B" attached hereto and made a part hereof (hereinafter referred to as "Lot A"); and

SCHEDULE A

ALL that certain plot, piece or parcel of land, situate, lying and being in the Town of Cornwall, County of Orange and State of New York, bounded and described as follows:

BEGINNING at a point on the westerly side of N.Y.S. Route 32 where it is intersected by the northerly line of lands now or formerly of Devitt;

RUNNING THENCE along the same North 59 degrees 49 minutes 00 seconds West a distance of 151.86 feet and South 31 degrees 13 minutes 00 seconds West a distance of 65.62 feet to lands now or formerly of the Estate of Markert;

RUNNING THENCE along the same North 60 degrees 14 minutes 20 seconds west a distance of 228.00 feet and South 33 degrees 43 minutes 40 seconds West a distance of 198.00 feet to a point;

RUNNING THENCE through lands now or formerly of Star Expansion Company the following courses and distances;

North 61 degrees 21 minutes 00 seconds West 305.95 feet;

North 44 degrees 20 minutes 00 seconds West 530.00 feet;

North 36 degrees 35 minutes 34 seconds East 216.82 feet;

North 43 degrees 15 minutes 16 seconds West 50.00 feet;

North 46 degrees 44 minutes 44 seconds East 35.04 feet; and

North 43 degrees 15 minutes 16 seconds West 585.00 feet to the easterly side of the New York State Thruway;

RUNNING THENCE along the same North 51 degrees 00 minutes 59 seconds East a distance of 1024.51 feet and North 51 degrees 46 minutes 35 seconds East a distance of 76.29 feet to a point on the westerly side of Ketchum Road;

RUNNING THENCE along the northeasterly line of premises herein described and through Ketchum Road South 35 degrees 05 minutes 25 seconds West a distance of 646.02 feet to a point;

THENCE leaving Ketchum Road and continuing along the

(Continued)

Legal Description (continued)
Northeasterly line of premises herein described the following courses and distances;

South 3 degrees 27 minutes 25 seconds East 94.30 feet;

South 57 degrees 30 minutes 35 seconds West 130.50 feet; and

South 58 degrees 29 minutes 25 seconds East 44.50 feet to a point in the bed of Creamery Road;

RUNNING THENCE through Creamery Road south 24 degrees 44 minutes 25 seconds East a distance of 45.60 feet and South 48 degrees 58 minutes 17 seconds East a distance of 671.55 feet to a point;

THENCE leaving Creamery Road and continuing along the northeasterly line of premises herein described South 41 degrees 49 minutes 00 seconds West a distance of 23.00 feet and South 39 degrees 59 minutes 18 seconds East a distance of 158.01 feet to a point;

RUNNING THENCE through lands now or formerly of Star Expansion Company South 33 degrees 34 minutes 00 seconds West a distance of 99.00 feet to a point;

RUNNING THENCE through lands now or formerly of Star Expansion Company and along the westerly line of lands now or formerly of Gayton, South 65 degrees 04 minutes 00 seconds West a distance of 440.00 feet to lands now or formerly of Gorbrecht;

RUNNING THENCE along the same the following course and distances;

North 86 degrees 53 minutes 40 seconds West 304.81 feet;

South 33 degrees 50 minutes 55 seconds West 140.00 feet;

South 13 degrees 20 minutes 55 seconds West 153.00 feet; and

South 80 degrees 09 minutes 05 seconds East 436.22 feet to lands now or formerly of Cupano;

RUNNING THENCE along the same South 26 degrees 15 minutes 30 seconds West a distance of 153.37 feet and South 65 degrees 52 minutes 30 seconds East a distance of 350.03 feet to the westerly side of N.Y.S. Route 32;

RUNNING THENCE along the same south 26 degrees 15 minutes 30 seconds West a distance of 158.11 feet to the point or place of BEGINNING.

SCHEDULE B

ALL that certain plot, piece or parcel of land situate, lying and being in the Town of Cornwall, County of Orange and State of New York, bounded and described as follows:

Commencing at a point on the Westerly side of N.Y.S. Route 32 where it is intersected by the Northerly line of lands now or formerly of Devitt;

RUNNING THENCE along the same North 59 degrees 49 minutes 00 seconds West a distance of 151.86 feet and South 31 degrees 13 minutes 00 seconds West a distance of 65.62 feet to lands now or formerly of the Estate of Markert;

RUNNING THENCE along the same North 60 degrees 14 minutes 20 seconds West a distance of 228.00 feet and South 33 degrees 43 minutes 40 seconds West a distance of 198.00 feet to a point;

RUNNING THENCE through lands now or formerly of Star Expansion Company North 61 degrees 21 minutes 00 seconds West distance of 305.95 feet to the point of beginning;

RUNNING THENCE from said point of beginning through land now or formerly of Star Expanion Company the following courses distances;

South 45 degrees 15 minutes 15 seconds West 55.82 feet;

South 62 degrees 43 minutes 48 seconds West 69.20 feet;

South 77 degrees 59 minutes 16 seconds West 57.15 feet;

South 83 degrees 37 minutes 02 seconds West 105.87 feet;

North 89 degrees 23 minutes 44 seconds West 54.26 feet;

North 84 degrees 14 minutes 16 seconds West 66.73 feet;

South 69 degrees 39 minutes 04 seconds West 56.82 feet;

South 53 degrees 34 minutes 03 seconds West 82.86 feet;

South 46 degrees 56 minutes 16 seconds West 95.71 feet;

South 34 degrees 28 minutes 55 seconds West 60.17 feet;

South 40 degrees 13 minutes 04 seconds West 61.22 feet;

North 59 degrees 39 minutes 30 seconds West 292.16 feet.

North 63 degrees 51 minutes 00 seconds West 37.96 feet;

North 38 degrees 41 minutes 35 seconds East 48.48 feet;

North 49 degrees 51 minutes 45 seconds West 324.80 feet;

North 37 degrees 54 minutes 20 seconds West 176.54 feet;

North 51 degrees 34 minutes 00 seconds West 67.63 feet;

North 78 degrees 39 minutes 15 seconds West 77.06 feet;

North 35 degrees 33 minutes 00 seconds East 21.28 feet; and

North 68 degrees 00 minutes 30 seconds West 92.07 feet

to the easterly side of the New York State Thruway;

RUNNING THENCE along the same North 49 degrees 14 minutes 44 seconds East a distance of 1,069.09 feet to a point;

RUNNING THENCE through lands now and formerly of Star Expansion Company the following courses and distances:

South 43 degrees 15 minutes 16 seconds East 585.00 feet;

South 46 degrees 44 minutes 44 seconds west 35.04 feet;

South 43 degrees 15 minutes 16 seconds East 50.00 feet;

South 36 degrees 35 minutes 34 seconds West 216.82 feet; and

South 44 degrees 20 minutes 00 seconds East 530.00 feet to the point or place of BEGINNING.

WHEREAS, the Town of Cornwall Planning Board has required that certain Reciprocal Easements and Rights-of-Way shall be provided for the benefit of Lots A and B and that provisions for the maintenance for the shared commercial access way, private drainage facilities, or any private water facilities serving Lot A and Lot B, likewise, be provided for the benefit of Lots A and B, respectively, as more particularly provided in Notes Number 5, 6 and 7 of the Subdivision Map; and

WHEREAS, Star and Newco wish to implement the Easements, Rights-of-Way and Maintenance of the shared commercial access way, private drainage facilities, or any private water facilities servicing more than one of the aforesaid Lots as provided in Notes 5, 6 and 7 of the Subdivision Map and as provided herein.

NOW, THEREFORE, in consideration of the premises and upon the terms and conditions hereinafter set forth, it is hereby agreed as follows:

1. Preamble Recitals. It is hereby specifically understood and agreed by the parties hereto that the terms set forth in the Preamble above are incorporated herein by reference and made a part hereof.

2. Representations of Ownership.

(a) Star represents that it is the owner in fee simple of Lot A.

(b) Newco represents that, upon the consummation of the transactions contemplated by the Agreement, it will be the owner in fee simple of Lot B.

3. Grant of Easements.

(a) Star hereby grants to Newco an Easement in favor of Lot B to enter upon Lot A to read the water meter in the building located on Lot A as more particularly set forth in the Subdivision Map.

(b) Newco hereby grants to Star an Easement in favor of Lot A to maintain the storm drain line discharging to the pond, east of the water tower on Lot B as more particularly described in the Subdivision Map.

(c) Newco hereby grants to Star an Easement in favor of Lot A for underground electric, telephone and natural gas lines currently located on Lot B but servicing Lot A and for installation of additional underground electric, telephone and natural gas lines as currently located along said easement, and along the route running between West Road and the existing building on Lot B as shown on Exhibit A hereto.

4. Grant of Rights-of-Way.

(a) Newco hereby grants to Star a Right-of-Way for the benefit of Lot A to enter and exit using the main entrance, now known as Industry Drive, a shared commercial access way (hereinafter referred to as the "Shared Commercial Access Way").

(b) Newco hereby grants to Star a Right-of-Way for the benefit of Lot A for emergency access and egress over Lot B from Creamery Road to service Lot A over the road now known as East Road as more particularly set forth on the Subdivision Map.

5. Maintenance.

(a) Maintenance shall be defined as those regularly recurring tasks of repair, restoration and care needed to keep the Shared Commercial Access Way, private drainage facilities or any private water facilities servicing Lot A and Lot B subject to the Easements and Rights-of-Way as provided above in paragraphs 3 and 4 usable under normal operating conditions for the benefit of the owner of Lot A or Lot B as provided herein.

(b) The Shared Commercial Access Way shall be maintained by Newco and/or its successors and assigns in good repair with costs and expense of maintenance to be shared by the parties. Star and/or its successors and assigns shall remit to Newco payment for a percentage of the cost of any and all maintenance of the Shared commercial Access Way equal to its proportionate use of the Shared Commercial Access Way within ten (10) days after receipt of any such bill and/or invoice rendered to it by Newco in connection therewith. Star and Newco agree that such percentage shall be redetermined by them no less frequently than annually and, in any event, shall be redetermined upon the transfer of ownership of Lot A or Lot B or upon a material change in the usage of Lot A or Lot B by the owner thereof.

(c) The parties hereto shall maintain and be responsible for the maintenance of their own water mains and sanitary sewer facilities on their respective Lots A and B and shall, likewise, maintain and be responsible for the maintenance of the private drainage facilities or any private water facilities, fire mains, water meters, and storm drain lines referred to above in paragraph 3 and provided in Footnotes 5 and 6 to the Subdivision Map for the mutual benefit of the other to the extent located on the respective property of Star or Newco; except that any damage due to the negligence of any third party who uses or has used the aforesaid improvements pursuant to the authority of either party hereto, in which case the party granting such authority to use shall be liable for such damages. The cost of such improvements shall be limited to actual and reasonable costs, including any allocated costs of the services of the caretaker and costs related to the ownership or rental of equipment. Newco and/or its successors and assigns or Star and/or its successors or assigns

shall remit to the other property owner responsible for the maintenance of the private drainage facilities or any fire mains, water meters, and storm drains as are located on each respective party's property payment for one-half (1/2) of the cost of any and all maintenance within ten (10) days after receipt of any such bill and/or invoice rendered to it by the other in connection therewith.

6. Personal Injury and Property Damage Liability. The parties hereto hereby indemnify and hold each other and their successors and/or assigns harmless from and against any and all loss, cost, damage and expense, including reasonable attorney's fees, incurred by either party or their successors in connection with any claim by any person arising out of the improvement, ownership, use or maintenance of the Easements and Rights-of-Way and the maintenance thereof as provided herein. Each party or its successor and/or assign shall at all times maintain in force liability insurance with respect to the Easements, Rights-of-Way and Maintenance Obligations provided herein, naming Star or its successor, and Newco or its successor, as the case may be, as additional insureds. Star or successors and Newco or successors shall make arrangements with their insurer to have their insurer deliver to each other copies of Certificates of such insurance on each anniversary date of such policy. Upon the request of either party, the other shall deliver copies of such Certificate to the requesting party. Any liability of the parties for personal injury to any employee or agent employed to make repairs under this Agreement or to a third person as well as any liability of the parties for damage to the property of such worker or agent, or of any third person, as a result or arising out of repairs and maintenance under this Agreement shall be borne equally between the parties.

Liability insurance in the amount of ONE MILLION and 00/100 ($1,000,000.00) DOLLARS shall be obtained from each other's respective insurance Carrier duly licensed to conduct business in the State of New York, each party to keep each other's insurance policies in full force and effect and to pay the premiums due and owing thereon in a timely manner. To the extent it does not invalidate any insurance policies required to be maintained by the parties as provided herein, each party shall obtain a waiver of subrogation from each other's respective insurance carrier in favor of the other.

7. Indemnity. Each of the parties agree to indemnify and hold the other harmless from and against any and all liability for personal injury or property damage when such injury or damage shall result from, arise out of, or be attributable to any maintenance or repair undertaken, under or pursuant to this Agreement.

8. Attorney's Fees. In the event that any action is filed in relation to this Agreement, the unsuccessful party in the action shall pay to the successful party, in addition to all sums that either party may be called on to pay, a reasonable sum for the successful's attorney's fees.

9. Notices. Any notices required under this Agreement shall be sent to the parties hereto at the addresses respectively indicated in this Agreement, unless such addresses change by written notice to each party concerned, in which event, the new address given shall be used for the sending of such notice. Any required notice shall be made by certified mail return receipt requested, properly addressed and postage pre-paid.

10. Modification of Agreement. Any modification of this Agreement or

additional obligation assumed by either party in connection with this Agreement shall be binding only if evidenced in writing signed by each party by an authorized representative of each party.

11. No Waiver. The failure of either party to this Agreement to insist upon the performance of any of the terms and conditions of this Agreement, or the waiver of any breach of any of the terms and conditions of this Agreement shall not be construed as a subsequent waiver of any such terms and conditions, but the same shall continue and remain in full force and effect as if no such forbearance or waiver had occurred.

12. Governing Law. It is hereby agreed between the parties hereto that this Agreement shall be governed by, construed, and enforced in accordance with the Laws of the State of New York.

13. Entire Agreement. This Agreement shall constitute the entire agreement between the parties hereto and any prior understanding or representation of any kind preceding the date of this Agreement shall not be binding under either party except to the extent incorporated in this Agreement.

14. Benefit and Binding Effect. The Easements, Rights-of-Way and Maintenance Obligations as provided in this Agreement, and all of the conditions, covenants and obligations relating thereto shall run with the land and bind the parties hereto and their successors and assigns.

15. Paragraph Headings. The titles to the paragraphs of this Agreement are solely for the convenience of the parties and shall not be used to explain, modify, simplify or aid in the interpretation of the provisions of this Agreement.

IN WITNESS WHEREOF, the party of the first part and the party of the second part have duly executed this Reciprocal Easement, Right-of-Way and Maintenance Agreement the date and year first above written.

STAR EXPANSION COMPANY,
A Debtor-In-Possession

BY: _____
H. Peter Stern, President

STAR NEWCO, INC.

BY: _____
Mark Ellis, President

STATE OF NEW YORK)
) ss.:
COUNTY OF ORANGE)

On this 7th day of February, 1996, before me personally came H. Peter Stern, to me known, who, being by me duly sworn did depose and say that he resides at ~~his~~ Route 32, Mountainville, New York; that he is the President of Star Expansion Company, the Corporation described in, and which executed the within instrument; ~~that he knows the seal of said Corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation;~~ and that he signed his name thereto by ~~like~~ order of the Board of Directors of said Corporation

MONIQUE WEISS
Notary Public, State of New York
No. 01WE5017072
Qualified In Queens County
Commission Expires Aut. 30, 1997

Monique Weiss
Notary Public

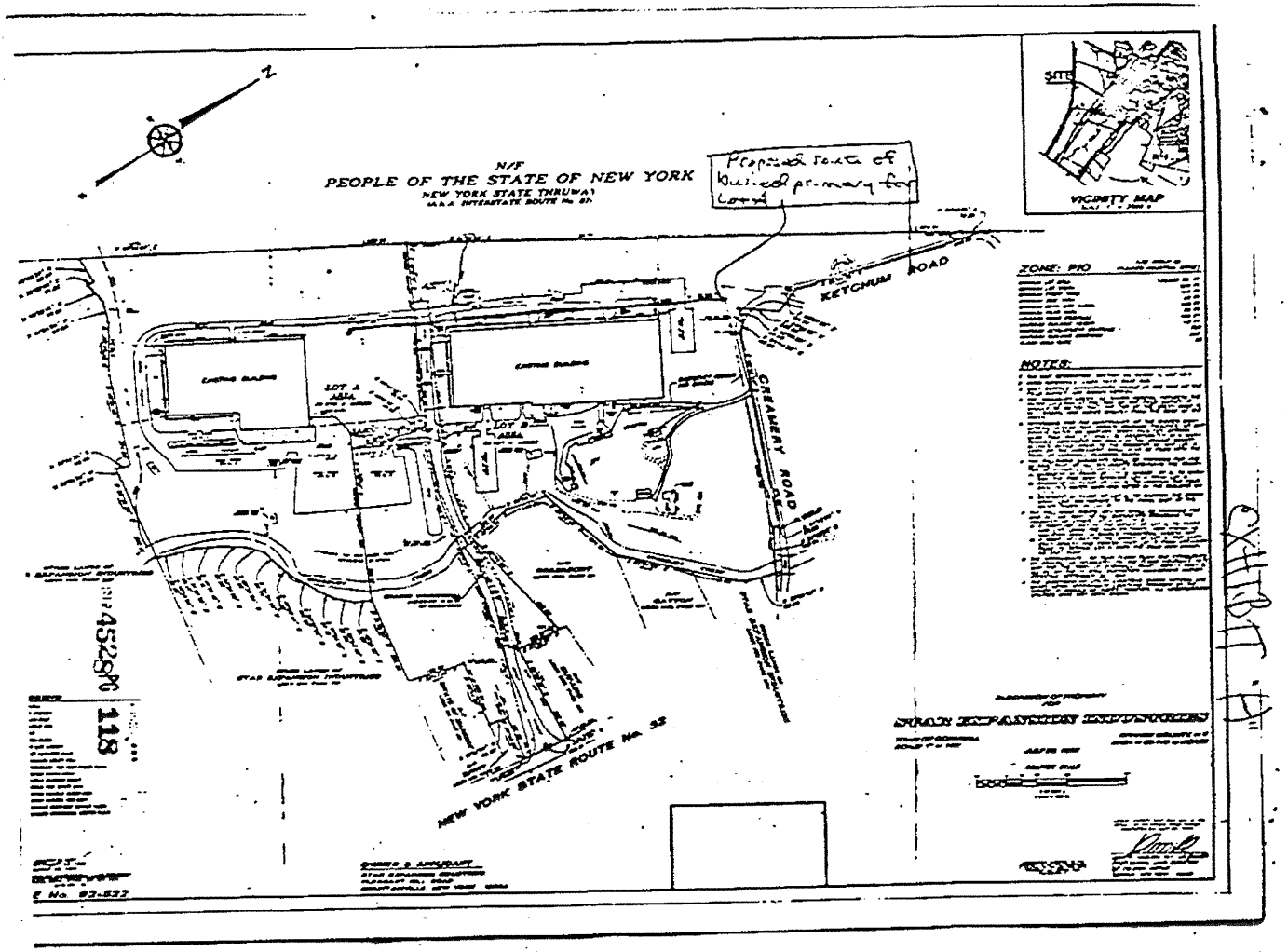
~~STATE OF PENNSYLVANIA~~ New York)
~~COUNTY OF PHILADELPHIA~~ New York) ss.:

On this 7th day of February 1996, before me personally came Mark Weiss to me known, who, being by me duly sworn did depose and say that he resides at ~~his~~ Route 32, Mountainville, N.Y ; that he is the President of Star Newco, Inc., the Corporation described in, and which executed the within instrument; ~~that he knows the seal of said Corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said Corporation;~~ and that he signed his name thereto by ~~like~~ order of the Board of Directors of said Corporation.

Richard Roel
Notary Public

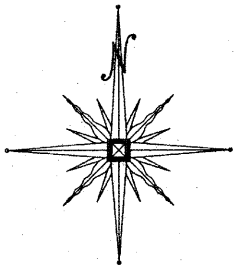
RICHARD ROEL
NOTARY PUBLIC, State of New
No. 01RO5028268
Qualified In Queens Coun
Commission Expires April 18,

RICHARD ROEL
NOTARY PUBLIC, State of New York
No. 01RO5028268
Qualified In Queens County
Commission Expires April 18, 1998


N/F
PEOPLE OF THE STATE OF NEW YORK
NEW YORK STATE THRUWAY
Proposed route of
KETCHUM ROAD
CREAMERY ROAD
NEW YORK STATE ROUTE No. 55
VICINITY MAP
ZONE: PIO
NOTES:
452890
118
EXHIBIT #1

GENERAL NOTES:

1. TOTAL AREA OF WAREHOUSE EXPANSION = 50,000 SQ.FT.
2. PROPOSED PROJECT TO BE SERVED BY EXISTING FACILITIES (NO NEW FACILITIES REQUIRED).
3. NO ADDITIONAL EMPLOYEES WILL BE REQUIRED BY THE EXPANSION OF THE EXISTING FACILITIES. EXPANSION IS FOR ADDITIONAL STORAGE SPACE ONLY.



UFPO

BEFORE YOU DIG, DRILL OR BLAST!
- CALL TOLL FREE 1-800-962-7962
- NY INDUSTRIAL CODE RULE 753 REQUIRES NO LESS THAN TWO WORKING DAYS NOTICE, BUT NOT MORE THAN TEN DAYS NOTICE.
- UNAUTHORIZED ALTERATION OR ADDITION TO THIS DRAWING IS A VIOLATION OF SECTION 7209 (2) OF THE NYS EDUCATION LAW.
- THIS DRAWING IS ONE IN A SET OF DRAWINGS AND IS INCOMPLETE AND INVALID WHEN IT IS SEPARATED FROM THE SET.

T 41.2

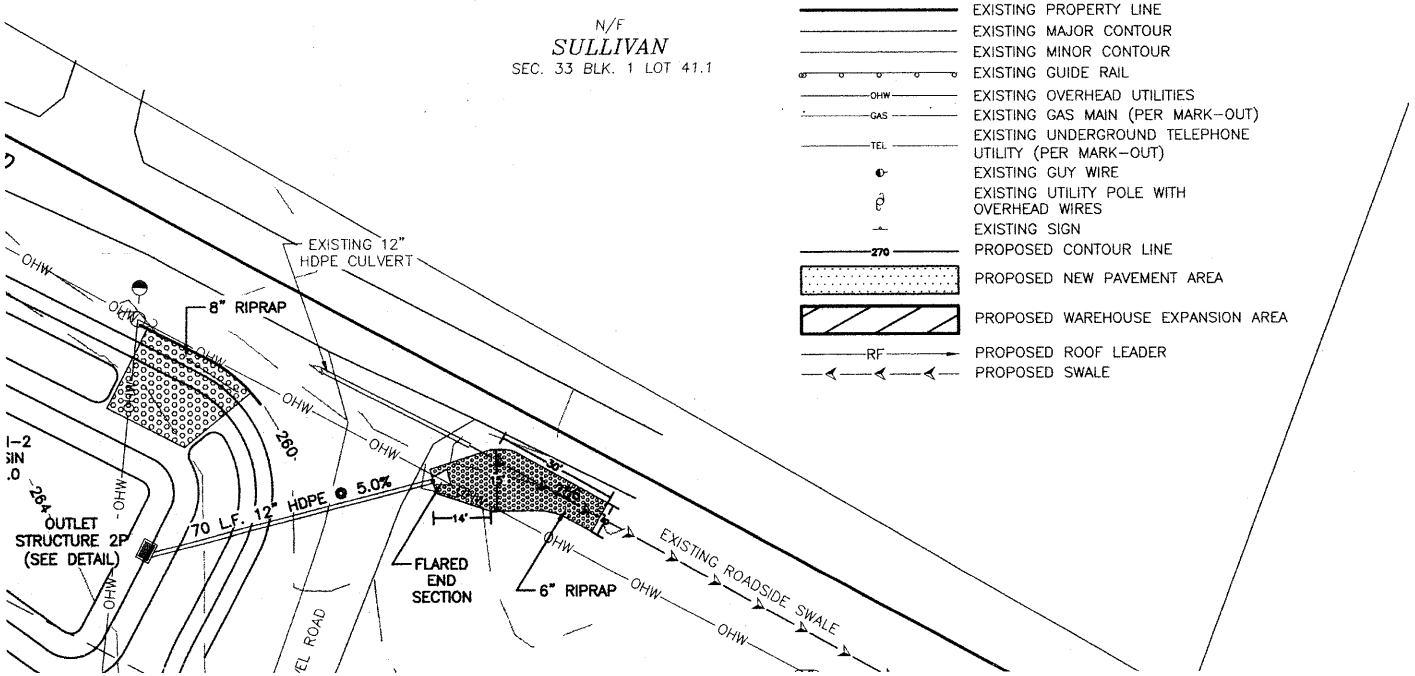
BULK REQUIREMENTS

ZONE PIO (PLANNED INDUSTRIAL / OFFICE)
USE GROUP C, SPECIAL PERMIT 22
FREIGHT AND TRUCK TRANSFER TERMINAL, GENERAL WAREHOUSING

	MIN. REQUIRED	EXISTING CONDITION	PROPOSED CONDITION
GROSS LOT AREA (SQ.FT.)	80,000	1,607,000*	1,607,000*
NET LOT AREA (SQ.FT.)	80,000	1,130,000	1,130,000
LOT WIDTH (FT.)	400	1,307±	1,307±
ROAD FRONTAGE (FT.)	400	1832±	1832±
FRONT YARD (FT.)	100	258±	113±
REAR YARD (FT.)	50	271±	189±
SIDE YARD (FT.)	50	104±	104±
BOTH SIDE YARDS (FT.)	100	417±	417±
	MAX. PERMITTED	EXISTING CONDITION	PROPOSED CONDITION
DEVELOPMENT COVERAGE (%)	70	≤70	≤70
BUILDING COVERAGE (%)	35	12±	15±
BUILDING HEIGHT (FT.)	40	≤40	≤40
FLOOR AREA RATIO	0.70	0.12±	0.15±

* PER TAX MAP INFORMATION

N/F
SULLIVAN
SEC. 33 BLK. 1 LOT 41.1



LEGEND

- EXISTING PROPERTY LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING GUIDE RAIL
- OHW — EXISTING OVERHEAD UTILITIES
- GAS — EXISTING GAS MAIN (PER MARK-OUT)
- TEL — EXISTING UNDERGROUND TELEPHONE UTILITY (PER MARK-OUT)
- EXISTING GUY WIRE
- EXISTING UTILITY POLE WITH OVERHEAD WIRES
- EXISTING SIGN
- 270 — PROPOSED CONTOUR LINE
- PROPOSED NEW PAVEMENT AREA
- PROPOSED WAREHOUSE EXPANSION AREA
- RF — PROPOSED ROOF LEADER
- PROPOSED SWALE

APPENDIX C

Stormwater Pollution Prevention Plan

APPENDIX

APPENDIX 1

Draft Notice of Intent

0806372691

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR ☐☐☐☐☐☐
(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-15-002

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)

Owner/Operator Contact Person Last Name (NOT CONSULTANT)

Owner/Operator Contact Person First Name

Owner/Operator Mailing Address

City

State ☐☐ Zip ☐☐☐☐☐ - ☐☐☐☐

Phone (Owner/Operator) ☐☐☐ - ☐☐☐ - ☐☐☐☐

Fax (Owner/Operator) ☐☐☐ - ☐☐☐ - ☐☐☐☐

Email (Owner/Operator)

FED TAX ID ☐☐ - ☐☐☐☐☐☐☐ (not required for individuals)

Project Site Information

Project/Site Name

STAR WAREHOUSE

Street Address (NOT P.O. BOX)

20 INDUSTRY DRIVE

Side of Street

● North ○ South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)

CORNWALL

State: NY | Zip: 12518- | County: ORANGE | DEC Region: 3

Name of Nearest Cross Street

NYS ROUTE 32

Distance to Nearest Cross Street (Feet)

1200

Project In Relation to Cross Street

○ North ○ South ○ East ● West

Tax Map Numbers
Section-Block-Parcel

33-1-49.12

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you must go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting): 576679

Y Coordinates (Northing): 4583774

2. What is the nature of this construction project?

● New Construction

○ Redevelopment with increase in impervious area

○ Redevelopment with no increase in impervious area

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use	Post-Development Future Land Use
○ FOREST	○ SINGLE FAMILY HOME
● PASTURE/OPEN LAND	○ SINGLE FAMILY SUBDIVISION
○ CULTIVATED LAND	○ TOWN HOME RESIDENTIAL
○ SINGLE FAMILY HOME	○ MULTIFAMILY RESIDENTIAL
○ SINGLE FAMILY SUBDIVISION	○ INSTITUTIONAL/SCHOOL
○ TOWN HOME RESIDENTIAL	○ INDUSTRIAL
○ MULTIFAMILY RESIDENTIAL	● COMMERCIAL
○ INSTITUTIONAL/SCHOOL	○ MUNICIPAL
○ INDUSTRIAL	○ ROAD/HIGHWAY
○ COMMERCIAL	○ RECREATIONAL/SPORTS FIELD
○ ROAD/HIGHWAY	○ BIKE PATH/TRAIL
○ RECREATIONAL/SPORTS FIELD	○ LINEAR UTILITY (water, sewer, gas, etc.)
○ BIKE PATH/TRAIL	○ PARKING LOT
○ LINEAR UTILITY	○ CLEARING/GRADING ONLY
○ PARKING LOT	○ DEMOLITION, NO REDEVELOPMENT
○ OTHER	○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
	○ OTHER

Number of Lots

***Note:** for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	Total Area To Be Disturbed	Existing Impervious Area To Be Disturbed	Future Impervious Area Within Disturbed Area
36.9	2.8	0.3	1.5

5. Do you plan to disturb more than 5 acres of soil at any one time? ○ Yes ● No

6. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
90 %	10 %	0 %	0 %

7. Is this a phased project? ○ Yes ● No

8. Enter the planned start and end dates of the disturbance activities.

Start Date ___/___/_____ – End Date ___/___/_____

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

Name

WOODBURY CREEK

9a. Type of waterbody identified in Question 9?

- ○ Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ● Stream / Creek On Site
- ○ Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ○ Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-15-002? ○ Yes ● No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-15-002? ○ Yes ● No

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? ○ Yes ● No
If no, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ Yes ● No
If Yes, what is the acreage to be disturbed?

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ Yes ● No

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ● Yes ○ No ○ Unknown

16. What is the name of the municipality/entity that owns the separate storm sewer system?

TOWN OF CORNWALL

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ Yes ● No ○ Unknown

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law? ○ Yes ● No

19. Is this property owned by a state authority, state agency, federal government or local government? ○ Yes ● No

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.) ○ Yes ● No

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ● Yes ○ No

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? ● Yes ○ No
If No, skip questions 23 and 27-39.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ● Yes ○ No

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer

PIETRZAK & PFAU ENGINEERING & SURVEYING

Contact Name (Last, Space, First)

PFAU, JOSEPH, J.

Mailing Address

262 GREENWICH AVENUE

City

GOSHEN

State NY Zip 10924-

Phone 845-294-0606

Fax 845-294-0610

Email

pietrzakpfau@pietrzakpfau.com

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-15-002. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name JOSEPH **MI** J

Last Name PFAU

Signature

Date 08/23/2016

25. Has a construction sequence schedule for the planned management practices been prepared? ○ Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ● Check Dams
- ○ Construction Road Stabilization
- ○ Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ● Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ○ Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ● Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ● Mulching
- ● Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ○ **Preservation of Undisturbed Areas**
- ○ **Preservation of Buffers**
- ○ **Reduction of Clearing and Grading**
- ○ **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ○ **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ● All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).
- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

		0	.	2	1	1

acre-feet

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

5997372697

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

RR Techniques (Area Reduction)	Total Contributing Area (acres)		Total Contributing Impervious Area (acres)
○ Conservation of Natural Areas (RR-1)		and/or	
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)		and/or	
○ Tree Planting/Tree Pit (RR-3)		and/or	
○ Disconnection of Rooftop Runoff (RR-4)		and/or	

RR Techniques (Volume Reduction)	
○ Vegetated Swale (RR-5)	
○ Rain Garden (RR-6)	
○ Stormwater Planter (RR-7)	
○ Rain Barrel/Cistern (RR-8)	
○ Porous Pavement (RR-9)	
○ Green Roof (RR-10)	

Standard SMPs with RRv Capacity	
○ Infiltration Trench (I-1)	
● Infiltration Basin (I-2)	1.72
○ Dry Well (I-3)	
○ Underground Infiltration System (I-4)	
○ Bioretention (F-5)	
○ Dry Swale (O-1)	

Standard SMPs	
○ Micropool Extended Detention (P-1)	
○ Wet Pond (P-2)	
○ Wet Extended Detention (P-3)	
○ Multiple Pond System (P-4)	
○ Pocket Pond (P-5)	
○ Surface Sand Filter (F-1)	
○ Underground Sand Filter (F-2)	
○ Perimeter Sand Filter (F-3)	
○ Organic Filter (F-4)	
○ Shallow Wetland (W-1)	
○ Extended Detention Wetland (W-2)	
○ Pond/Wetland System (W-3)	
○ Pocket Wetland (W-4)	
○ Wet Swale (O-2)	

Table 2 - Alternative SMPs
(DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area (acres)
○ Hydrodynamic	
○ Wet Vault	
○ Media Filter	
○ Other [ ]	

Provide the name and manufacturer of the Alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Name

Manufacturer

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29.

Total RRv provided

.203 acre-feet

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

○ Yes ● No

If Yes, go to question 36.
If No, go to question 32.

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

0.088 acre-feet

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

● Yes ○ No

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question 29.

WQv Provided

.203 acre-feet

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - RRv provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).

.406

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ● Yes ○ No

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv) required and provided or select waiver (36a), if applicable.

CPv Required

0.203 acre-feet

CPv Provided

0.203 acre-feet

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

○ Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (37a), if applicable.

Total Overbank Flood Control Criteria (Qp)

Pre-Development

1.42 CFS

Post-development

1.40 CFS

Total Extreme Flood Control Criteria (Qf)

Pre-Development

8.66 CFS

Post-development

8.61 CFS

37a. The need to meet the Qp and Qf criteria has been waived because:

- ○ Site discharges directly to tidal waters or a fifth order or larger stream.
- ○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ● Yes ○ No

If Yes, Identify the entity responsible for the long term Operation and Maintenance

PROPERTY OWNER

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

The Water Quality Volume for this project has not been reduced completely due to the following limitations. The Green Infrastructure Runoff Reduction Techniques and Standard SMPs with RRv capacity have been evaluated and determined to be infeasible for use with the proposed project. The stormwater runoff contributed by the proposed facility rooftops has been addressed by being captured and treated in the proposed Infiltration Basin (I-2). This eliminates the possible incorporation of Sheet flow to riparian buffers, Disconnection of rooftop runoff, Rain gardens, Green roof, Stormwater planter and Rain Tank/Cistern Runoff Reduction Techniques. Additionally, the use of porous pavement is not feasible as a Runoff Reduction practice for this project due to the use of winter sanding which would reduce the effectiveness of this application.

5396372690

40. Identify other DEC permits, existing and new, that are required for this project/facility.

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ○ Individual SPDES
- ○ SPDES Multi-Sector GP [N][Y][R][ ][ ][ ][ ][ ][ ]
- ○ Other [ ]
- ● None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ● No
If Yes, Indicate Size of Impact. [ ][ ][ ][ ][ ][ ].[ ]

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● Yes ○ No
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ○ Yes ● No

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. [N][Y][R][ ][ ][ ][ ][ ][ ]

8741372697

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name

MI

Print Last Name

Owner/Operator Signature

Date

/ /

APPENDIX 2

Draft Notice of Termination

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person:	4a.Telephone:

4b. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name: Warehouse Expansion/Star Warehouse

6. Street Address: 20 Industry Drive

7. City/Zip: Cornwall, 12518

8. County: Orange

III. Reason for Termination

9a. □ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. ***Date final stabilization completed** (month/year): _____

9b. □ Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ___ ___ ___ ___ ___ ___

(Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. □ Other (Explain on Page 2)

IV. Final Site Information:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? ☒ yes □ no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? □ yes □ no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

Property Owner

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? □ yes □ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

□ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

□ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

□ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

□ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? 1.5 Acres (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? ☒ yes □ no

(If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation:

(Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:	
Title/Position:	
Signature:	Date:

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued	
VII. Qualified Inspector Certification - Final Stabilization:	
I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:
VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):	
I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:
IX. Owner or Operator Certification	
I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:

(NYS DEC Notice of Termination - January 2015)

APPENDIX 3

Draft MS4 Acceptance Form

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NYS Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information
1. Owner/Operator Name:
2. Contact Person:
3. Street Address:
4. City/State/Zip:
II. Project Site Information
5. Project/Site Name: Warehouse Expansion/Star Warehouse
6. Street Address: 20 Industry Drive
7. City/State/Zip: Cornwall, NY, 12518
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information
8. SWPPP Reviewed by:
9. Title/Position:
10. Date Final SWPPP Reviewed and Accepted:
IV. Regulated MS4 Information
11. Name of MS4: Town of Cornwall
12. MS4 SPDES Permit Identification Number: NYR20A
13. Contact Person:
14. Street Address:
15. City/State/Zip:
16. Telephone Number:

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

Title/Position:

Signature:

Date:

VI. Additional Information

(NYS DEC - MS4 SWPPP Acceptance Form - January 2015)

APPENDIX 4

SWPPP Certifications

I. Application Information:

RECORD OWNER:	Cornwall Properties, LLC
RECORD APPLICANT:	Cornwall Properties, LLC
CURRENT SITE ADDRESS:	20 Industry Drive Cornwall, NY 12518

II. Certifications:

SWPPP Preparation Certification:

I hereby certify that all components of this Storm Water Pollution Prevention Plan have been prepared in accordance with the requirements set for by the New York State Department of Environmental Conservation Stormwater Management Design Manual and SPDES General Permit for Stormwater Discharges.

_____

SWPPP Preparer (Qualified Professional)

Owner/Operator Certification:

I hereby certify that all requirements of this Storm Water Pollution Prevention Plan will be adhered to during the construction of the Star Warehouse Project. I have thoroughly reviewed the components of the SWPPP and understand the requirements therein. Should the ownership of the project change at any point prior to the completion of construction, the new owner will be provided with a complete copy of the Storm Water Pollution Plan and advised of its requirements.

_____

Project Owner

Contractor and Subcontractor Certification:

I hereby certify that all requirements of this Storm Water Pollution Prevention Plan will be adhered to during the construction of the Star Warehouse Project. I have thoroughly reviewed the components of the SWPPP and understand the requirements therein. Should the contractor or subcontractors of the project change at any point prior to the completion of construction, the new contractor or subcontractors will be provided with a complete copy of the Storm Water Pollution Plan and advised of its requirements.

_____
Contractor

_____
Contractor

_____
Contractor

_____
Subcontractor

_____
Subcontractor

_____
Subcontractor

_____
Subcontractor

_____
Subcontractor

_____
Subcontractor

_____
Subcontractor

APPENDIX 5

Drainage Basin Maps

PIETRZAK & PFAU
ENGINEERING & SURVEYING, PLLC

262 GREENWICH AVENUE, SUITE A
GOSHEN, NEW YORK 10924
TEL: (845) 294-0606

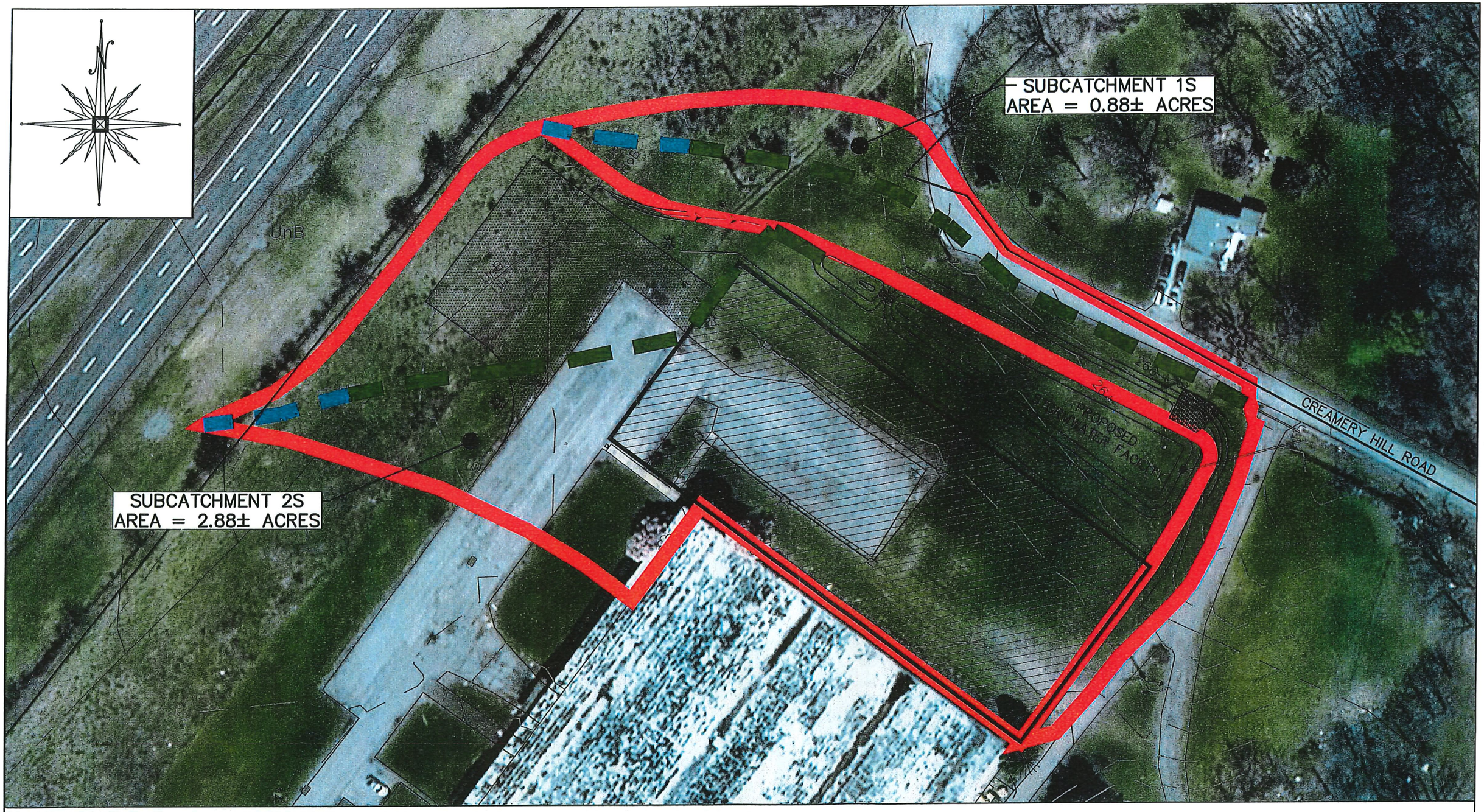
EXISTING CONDITIONS

TOWN OF CORNWALL
COUNTY OF ORANGE, NEW YORK
SECTION 33 BLOCK 1 LOT 49.12

SCALE: 1"=60'

LEGEND

- SHEET FLOW
- SHALLOW CONCENTRATED FLOW
- DRAINAGE BASIN BOUNDARY



PIETRZAK & PFAU
ENGINEERING & SURVEYING, PLLC

262 GREENWICH AVENUE, SUITE A
GOSHEN, NEW YORK 10924
TEL: (845) 294-0606

PROPOSED CONDITIONS

TOWN OF CORNWALL
COUNTY OF ORANGE, NEW YORK
SECTION 33 BLOCK 1 LOT 49.12

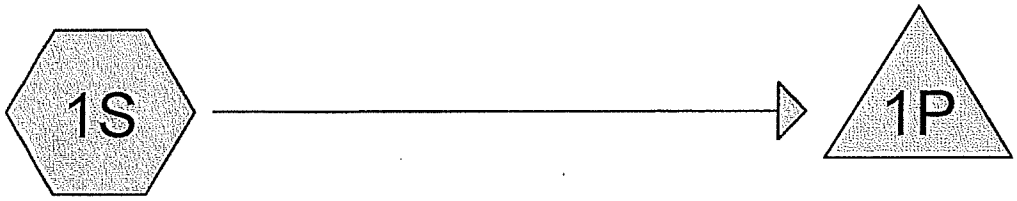
SCALE: 1"=60'

LEGEND

- SHEET FLOW
- SHALLOW CONCENTRATED FLOW
- DRAINAGE BASIN BOUNDARY

APPENDIX 6

TR-20 Hydro-CAD Calculations – Existing Conditions



Subcatchment 1S

Design Point 1P

Subcat Reach Pond Link

Drainage Diagram for Existing Conditions
Prepared by Pietrzak & Pfau Engineering and Surveying, PLLC

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=3.760 ac Runoff Depth=0.05"
Flow Length=734' Tc=16.4 min CN=50 Runoff=0.03 cfs 0.016 af

Pond 1P: Design Point 1P Inflow=0.03 cfs 0.016 af
Primary=0.03 cfs 0.016 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.016 af Average Runoff Depth = 0.05"

Subcatchment 1S: Subcatchment 1S

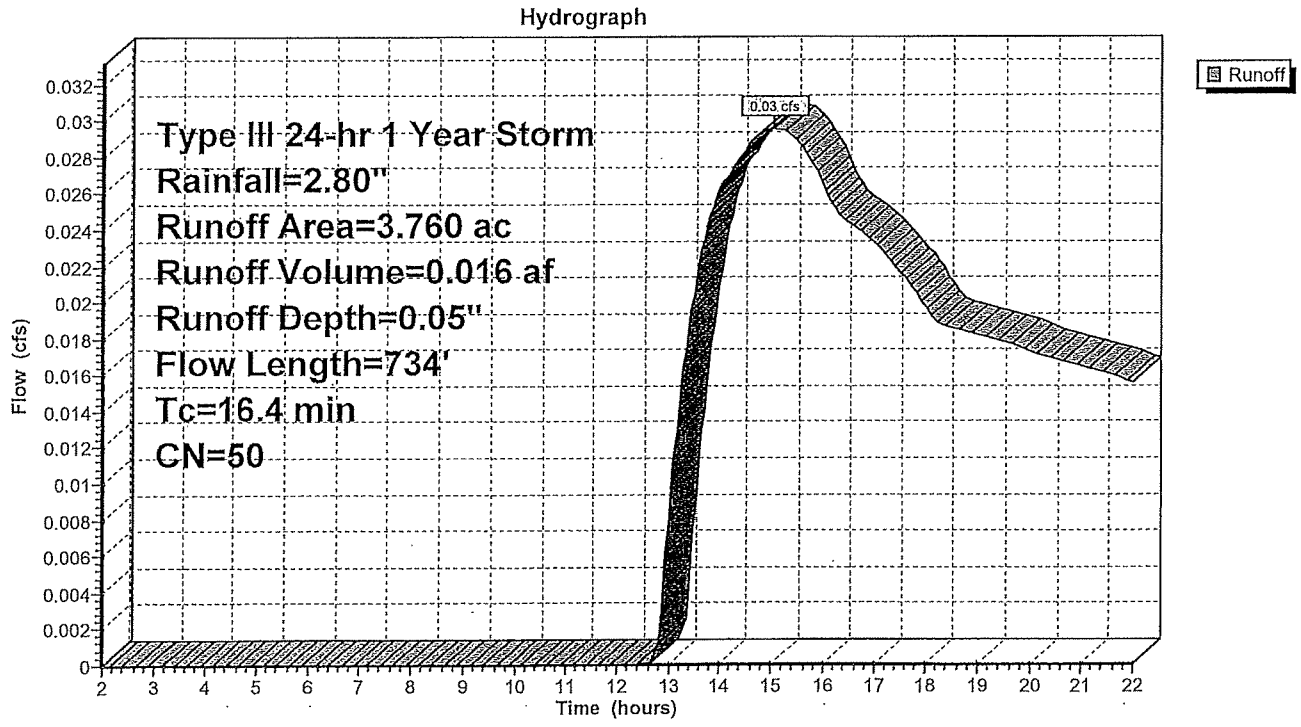
Runoff = 0.03 cfs @ 15.05 hrs, Volume= 0.016 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Storm Rainfall=2.80"

Area (ac)	CN	Description
2.510	39	>75% Grass cover, Good, HSG A
0.610	98	Existing Impervious Area
0.250	35	Brush, Fair, HSG A
0.390	56	Brush, Fair, HSG B
3.760	50	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
2.0	145	0.0140	1.2		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0150	2.5		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
5.4	402	0.0320	1.3		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
16.4	734	Total			

Subcatchment 1S: Subcatchment 1S

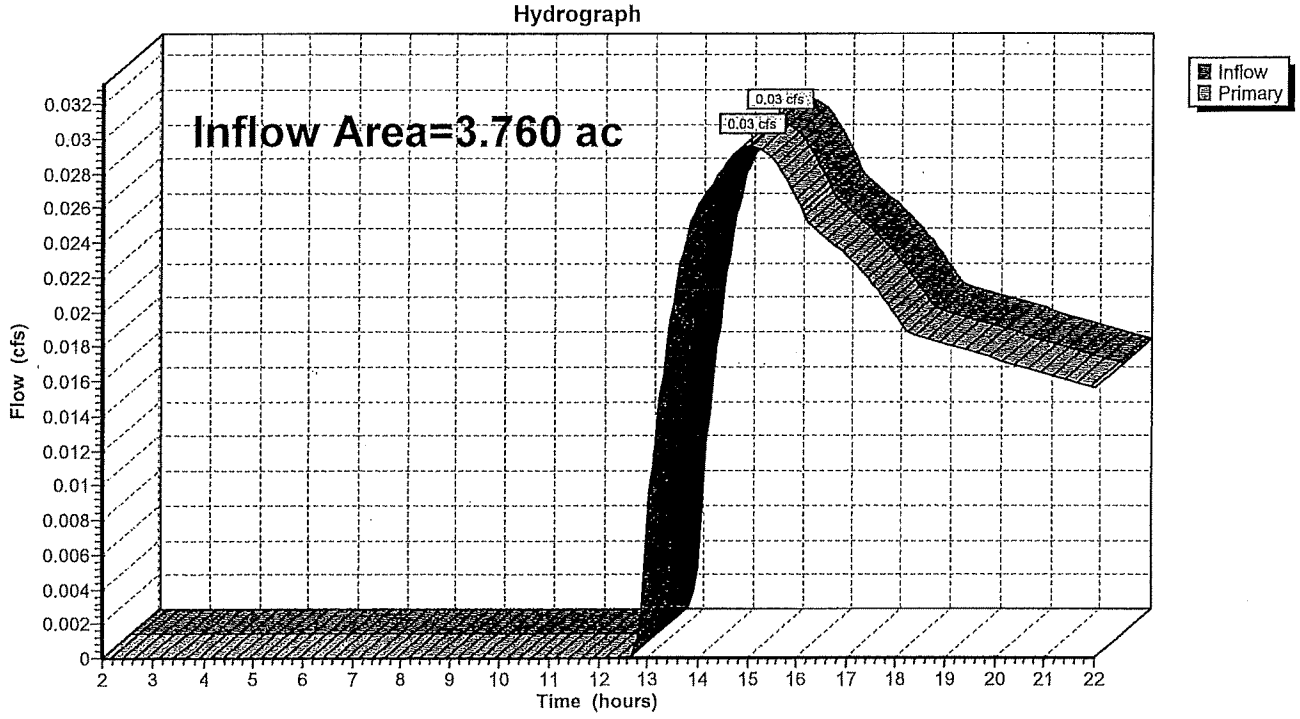


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 0.05" for 1 Year Storm event
Inflow = 0.03 cfs @ 15.05 hrs, Volume= 0.016 af
Primary = 0.03 cfs @ 15.05 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=3.760 ac Runoff Depth=0.18"
Flow Length=734' Tc=16.4 min CN=50 Runoff=0.19 cfs 0.056 af

Pond 1P: Design Point 1P Inflow=0.19 cfs 0.056 af
Primary=0.19 cfs 0.056 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.056 af Average Runoff Depth = 0.18"

Subcatchment 1S: Subcatchment 1S

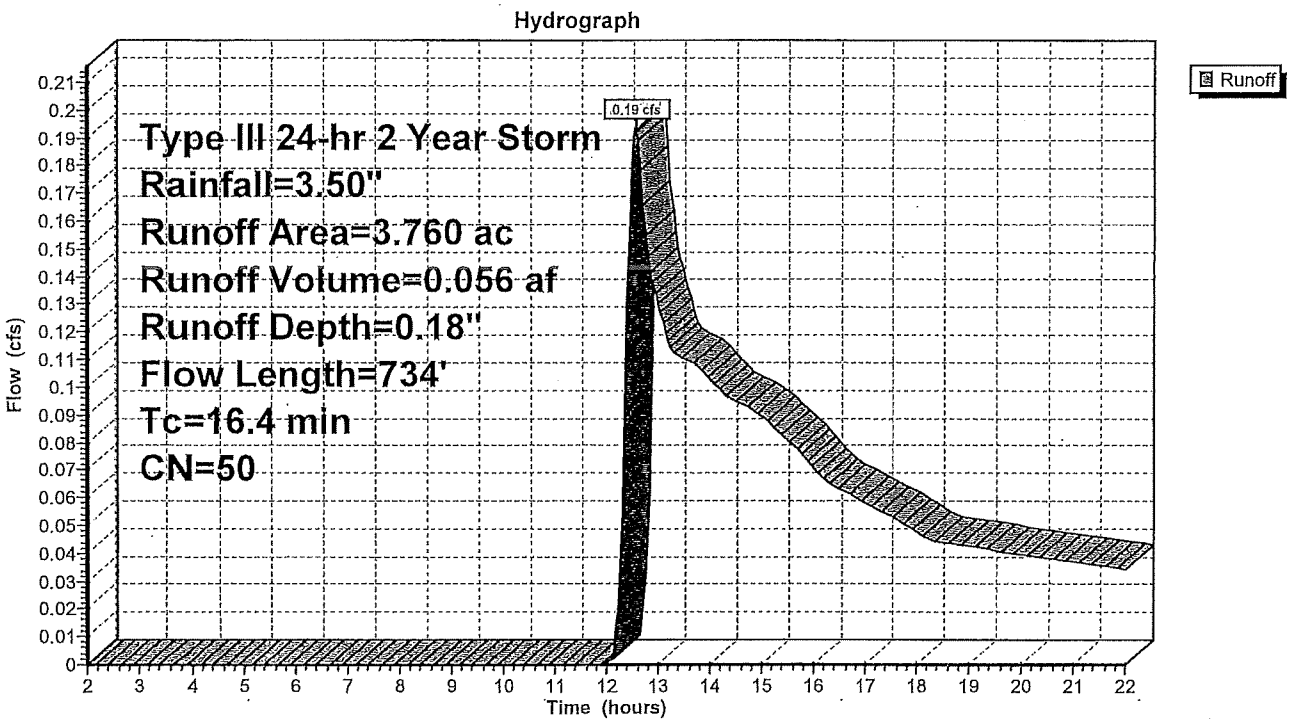
Runoff = 0.19 cfs @ 12.56 hrs, Volume= 0.056 af, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.50"

Area (ac)	CN	Description
2.510	39	>75% Grass cover, Good, HSG A
0.610	98	Existing Impervious Area
0.250	35	Brush, Fair, HSG A
0.390	56	Brush, Fair, HSG B
3.760	50	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
2.0	145	0.0140	1.2		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0150	2.5		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
5.4	402	0.0320	1.3		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
16.4	734	Total			

Subcatchment 1S: Subcatchment 1S

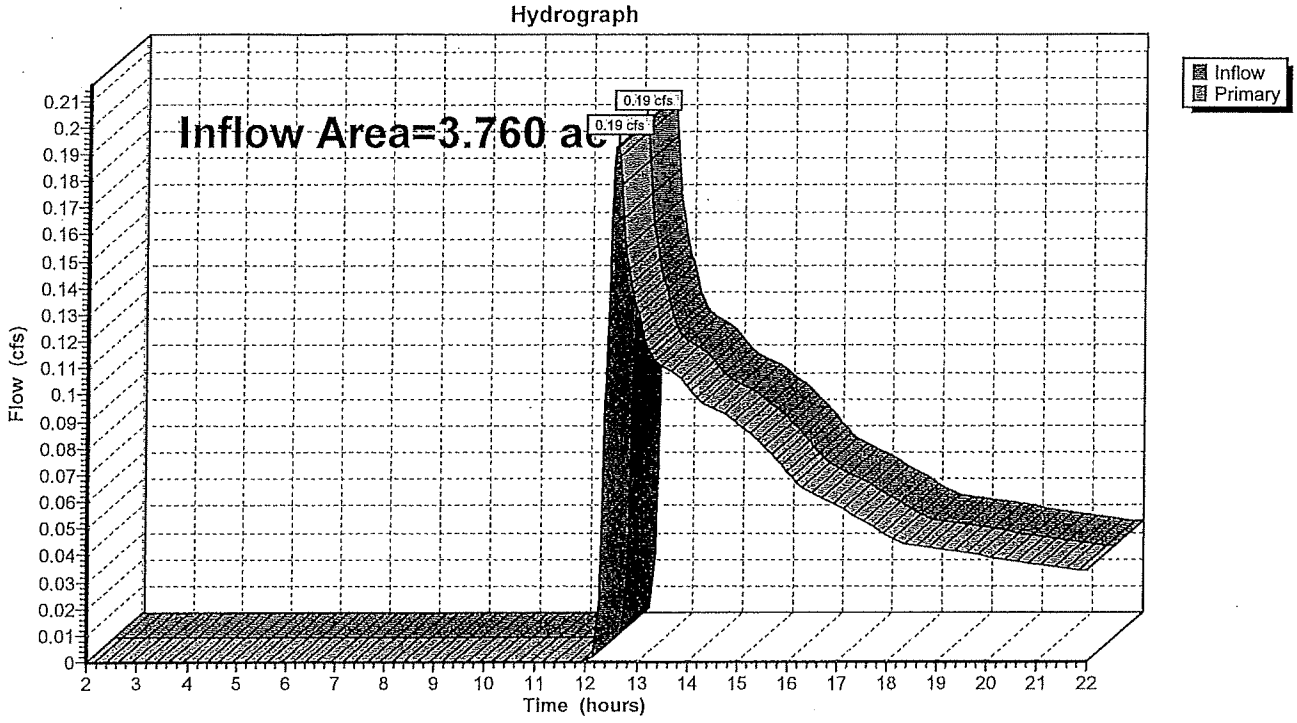


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 0.18" for 2 Year Storm event
Inflow = 0.19 cfs @ 12.56 hrs, Volume= 0.056 af
Primary = 0.19 cfs @ 12.56 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=3.760 ac Runoff Depth=0.65"
Flow Length=734' Tc=16.4 min CN=50 Runoff=1.42 cfs 0.203 af

Pond 1P: Design Point 1P Inflow=1.42 cfs 0.203 af
Primary=1.42 cfs 0.203 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.203 af Average Runoff Depth = 0.65"

Subcatchment 1S: Subcatchment 1S

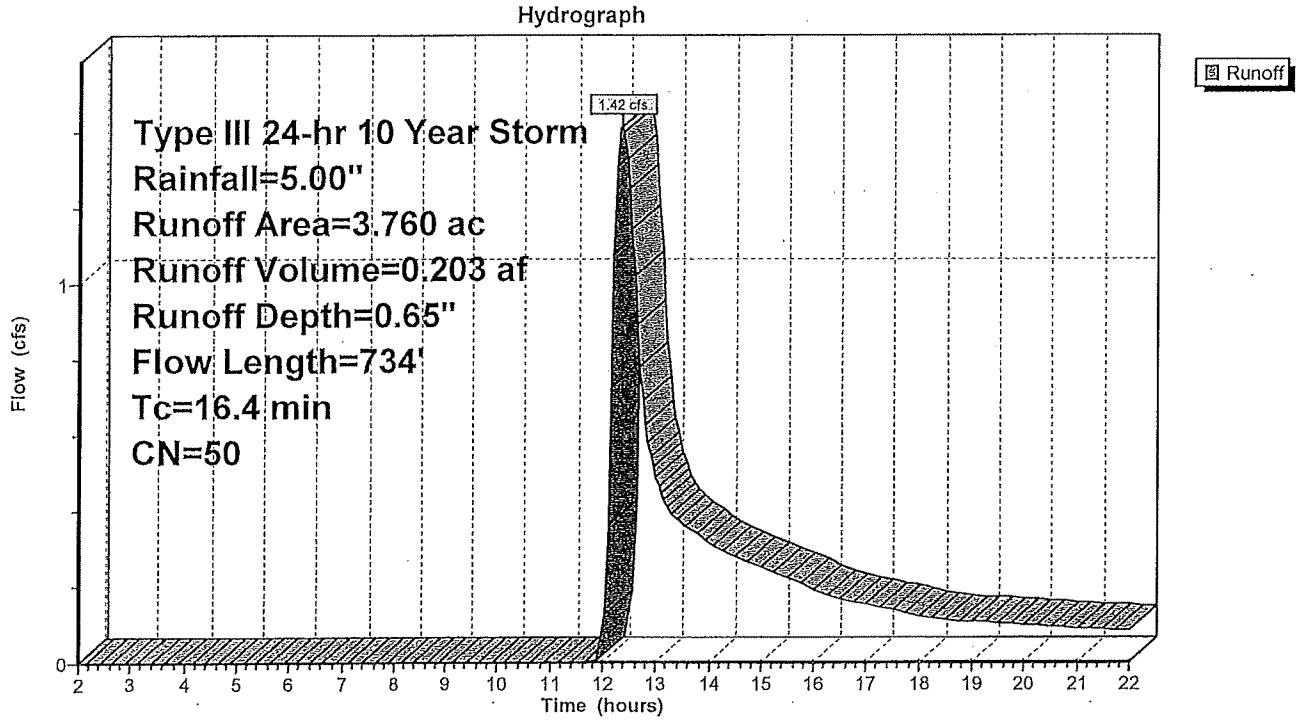
Runoff = 1.42 cfs @ 12.33 hrs, Volume= 0.203 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=5.00"

Area (ac)	CN	Description
2.510	39	>75% Grass cover, Good, HSG A
0.610	98	Existing Impervious Area
0.250	35	Brush, Fair, HSG A
0.390	56	Brush, Fair, HSG B
3.760	50	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
2.0	145	0.0140	1.2		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0150	2.5		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
5.4	402	0.0320	1.3		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
16.4	734	Total			

Subcatchment 1S: Subcatchment 1S

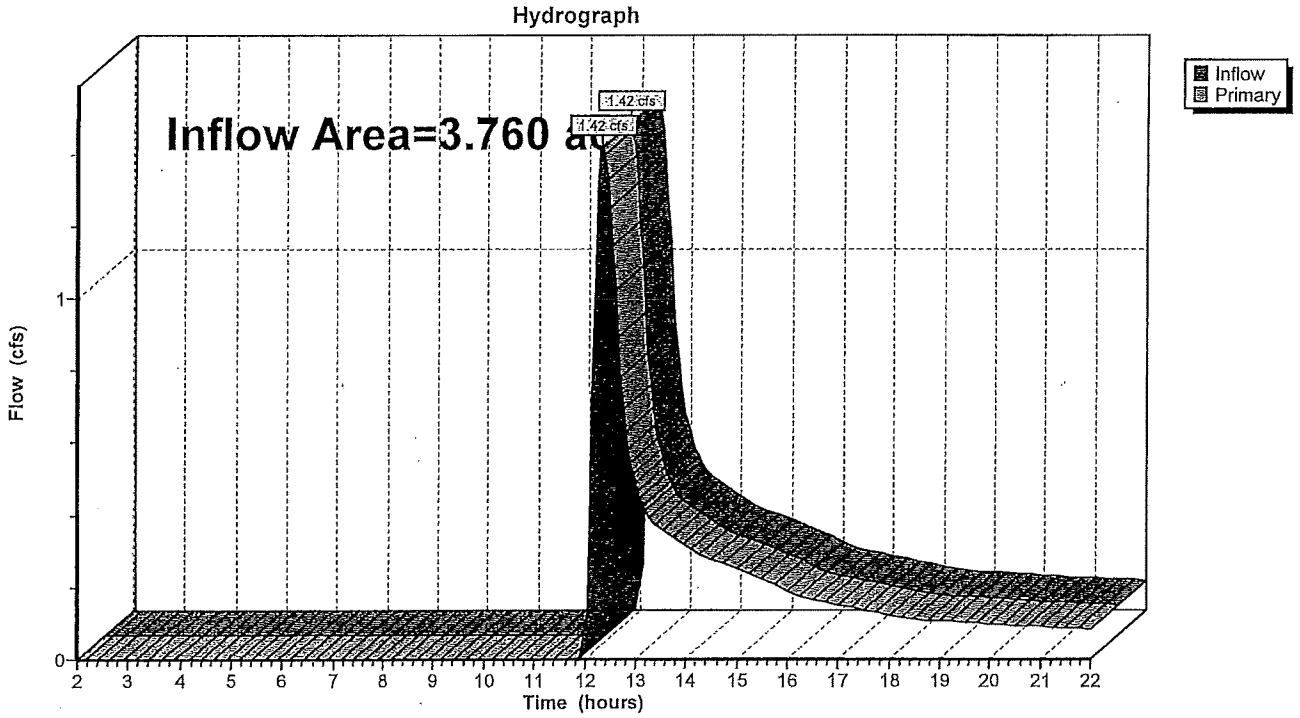


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 0.65" for 10 Year Storm event
Inflow = 1.42 cfs @ 12.33 hrs, Volume= 0.203 af
Primary = 1.42 cfs @ 12.33 hrs, Volume= 0.203 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=3.760 ac Runoff Depth=1.08"
Flow Length=734' Tc=16.4 min CN=50 Runoff=2.85 cfs 0.338 af

Pond 1P: Design Point 1P Inflow=2.85 cfs 0.338 af
Primary=2.85 cfs 0.338 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.338 af Average Runoff Depth = 1.08"

Subcatchment 1S: Subcatchment 1S

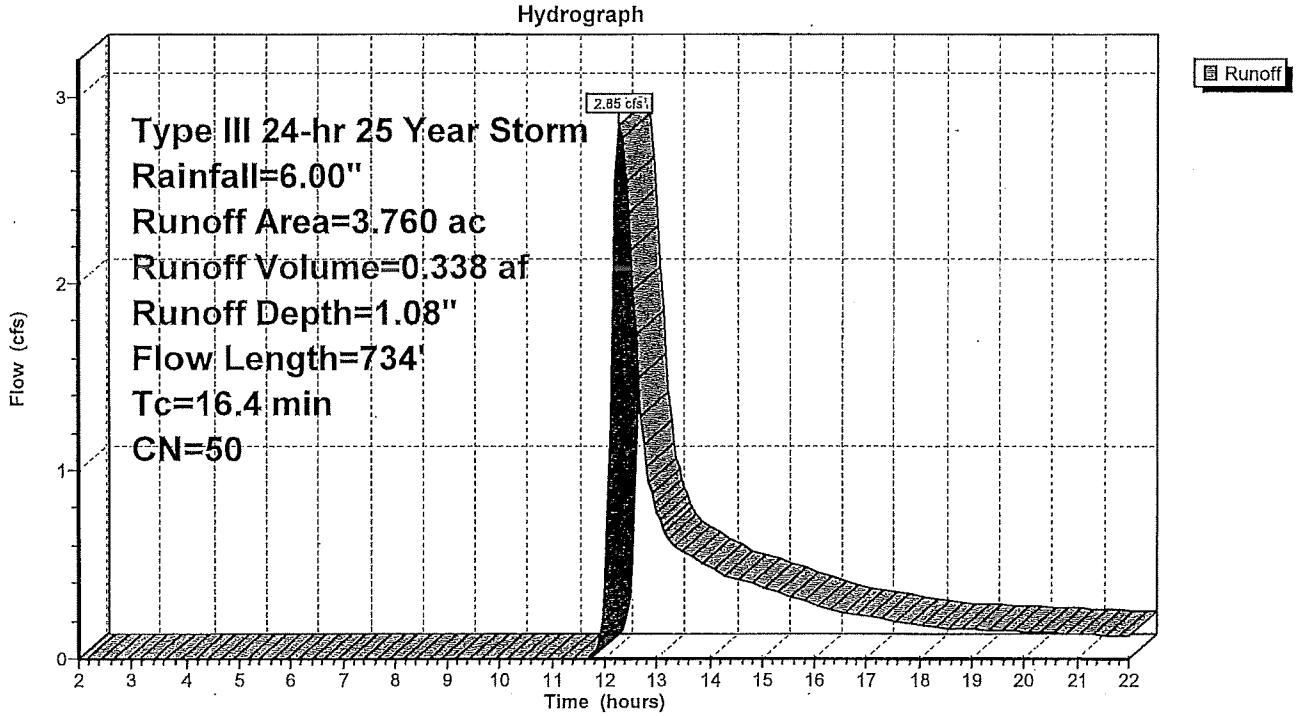
Runoff = 2.85 cfs @ 12.28 hrs, Volume= 0.338 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Storm Rainfall=6.00"

Area (ac)	CN	Description
2.510	39	>75% Grass cover, Good, HSG A
0.610	98	Existing Impervious Area
0.250	35	Brush, Fair, HSG A
0.390	56	Brush, Fair, HSG B
3.760	50	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
2.0	145	0.0140	1.2		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0150	2.5		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
5.4	402	0.0320	1.3		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
16.4	734	Total			

Subcatchment 1S: Subcatchment 1S

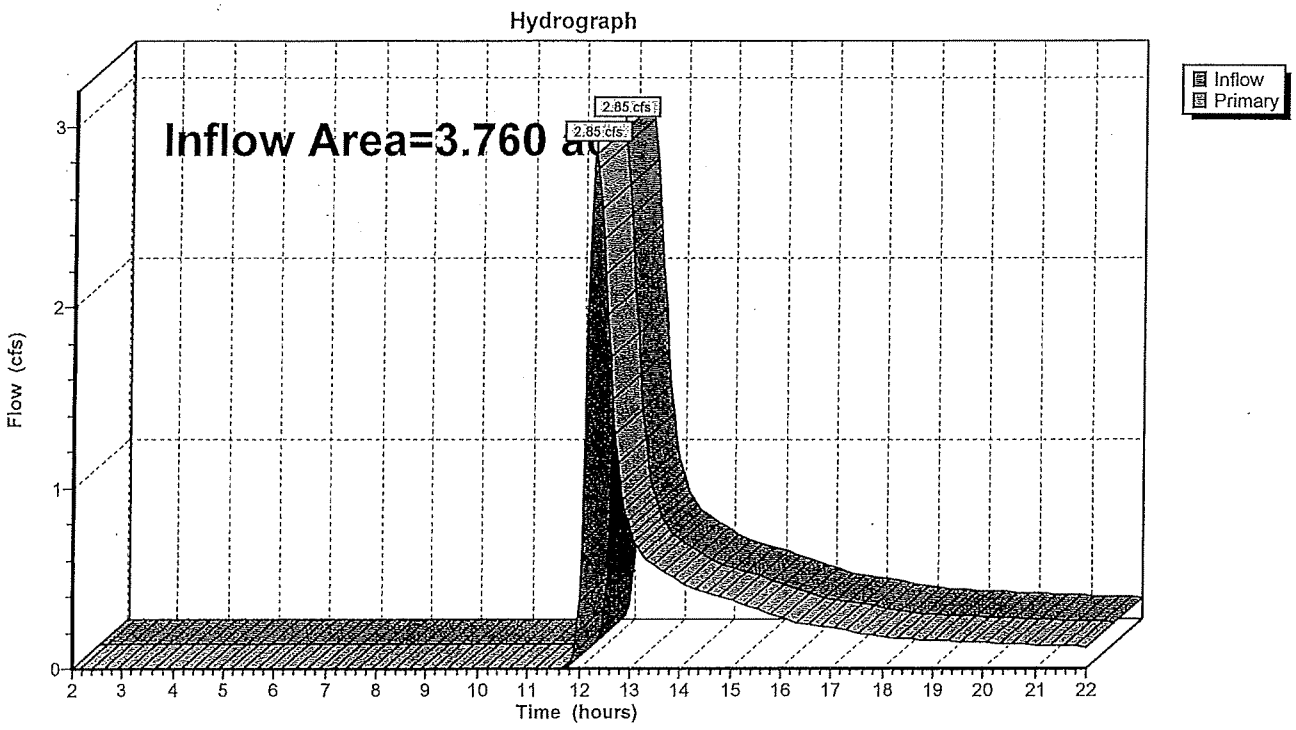


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 1.08" for 25 Year Storm event
Inflow = 2.85 cfs @ 12.28 hrs, Volume= 0.338 af
Primary = 2.85 cfs @ 12.28 hrs, Volume= 0.338 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=3.760 ac Runoff Depth=2.76"
Flow Length=734' Tc=16.4 min CN=50 Runoff=8.66 cfs 0.863 af

Pond 1P: Design Point 1P Inflow=8.66 cfs 0.863 af
Primary=8.66 cfs 0.863 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.863 af Average Runoff Depth = 2.76"

Subcatchment 1S: Subcatchment 1S

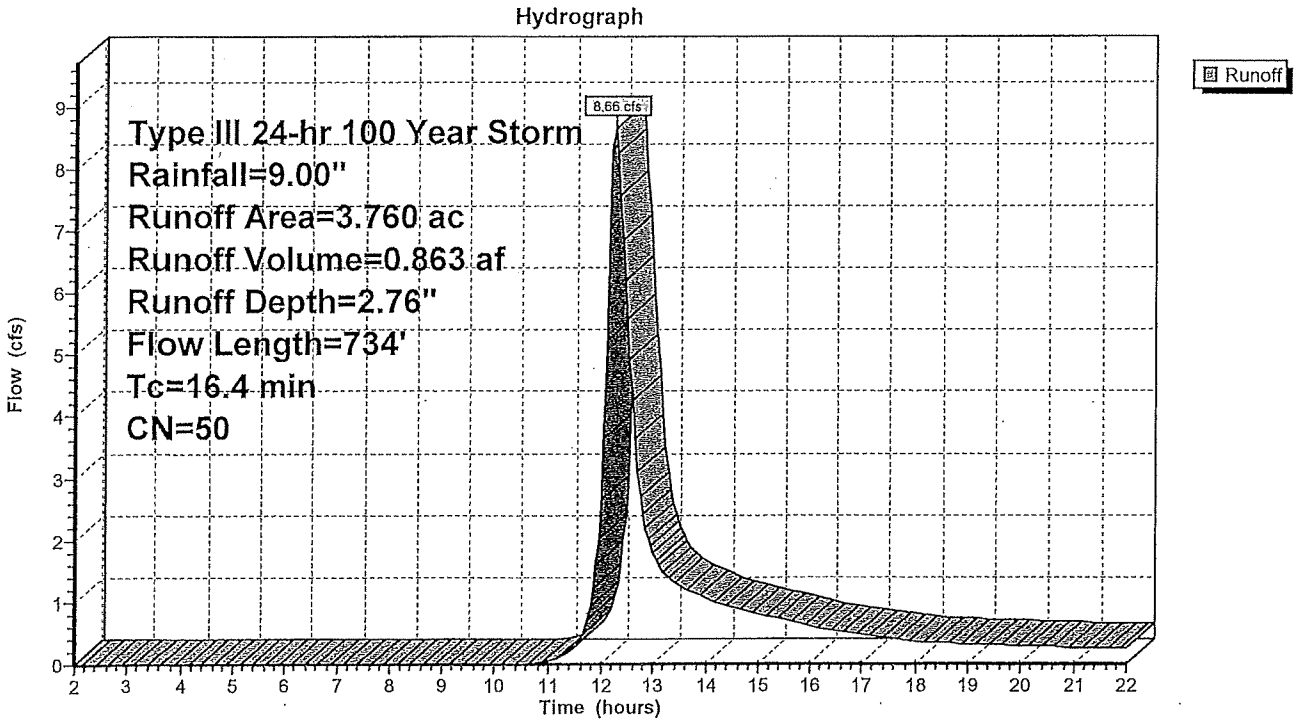
Runoff = 8.66 cfs @ 12.25 hrs, Volume= 0.863 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=9.00"

Area (ac)	CN	Description
2.510	39	>75% Grass cover, Good, HSG A
0.610	98	Existing Impervious Area
0.250	35	Brush, Fair, HSG A
0.390	56	Brush, Fair, HSG B
3.760	50	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
2.0	145	0.0140	1.2		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0150	2.5		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
5.4	402	0.0320	1.3		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
16.4	734	Total			

Subcatchment 1S: Subcatchment 1S

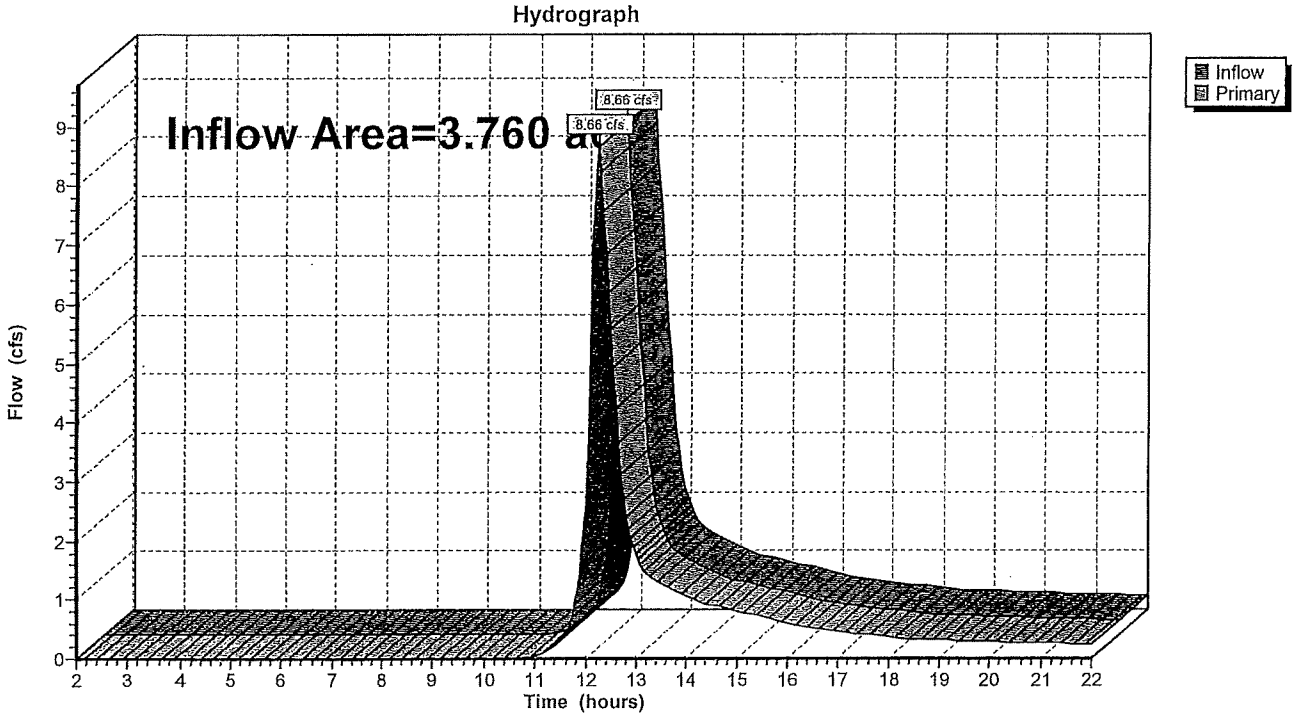


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 2.76" for 100 Year Storm event
Inflow = 8.66 cfs @ 12.25 hrs, Volume= 0.863 af
Primary = 8.66 cfs @ 12.25 hrs, Volume= 0.863 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=3.760 ac Runoff Depth=0.00"
Flow Length=734' Tc=16.4 min CN=50 Runoff=0.00 cfs 0.000 af

Pond 1P: Design Point 1P Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"

Subcatchment 1S: Subcatchment 1S

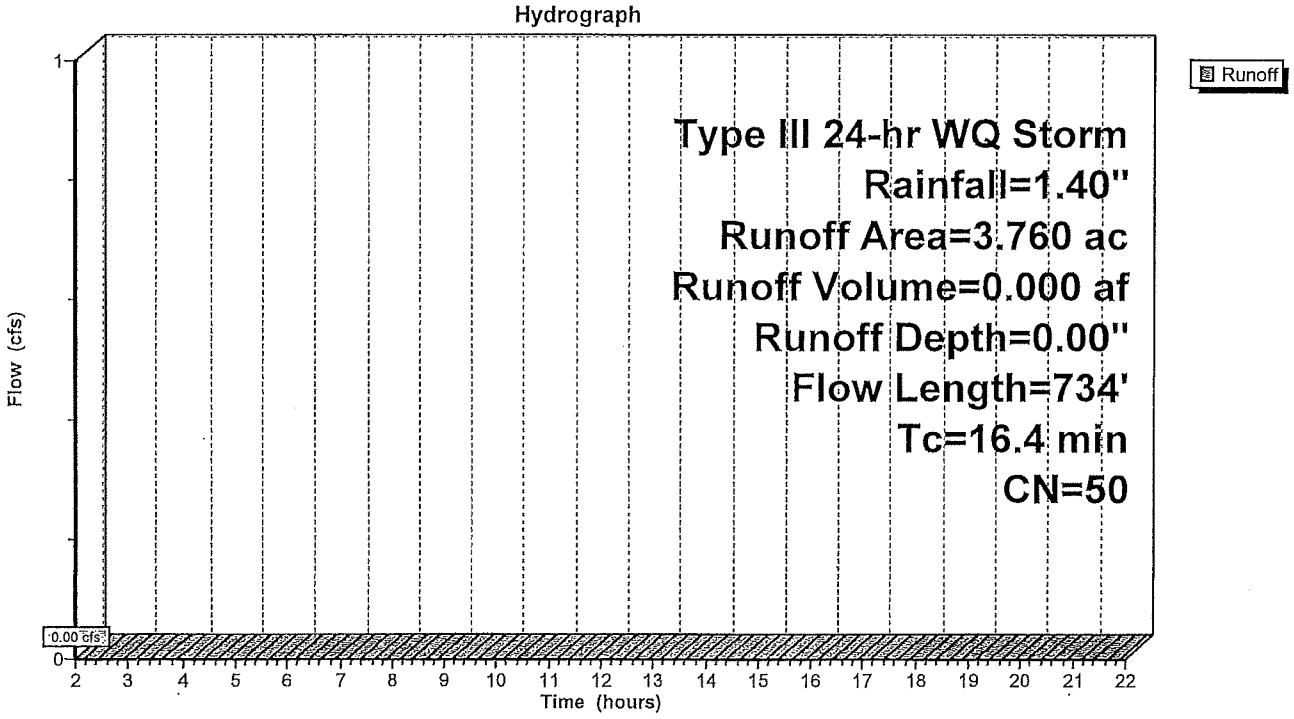
Runoff = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ Storm Rainfall=1.40"

Area (ac)	CN	Description
2.510	39	>75% Grass cover, Good, HSG A
0.610	98	Existing Impervious Area
0.250	35	Brush, Fair, HSG A
0.390	56	Brush, Fair, HSG B
3.760	50	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
2.0	145	0.0140	1.2		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0150	2.5		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
5.4	402	0.0320	1.3		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
16.4	734	Total			

Subcatchment 1S: Subcatchment 1S

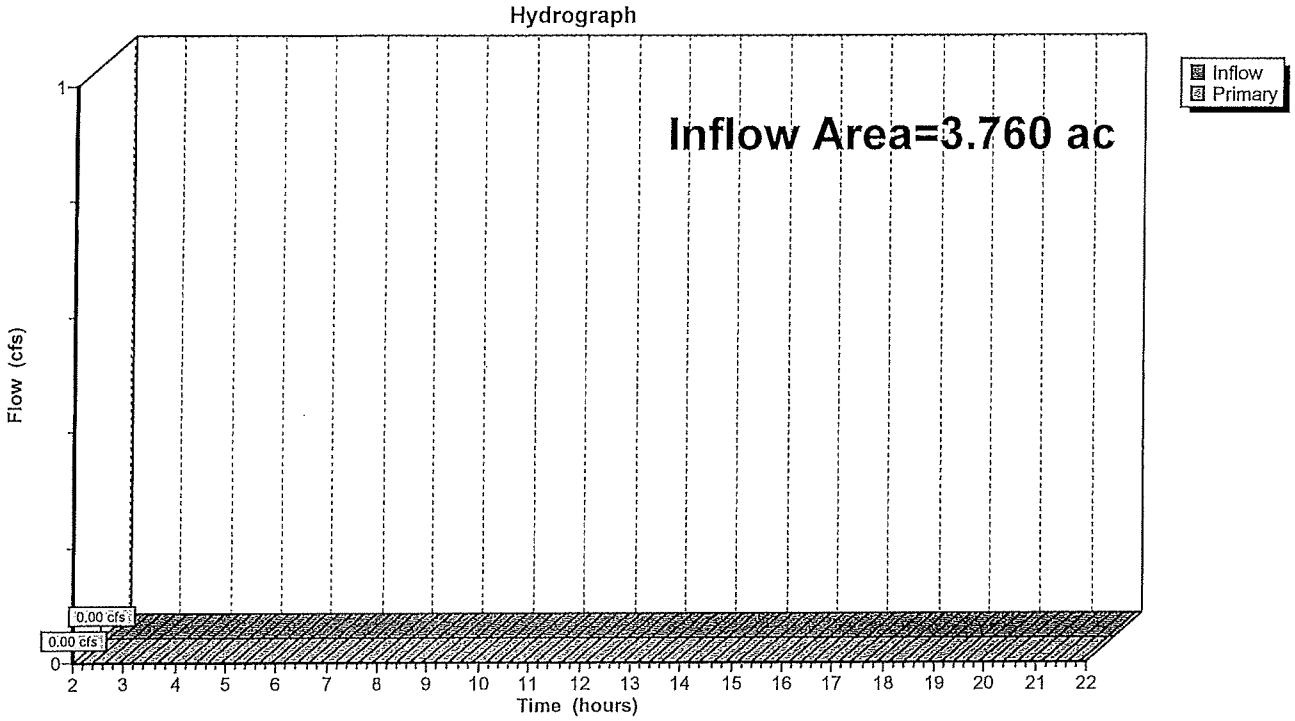


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 0.00" for WQ Storm event
Inflow = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

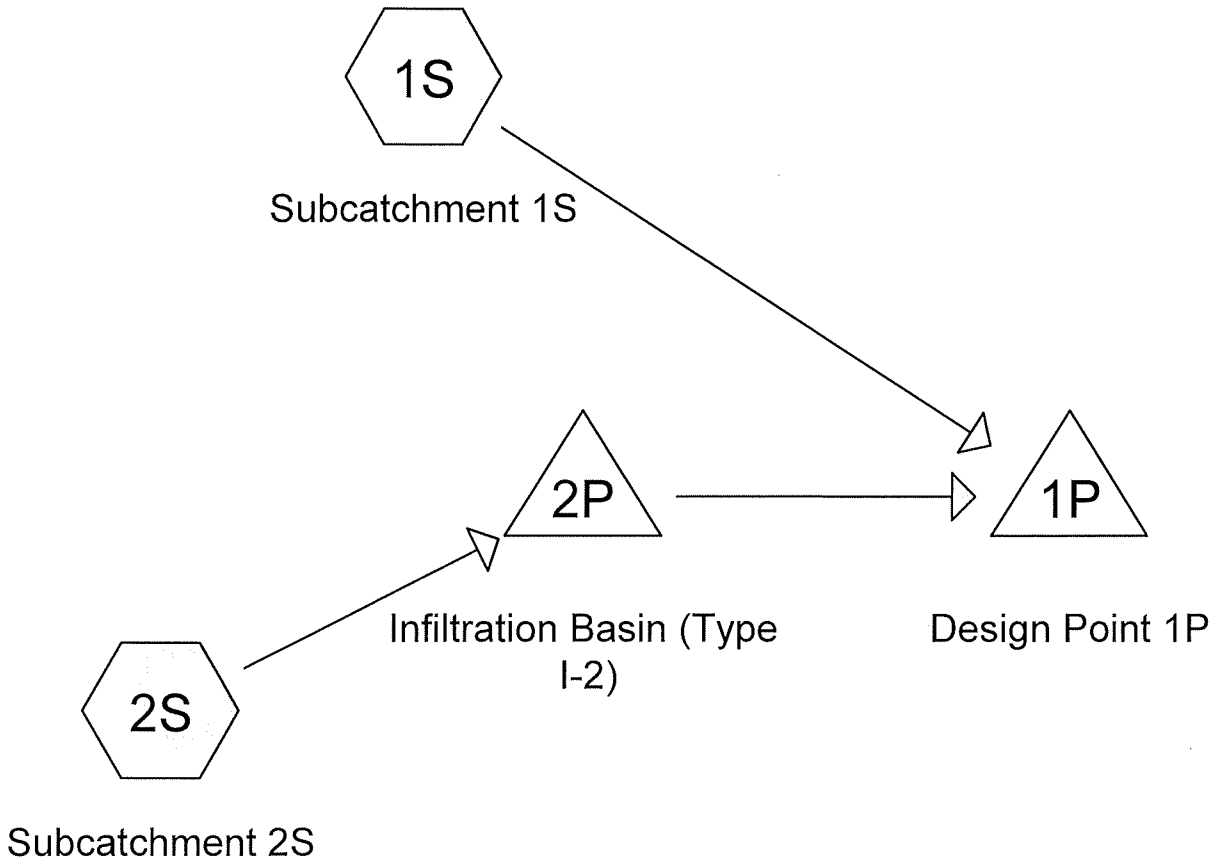
Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



APPENDIX 7

TR-20 Hydro-CAD Calculations – Proposed Conditions



Subcat Reach Pond Link

Drainage Diagram for Proposed Conditions
Prepared by Pietrzak & Pfau Engineering and Surveying, PLLC

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=0.880 ac Runoff Depth=0.01"
Flow Length=520' Tc=12.4 min CN=46 Runoff=0.00 cfs 0.001 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.880 ac Runoff Depth=0.84"
Flow Length=531' Tc=12.6 min CN=76 Runoff=2.23 cfs 0.203 af

Pond 1P: Design Point 1P Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af

Pond 2P: Infiltration Basin (Type I-2) Peak Elev=262.73' Storage=4,855 cf Inflow=2.23 cfs 0.203 af
Discarded=0.15 cfs 0.122 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.122 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.204 af Average Runoff Depth = 0.65"

Subcatchment 1S: Subcatchment 1S

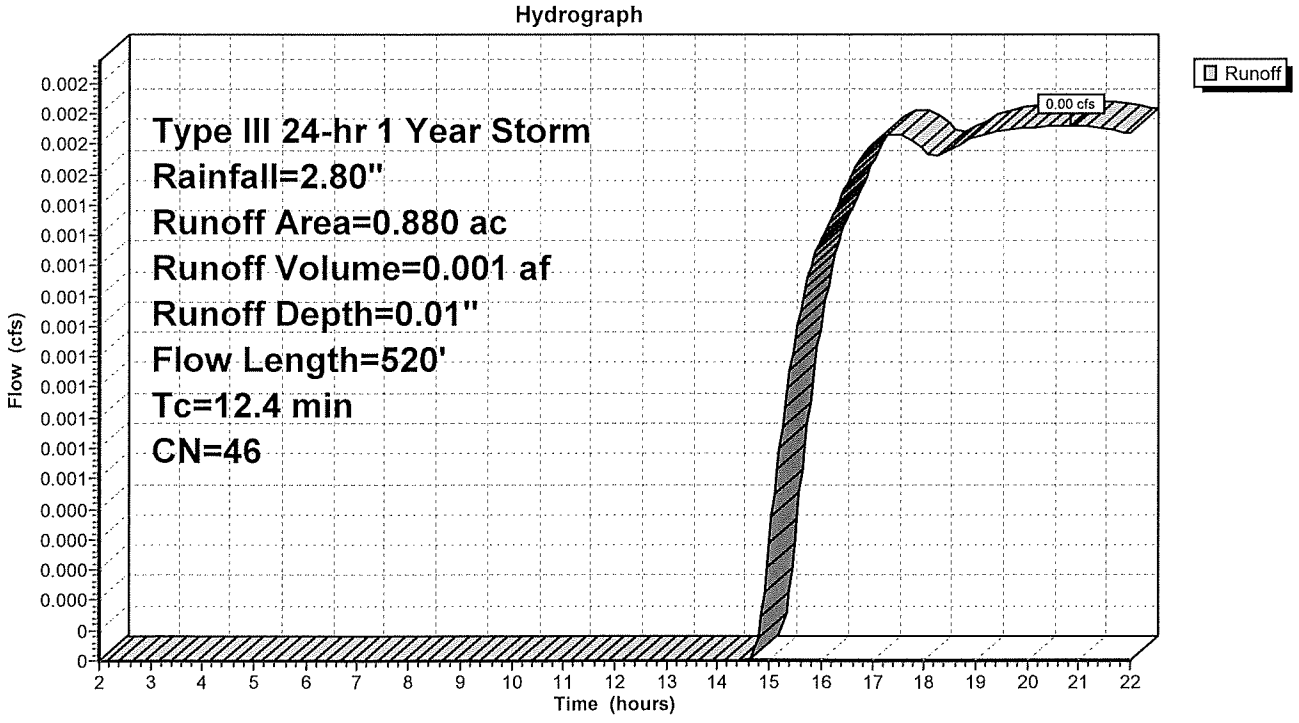
Runoff = 0.00 cfs @ 20.83 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Storm Rainfall=2.80"

Area (ac)	CN	Description
0.700	39	>75% Grass cover, Good, HSG A
0.090	98	Existing Impervious Area
0.050	35	Brush, Fair, HSG A
0.040	56	Brush, Fair, HSG B
0.880	46	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
4.0	420	0.0300	1.7		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
12.4	520	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

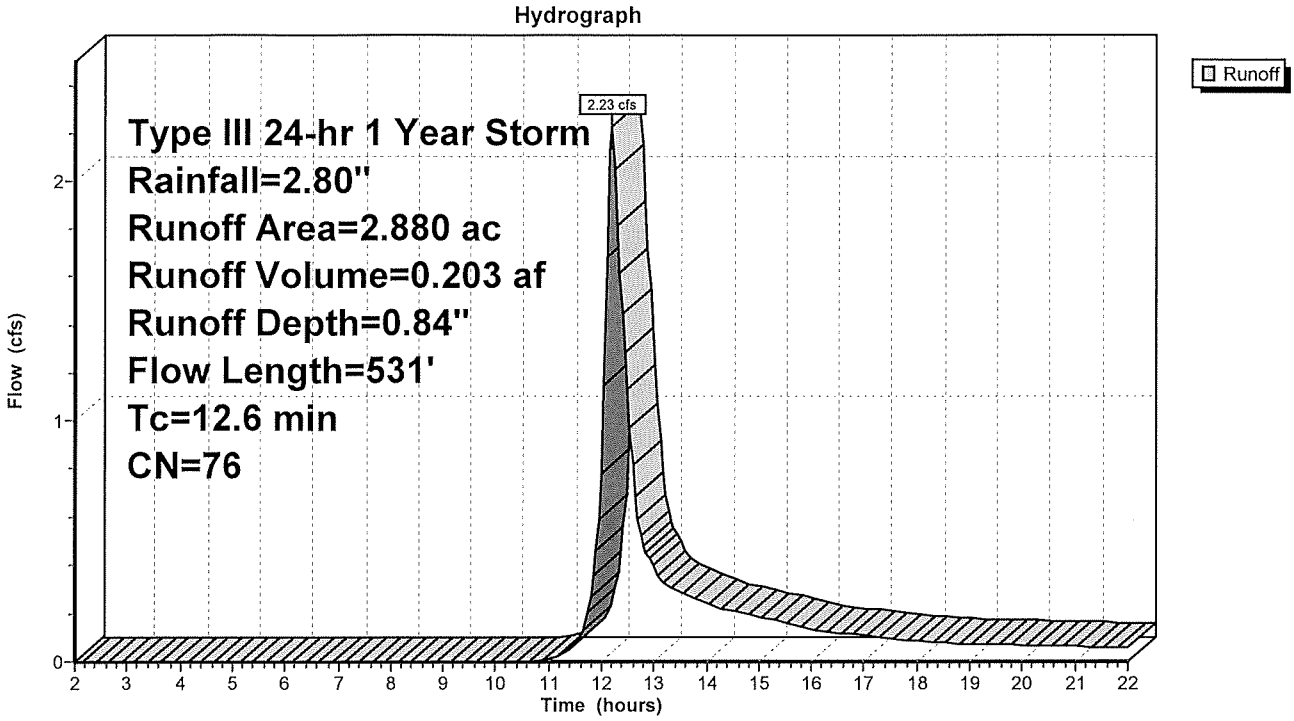
Runoff = 2.23 cfs @ 12.19 hrs, Volume= 0.203 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Storm Rainfall=2.80"

Area (ac)	CN	Description
0.770	39	>75% Grass cover, Good, HSG A
0.240	98	Existing Impervious Area
1.480	98	Proposed Impervious Area
0.130	35	Brush, Fair, HSG A
0.260	56	Brush, Fair, HSG B
2.880	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
1.6	107	0.0120	1.1		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
1.1	159	0.0140	2.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
0.7	60	0.0400	1.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.8	105	0.0190	2.1		**Shallow Concentrated Flow, Vegetated Swale** Grassed Waterway Kv= 15.0 fps
12.6	531	Total			

Subcatchment 2S: Subcatchment 2S

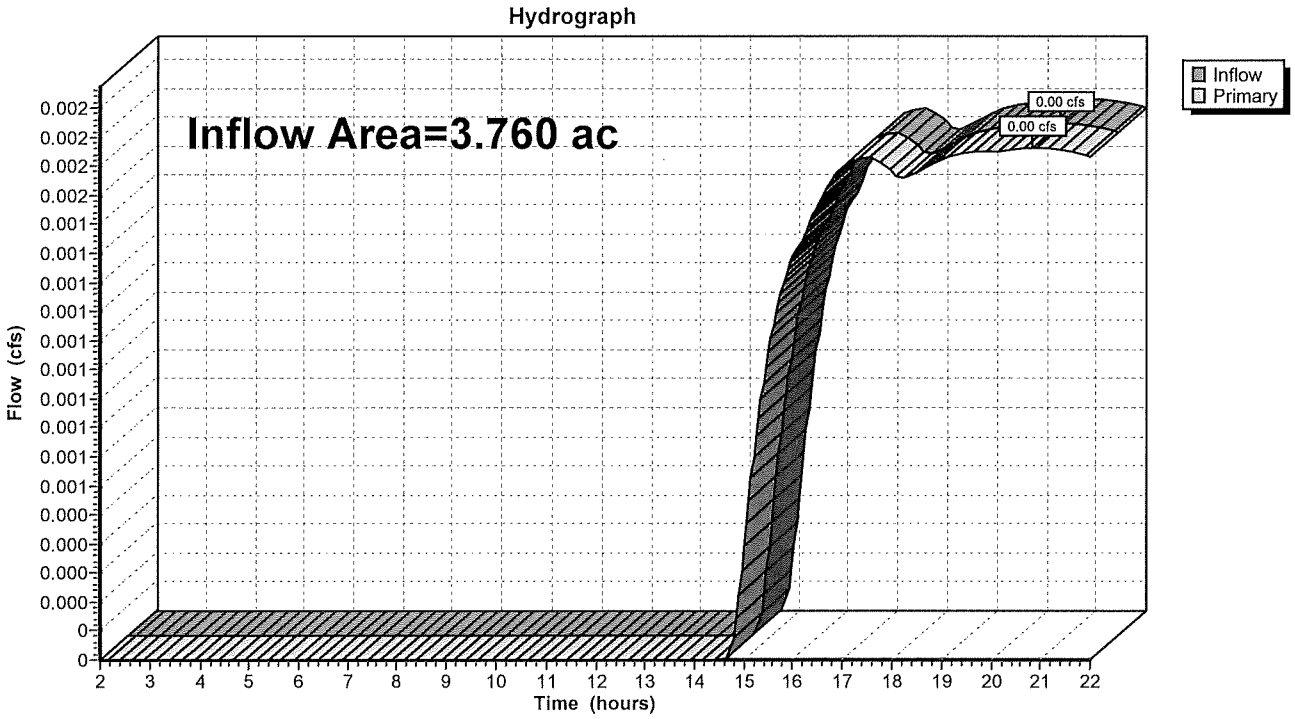


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 0.00" for 1 Year Storm event
Inflow = 0.00 cfs @ 20.83 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 20.83 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Pond 2P: Infiltration Basin (Type I-2)

Inflow Area = 2.880 ac, Inflow Depth = 0.84" for 1 Year Storm event
Inflow = 2.23 cfs @ 12.19 hrs, Volume= 0.203 af
Outflow = 0.15 cfs @ 15.84 hrs, Volume= 0.122 af, Atten= 93%, Lag= 218.7 min
Discarded = 0.15 cfs @ 15.84 hrs, Volume= 0.122 af
Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 262.73' @ 15.84 hrs Surf.Area= 6,272 sf Storage= 4,855 cf
Plug-Flow detention time= 267.2 min calculated for 0.122 af (60% of inflow)
Center-of-Mass det. time= 166.1 min (1,012.8 - 846.7)

#	Invert	Avail.Storage	Storage Description
1	262.00'	32,776 cf	**Custom Stage Data (Prismatic)** Listed below

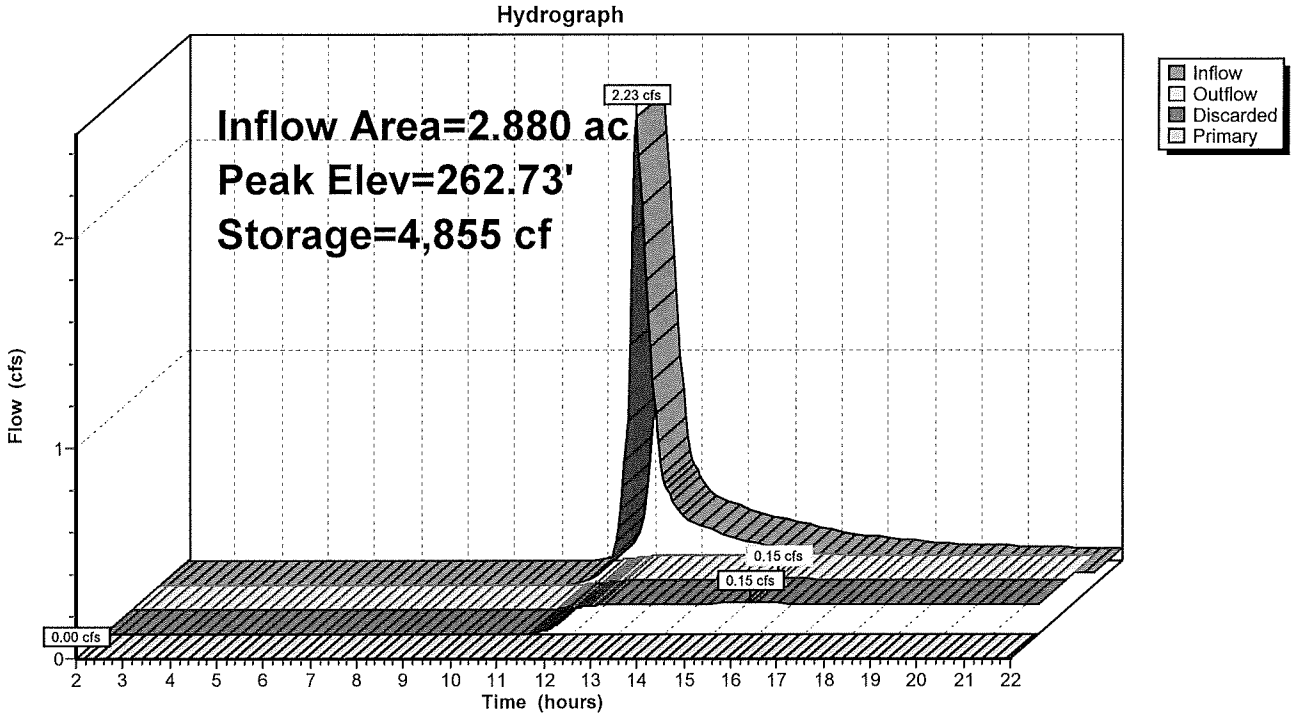
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
262.00	5,205	0	0
264.00	8,137	13,342	13,342
266.00	11,297	19,434	32,776

#	Routing	Invert	Outlet Devices
1	Primary	260.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 256.00' S= 0.0500 '/' n= 0.011 Cc= 0.900
2	Discarded	0.00'	**0.001400 fpm Exfiltration over entire Surface area**
3	Device 1	262.73'	**0.50' x 0.15' Vert. Orifice/Grate** C= 0.600
4	Device 1	263.05'	**8.0" Vert. Orifice/Grate** C= 0.600
5	Device 1	264.00'	**1.5' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
6	Device 1	265.00'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	265.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.15 cfs @ 15.84 hrs HW=262.73' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=262.00' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 4.63 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  ├**4=Orifice/Grate** (Controls 0.00 cfs)
  ├**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**6=Orifice/Grate** (Controls 0.00 cfs)
└**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin (Type I-2)



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=0.880 ac Runoff Depth=0.09"
Flow Length=520' Tc=12.4 min CN=46 Runoff=0.01 cfs 0.007 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.880 ac Runoff Depth=1.31"
Flow Length=531' Tc=12.6 min CN=76 Runoff=3.58 cfs 0.315 af

Pond 1P: Design Point 1P Inflow=0.19 cfs 0.080 af
Primary=0.19 cfs 0.080 af

Pond 2P: Infiltration Basin (Type I-2) Peak Elev=263.05' Storage=6,979 cf Inflow=3.58 cfs 0.315 af
Discarded=0.16 cfs 0.134 af Primary=0.18 cfs 0.074 af Outflow=0.33 cfs 0.207 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.322 af Average Runoff Depth = 1.03"

Subcatchment 1S: Subcatchment 1S

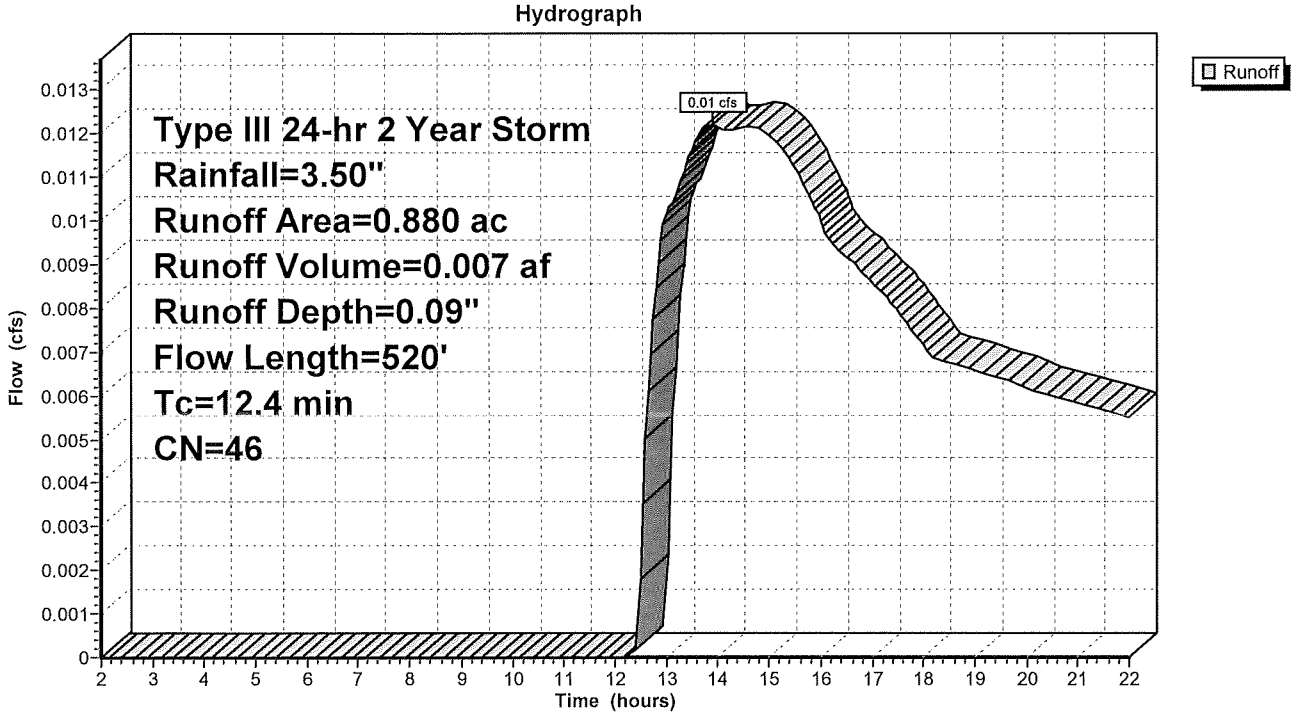
Runoff = 0.01 cfs @ 13.90 hrs, Volume= 0.007 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.50"

Area (ac)	CN	Description
0.700	39	>75% Grass cover, Good, HSG A
0.090	98	Existing Impervious Area
0.050	35	Brush, Fair, HSG A
0.040	56	Brush, Fair, HSG B
0.880	46	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
4.0	420	0.0300	1.7		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
12.4	520	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

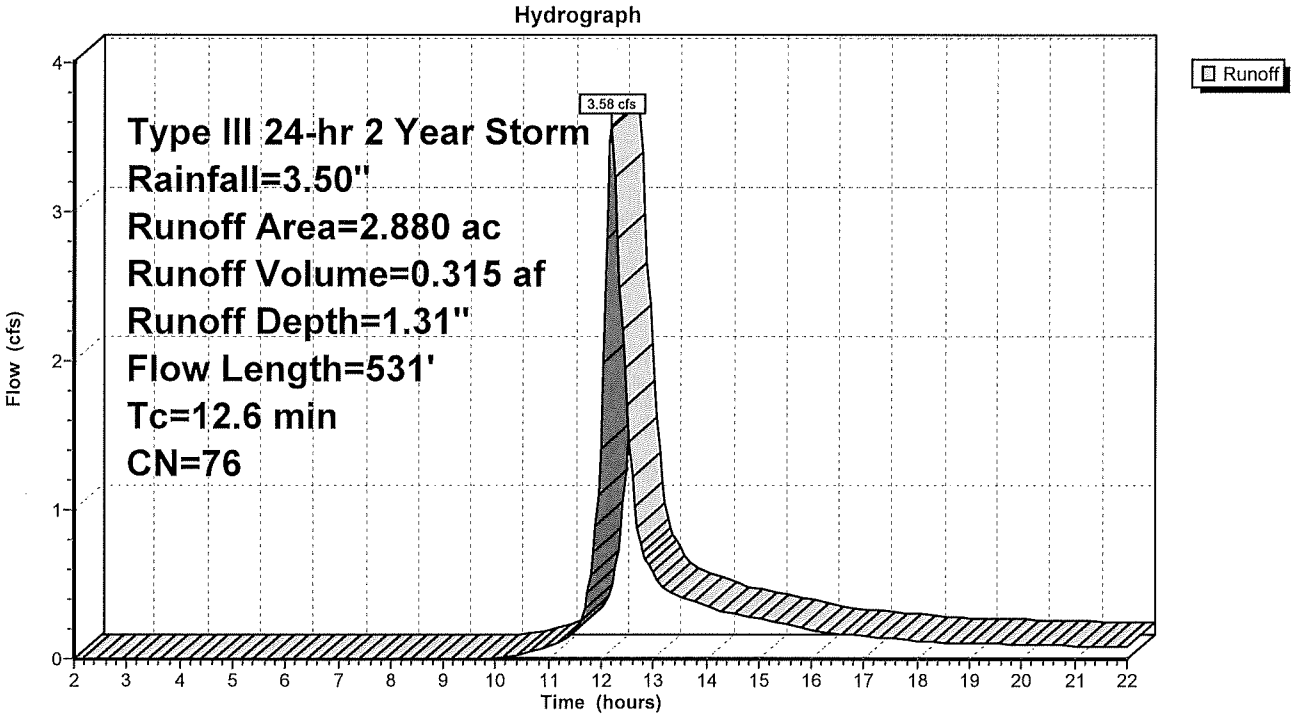
Runoff = 3.58 cfs @ 12.19 hrs, Volume= 0.315 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.50"

Area (ac)	CN	Description
0.770	39	>75% Grass cover, Good, HSG A
0.240	98	Existing Impervious Area
1.480	98	Proposed Impervious Area
0.130	35	Brush, Fair, HSG A
0.260	56	Brush, Fair, HSG B
2.880	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
1.6	107	0.0120	1.1		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
1.1	159	0.0140	2.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
0.7	60	0.0400	1.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.8	105	0.0190	2.1		**Shallow Concentrated Flow, Vegetated Swale** Grassed Waterway Kv= 15.0 fps
12.6	531	Total			

Subcatchment 2S: Subcatchment 2S

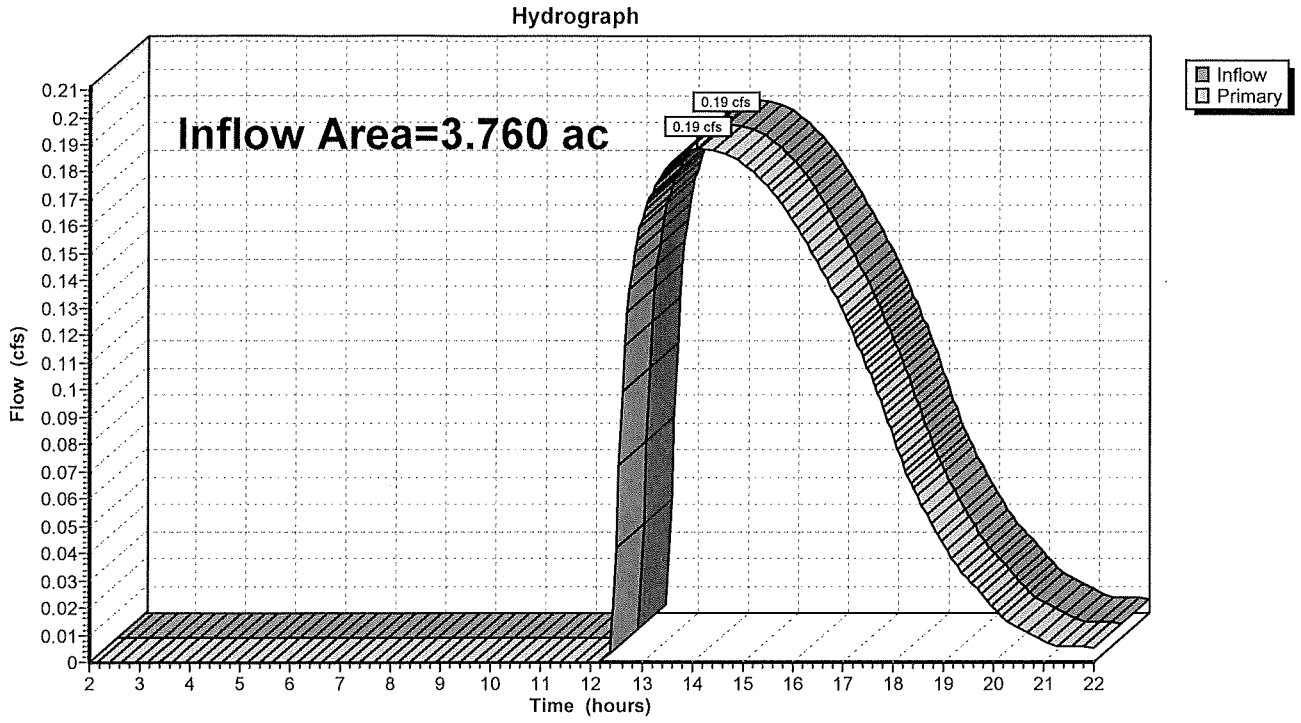


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 0.26" for 2 Year Storm event
Inflow = 0.19 cfs @ 14.11 hrs, Volume= 0.080 af
Primary = 0.19 cfs @ 14.11 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Pond 2P: Infiltration Basin (Type I-2)

Inflow Area = 2.880 ac, Inflow Depth = 1.31" for 2 Year Storm event
Inflow = 3.58 cfs @ 12.19 hrs, Volume= 0.315 af
Outflow = 0.33 cfs @ 14.15 hrs, Volume= 0.207 af, Atten= 91%, Lag= 117.7 min
Discarded = 0.16 cfs @ 14.15 hrs, Volume= 0.134 af
Primary = 0.18 cfs @ 14.15 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 263.05' @ 14.15 hrs Surf.Area= 6,739 sf Storage= 6,979 cf
Plug-Flow detention time= 228.1 min calculated for 0.207 af (66% of inflow)
Center-of-Mass det. time= 137.3 min (972.5 - 835.2)

#	Invert	Avail.Storage	Storage Description
1	262.00'	32,776 cf	**Custom Stage Data (Prismatic)** Listed below

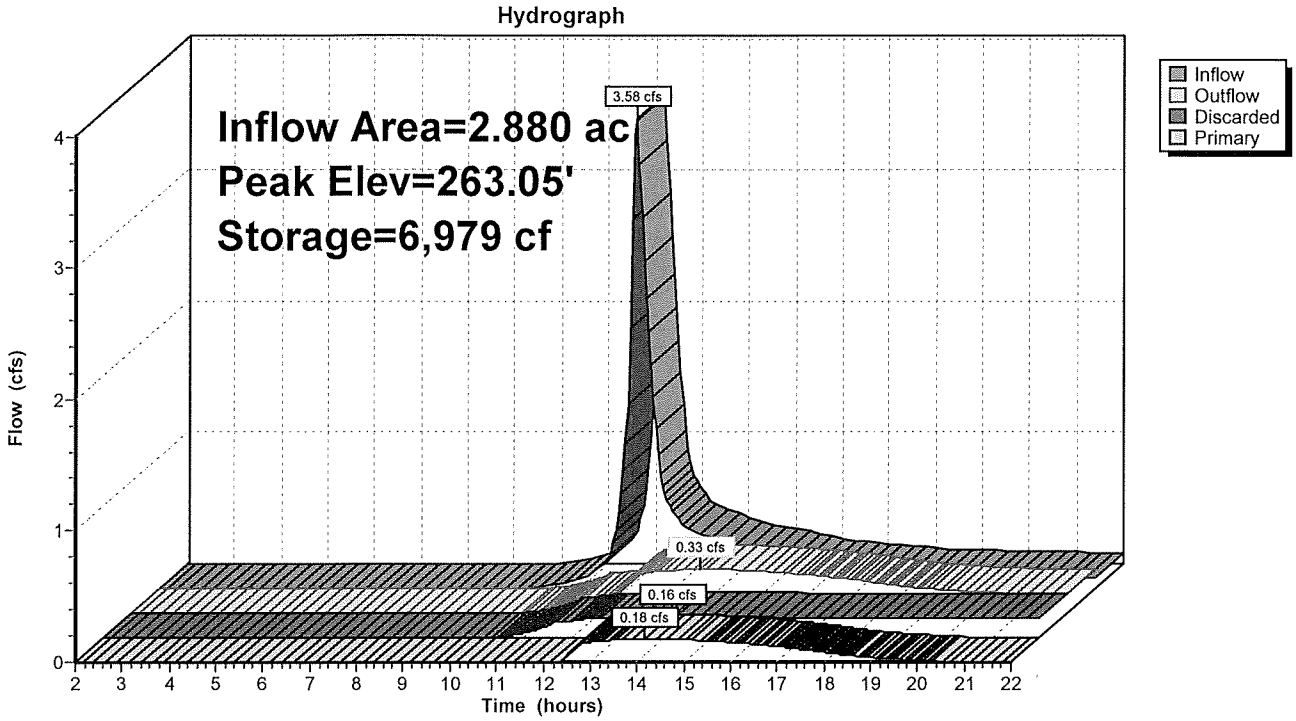
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
262.00	5,205	0	0
264.00	8,137	13,342	13,342
266.00	11,297	19,434	32,776

#	Routing	Invert	Outlet Devices
1	Primary	260.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 256.00' S= 0.0500 '/' n= 0.011 Cc= 0.900
2	Discarded	0.00'	**0.001400 fpm Exfiltration over entire Surface area**
3	Device 1	262.73'	**0.50' x 0.15' Vert. Orifice/Grate** C= 0.600
4	Device 1	263.05'	**8.0" Vert. Orifice/Grate** C= 0.600
5	Device 1	264.00'	**1.5' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
6	Device 1	265.00'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	265.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.16 cfs @ 14.15 hrs HW=263.05' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.18 cfs @ 14.15 hrs HW=263.05' (Free Discharge)
└─**1=Culvert** (Passes 0.18 cfs of 6.03 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.18 cfs @ 2.4 fps)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  ├─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**6=Orifice/Grate** (Controls 0.00 cfs)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin (Type I-2)



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=0.880 ac Runoff Depth=0.45"
Flow Length=520' Tc=12.4 min CN=46 Runoff=0.19 cfs 0.033 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.880 ac Runoff Depth=2.45"
Flow Length=531' Tc=12.6 min CN=76 Runoff=6.81 cfs 0.588 af

Pond 1P: Design Point 1P Inflow=1.40 cfs 0.341 af
Primary=1.40 cfs 0.341 af

Pond 2P: Infiltration Basin (Type I-2) Peak Elev=263.70' Storage=11,344 cf Inflow=6.81 cfs 0.588 af
Discarded=0.18 cfs 0.154 af Primary=1.29 cfs 0.308 af Outflow=1.47 cfs 0.462 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.621 af Average Runoff Depth = 1.98"

Subcatchment 1S: Subcatchment 1S

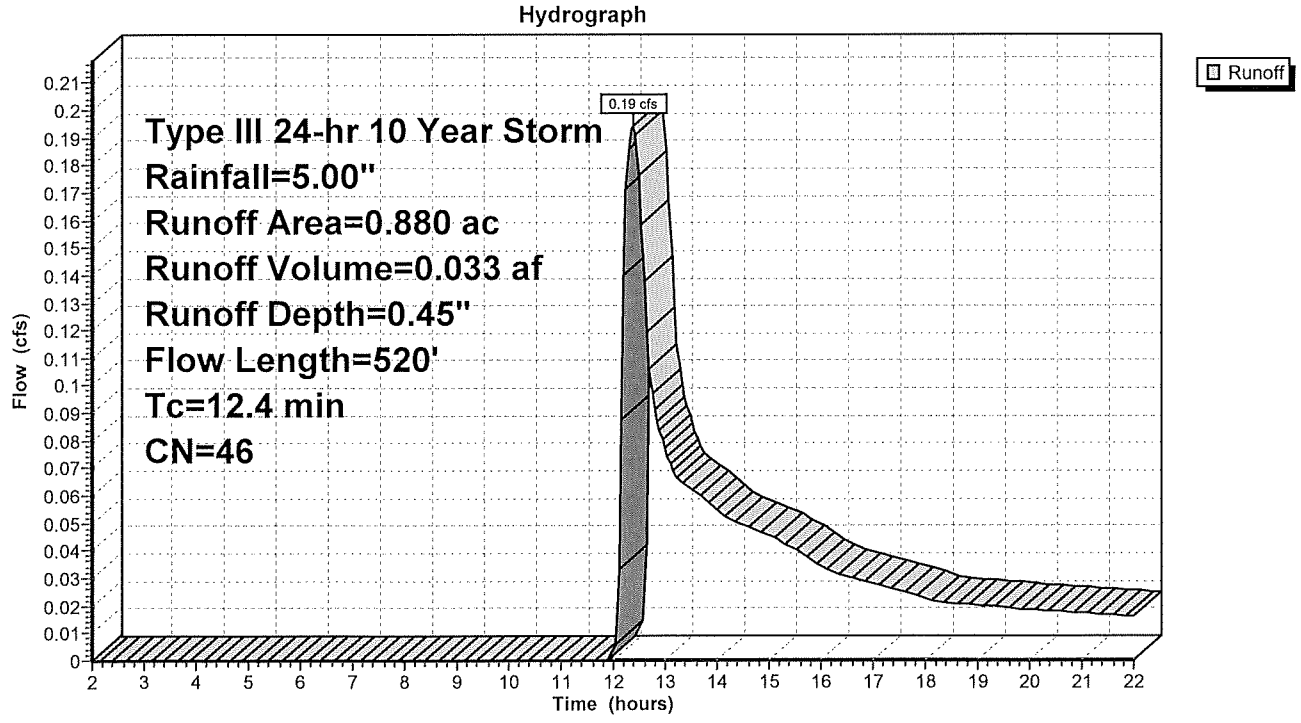
Runoff = 0.19 cfs @ 12.38 hrs, Volume= 0.033 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=5.00"

Area (ac)	CN	Description
0.700	39	>75% Grass cover, Good, HSG A
0.090	98	Existing Impervious Area
0.050	35	Brush, Fair, HSG A
0.040	56	Brush, Fair, HSG B
0.880	46	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
4.0	420	0.0300	1.7		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
12.4	520	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

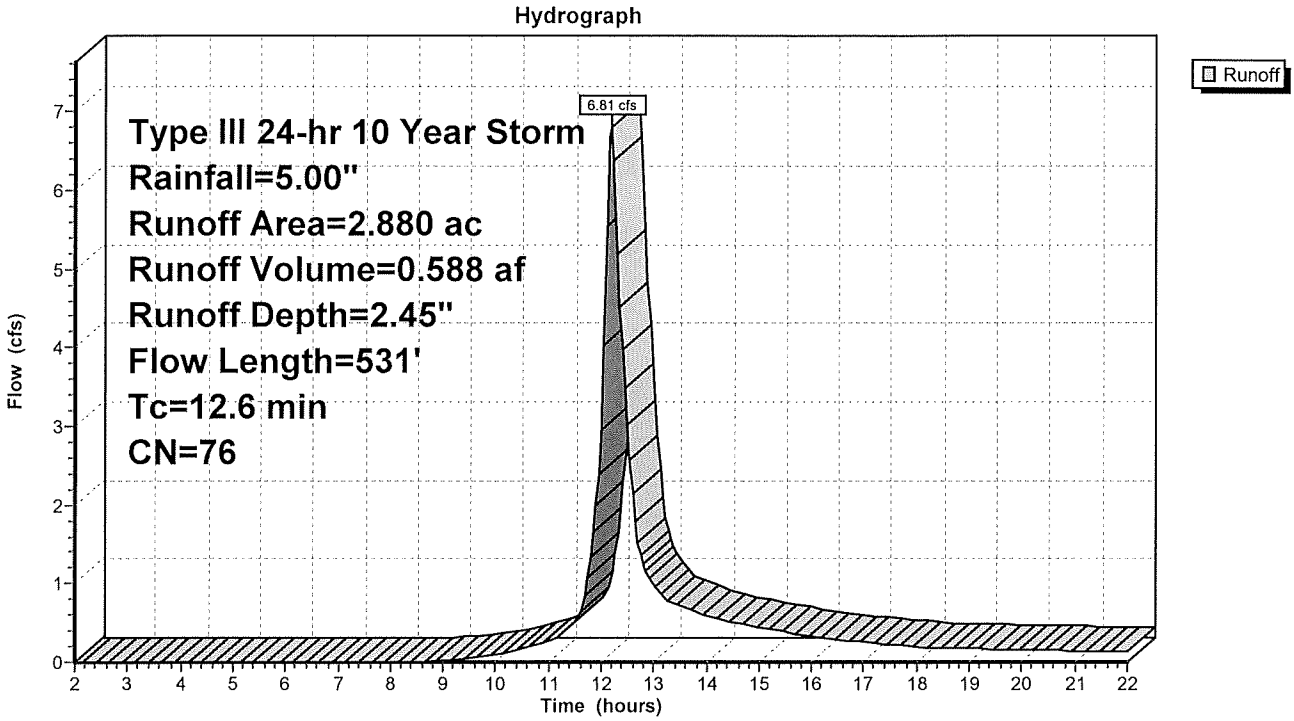
Runoff = 6.81 cfs @ 12.18 hrs, Volume= 0.588 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=5.00"

Area (ac)	CN	Description
0.770	39	>75% Grass cover, Good, HSG A
0.240	98	Existing Impervious Area
1.480	98	Proposed Impervious Area
0.130	35	Brush, Fair, HSG A
0.260	56	Brush, Fair, HSG B
2.880	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
1.6	107	0.0120	1.1		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
1.1	159	0.0140	2.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
0.7	60	0.0400	1.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.8	105	0.0190	2.1		**Shallow Concentrated Flow, Vegetated Swale** Grassed Waterway Kv= 15.0 fps
12.6	531	Total			

Subcatchment 2S: Subcatchment 2S

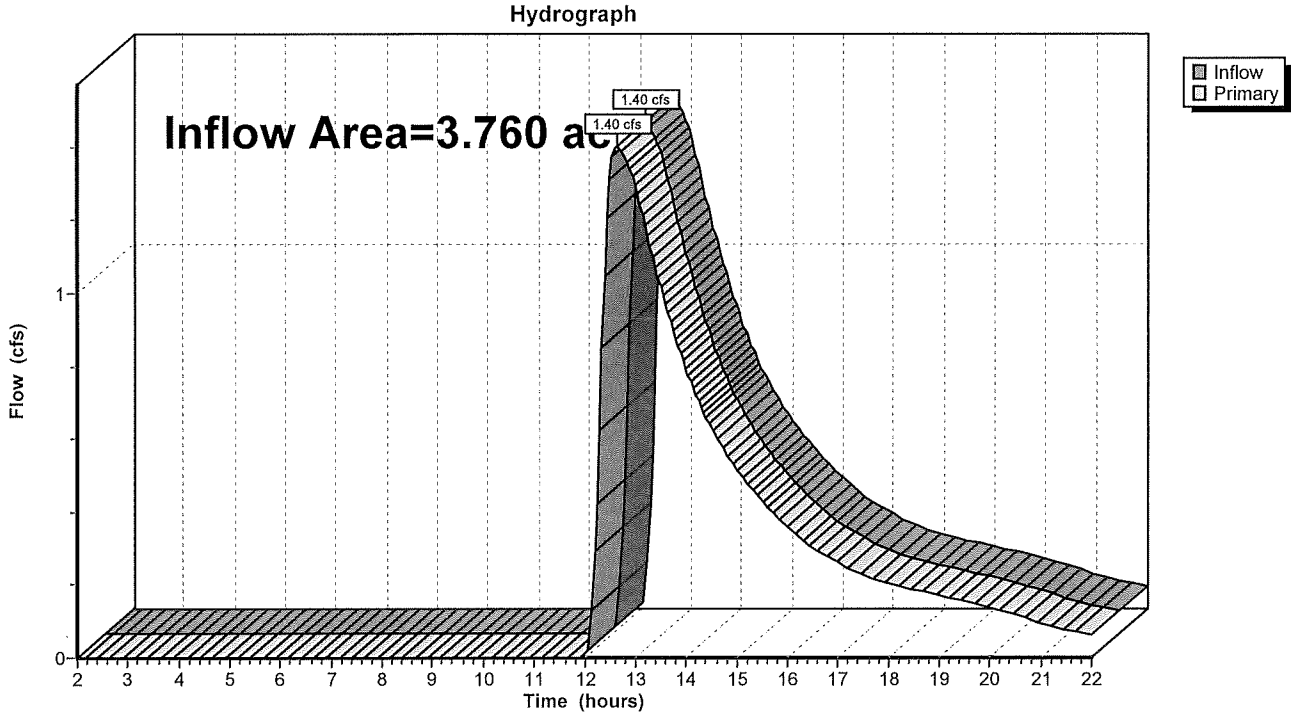


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 1.09" for 10 Year Storm event
Inflow = 1.40 cfs @ 12.64 hrs, Volume= 0.341 af
Primary = 1.40 cfs @ 12.64 hrs, Volume= 0.341 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Pond 2P: Infiltration Basin (Type I-2)

Inflow Area = 2.880 ac, Inflow Depth = 2.45" for 10 Year Storm event
Inflow = 6.81 cfs @ 12.18 hrs, Volume= 0.588 af
Outflow = 1.47 cfs @ 12.72 hrs, Volume= 0.462 af, Atten= 78%, Lag= 32.4 min
Discarded = 0.18 cfs @ 12.72 hrs, Volume= 0.154 af
Primary = 1.29 cfs @ 12.72 hrs, Volume= 0.308 af

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 263.70' @ 12.72 hrs Surf.Area= 7,698 sf Storage= 11,344 cf
Plug-Flow detention time= 165.0 min calculated for 0.462 af (79% of inflow)
Center-of-Mass det. time= 96.9 min (916.1 - 819.1)

#	Invert	Avail.Storage	Storage Description
1	262.00'	32,776 cf	**Custom Stage Data (Prismatic)** Listed below

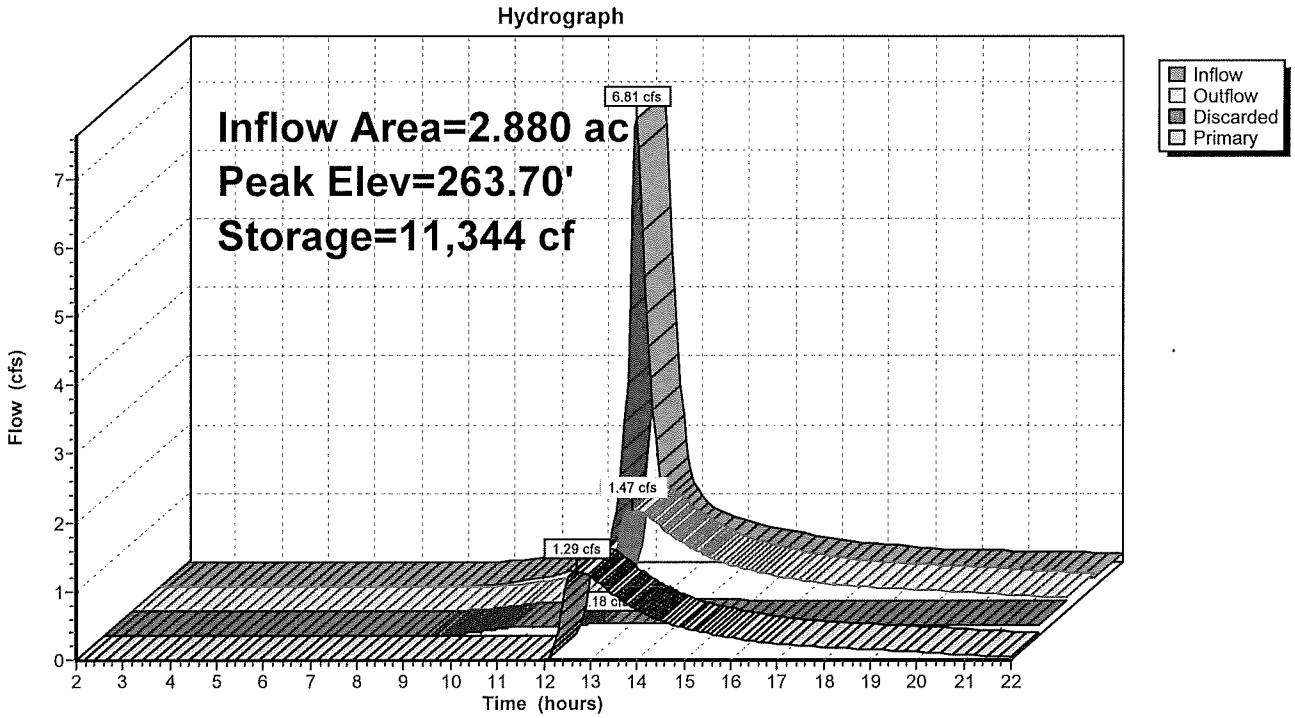
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
262.00	5,205	0	0
264.00	8,137	13,342	13,342
266.00	11,297	19,434	32,776

#	Routing	Invert	Outlet Devices
1	Primary	260.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 256.00' S= 0.0500 '/' n= 0.011 Cc= 0.900
2	Discarded	0.00'	**0.001400 fpm Exfiltration over entire Surface area**
3	Device 1	262.73'	**0.50' x 0.15' Vert. Orifice/Grate** C= 0.600
4	Device 1	263.05'	**8.0" Vert. Orifice/Grate** C= 0.600
5	Device 1	264.00'	**1.5' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
6	Device 1	265.00'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	265.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.18 cfs @ 12.72 hrs HW=263.70' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=1.29 cfs @ 12.72 hrs HW=263.70' (Free Discharge)
├─**1=Culvert** (Passes 1.29 cfs of 6.76 cfs potential flow)
│ ├─**3=Orifice/Grate** (Orifice Controls 0.34 cfs @ 4.6 fps)
│ ├─**4=Orifice/Grate** (Orifice Controls 0.95 cfs @ 2.7 fps)
│ ├─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
│ └─**6=Orifice/Grate** (Controls 0.00 cfs)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin (Type I-2)



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=0.880 ac Runoff Depth=0.81"
Flow Length=520' Tc=12.4 min CN=46 Runoff=0.46 cfs 0.060 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.880 ac Runoff Depth=3.27"
Flow Length=531' Tc=12.6 min CN=76 Runoff=9.11 cfs 0.785 af

Pond 1P: Design Point 1P Inflow=2.38 cfs 0.544 af
Primary=2.38 cfs 0.544 af

Pond 2P: Infiltration Basin (Type I-2) Peak Elev=264.15' Storage=14,809 cf Inflow=9.11 cfs 0.785 af
Discarded=0.20 cfs 0.166 af Primary=2.14 cfs 0.484 af Outflow=2.33 cfs 0.650 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.845 af Average Runoff Depth = 2.70"

Subcatchment 1S: Subcatchment 1S

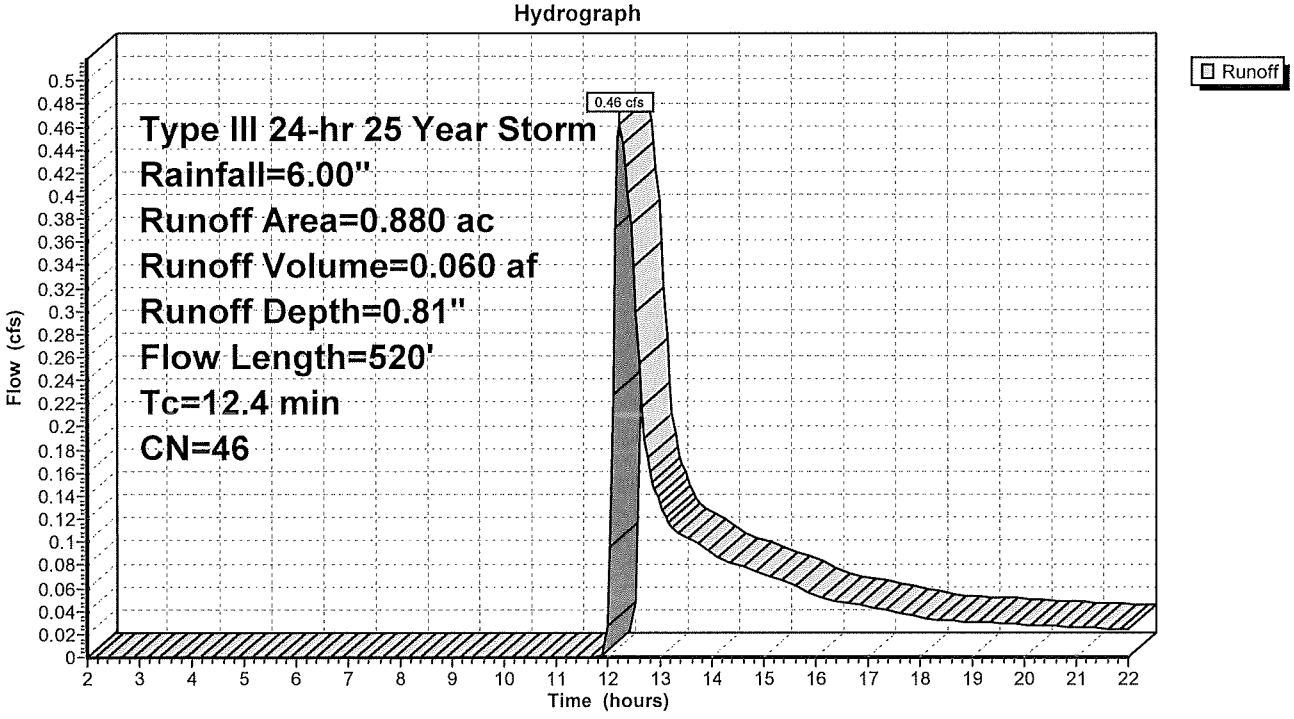
Runoff = 0.46 cfs @ 12.24 hrs, Volume= 0.060 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Storm Rainfall=6.00"

Area (ac)	CN	Description
0.700	39	>75% Grass cover, Good, HSG A
0.090	98	Existing Impervious Area
0.050	35	Brush, Fair, HSG A
0.040	56	Brush, Fair, HSG B
0.880	46	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
4.0	420	0.0300	1.7		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
12.4	520	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

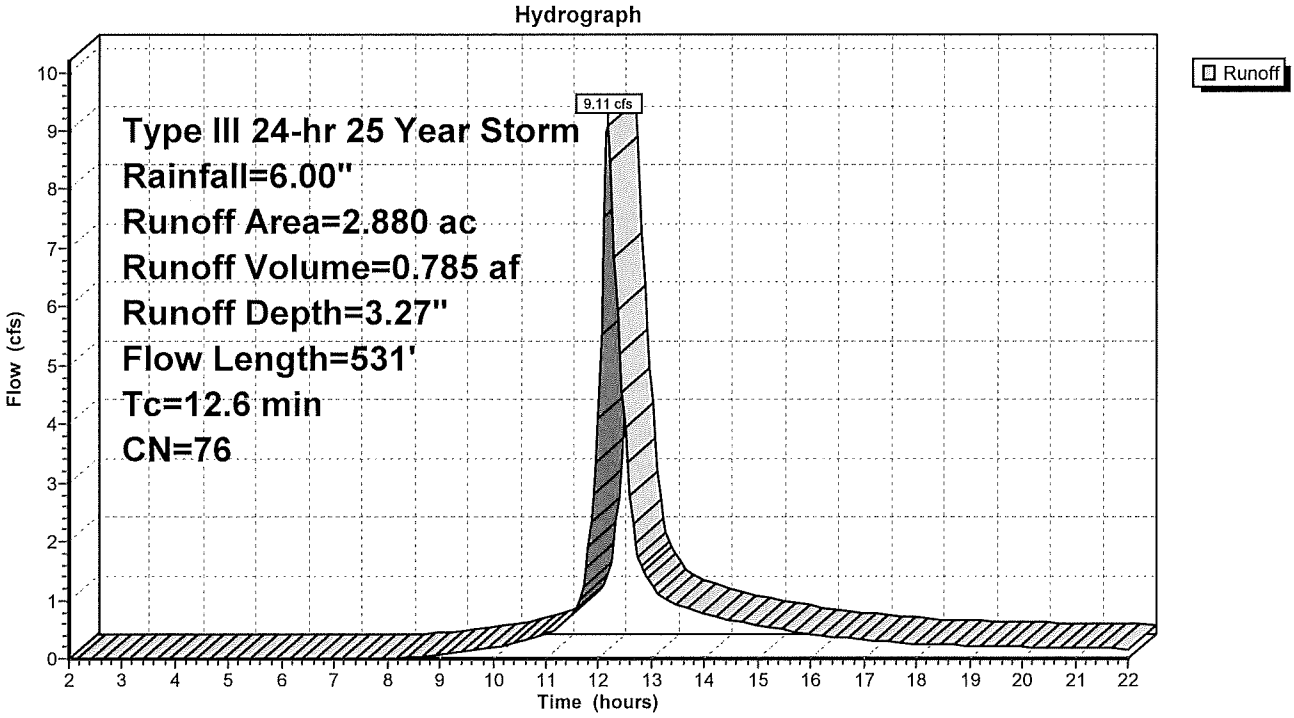
Runoff = 9.11 cfs @ 12.18 hrs, Volume= 0.785 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Storm Rainfall=6.00"

Area (ac)	CN	Description
0.770	39	>75% Grass cover, Good, HSG A
0.240	98	Existing Impervious Area
1.480	98	Proposed Impervious Area
0.130	35	Brush, Fair, HSG A
0.260	56	Brush, Fair, HSG B
2.880	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
1.6	107	0.0120	1.1		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
1.1	159	0.0140	2.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
0.7	60	0.0400	1.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.8	105	0.0190	2.1		**Shallow Concentrated Flow, Vegetated Swale** Grassed Waterway Kv= 15.0 fps
12.6	531	Total			

Subcatchment 2S: Subcatchment 2S

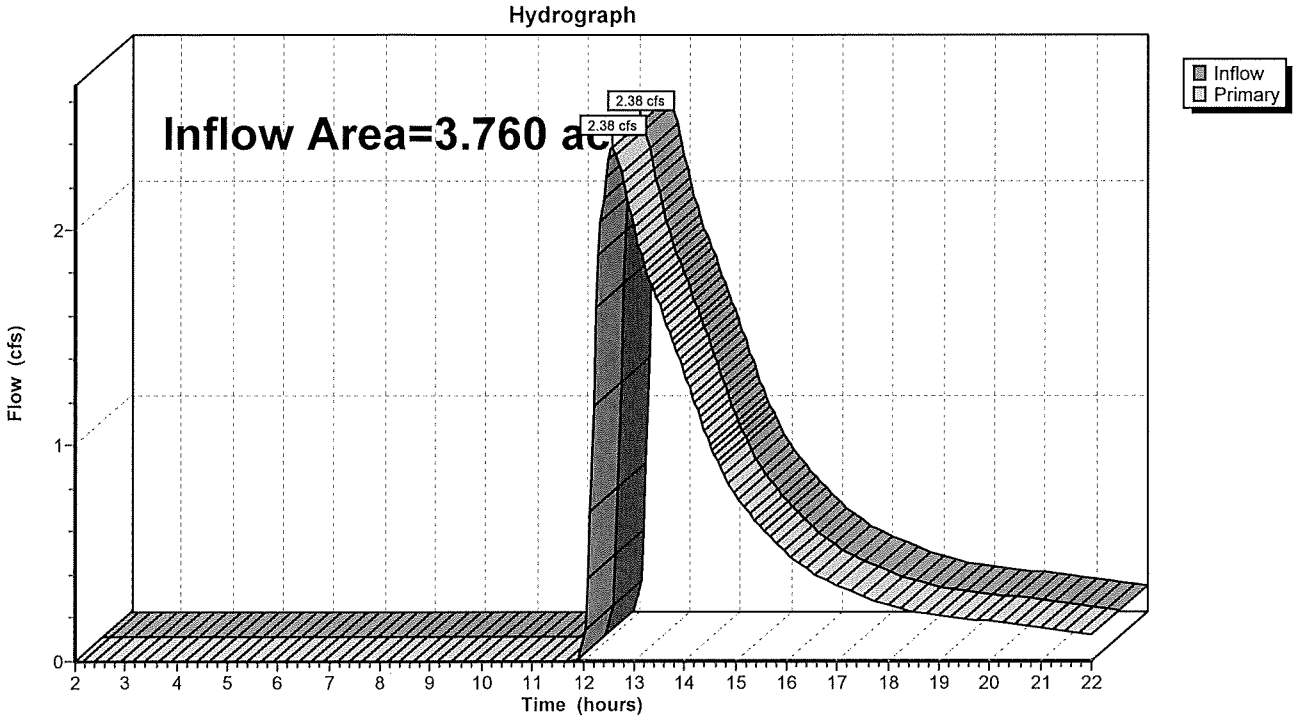


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 1.73" for 25 Year Storm event
Inflow = 2.38 cfs @ 12.58 hrs, Volume= 0.544 af
Primary = 2.38 cfs @ 12.58 hrs, Volume= 0.544 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Pond 2P: Infiltration Basin (Type I-2)

Inflow Area = 2.880 ac, Inflow Depth = 3.27" for 25 Year Storm event
Inflow = 9.11 cfs @ 12.18 hrs, Volume= 0.785 af
Outflow = 2.33 cfs @ 12.65 hrs, Volume= 0.650 af, Atten= 74%, Lag= 28.6 min
Discarded = 0.20 cfs @ 12.65 hrs, Volume= 0.166 af
Primary = 2.14 cfs @ 12.65 hrs, Volume= 0.484 af

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 264.15' @ 12.65 hrs Surf.Area= 8,376 sf Storage= 14,809 cf
Plug-Flow detention time= 142.3 min calculated for 0.648 af (83% of inflow)
Center-of-Mass det. time= 83.9 min (895.6 - 811.7)

#	Invert	Avail.Storage	Storage Description
1	262.00'	32,776 cf	**Custom Stage Data (Prismatic)** Listed below

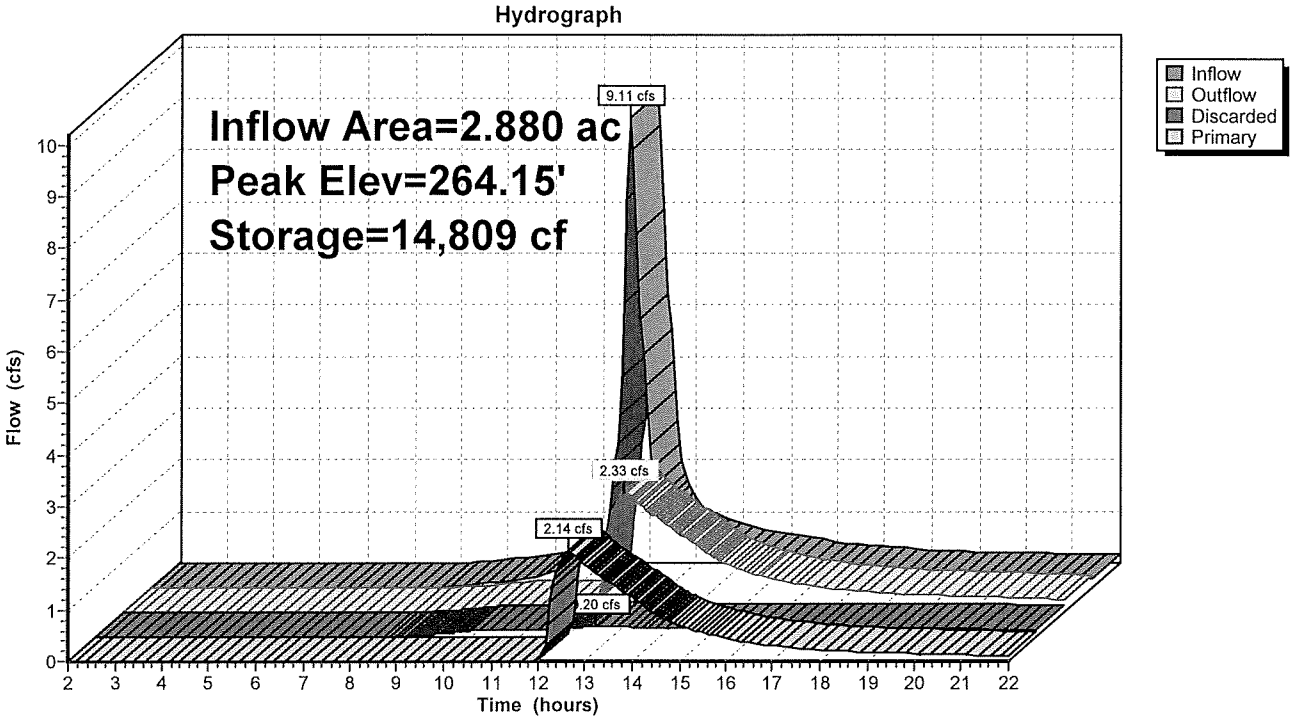
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
262.00	5,205	0	0
264.00	8,137	13,342	13,342
266.00	11,297	19,434	32,776

#	Routing	Invert	Outlet Devices
1	Primary	260.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 256.00' S= 0.0500 '/' n= 0.011 Cc= 0.900
2	Discarded	0.00'	**0.001400 fpm Exfiltration over entire Surface area**
3	Device 1	262.73'	**0.50' x 0.15' Vert. Orifice/Grate** C= 0.600
4	Device 1	263.05'	**8.0" Vert. Orifice/Grate** C= 0.600
5	Device 1	264.00'	**1.5' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
6	Device 1	265.00'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	265.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.20 cfs @ 12.65 hrs HW=264.15' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=2.14 cfs @ 12.65 hrs HW=264.15' (Free Discharge)
├─**1=Culvert** (Passes 2.14 cfs of 7.23 cfs potential flow)
│ ├─**3=Orifice/Grate** (Orifice Controls 0.42 cfs @ 5.6 fps)
│ ├─**4=Orifice/Grate** (Orifice Controls 1.47 cfs @ 4.2 fps)
│ ├─**5=Broad-Crested Rectangular Weir** (Weir Controls 0.25 cfs @ 1.1 fps)
│ └─**6=Orifice/Grate** (Controls 0.00 cfs)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin (Type I-2)



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=0.880 ac Runoff Depth=2.29"
Flow Length=520' Tc=12.4 min CN=46 Runoff=1.79 cfs 0.168 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.880 ac Runoff Depth=5.90"
Flow Length=531' Tc=12.6 min CN=76 Runoff=16.33 cfs 1.416 af

Pond 1P: Design Point 1P Inflow=8.61 cfs 1.229 af
Primary=8.61 cfs 1.229 af

Pond 2P: Infiltration Basin (Type I-2) Peak Elev=264.98' Storage=22,881 cf Inflow=16.33 cfs 1.416 af
Discarded=0.23 cfs 0.193 af Primary=7.50 cfs 1.061 af Outflow=7.73 cfs 1.254 af

Total Runoff Area = 3.760 ac Runoff Volume = 1.584 af Average Runoff Depth = 5.06"

Subcatchment 1S: Subcatchment 1S

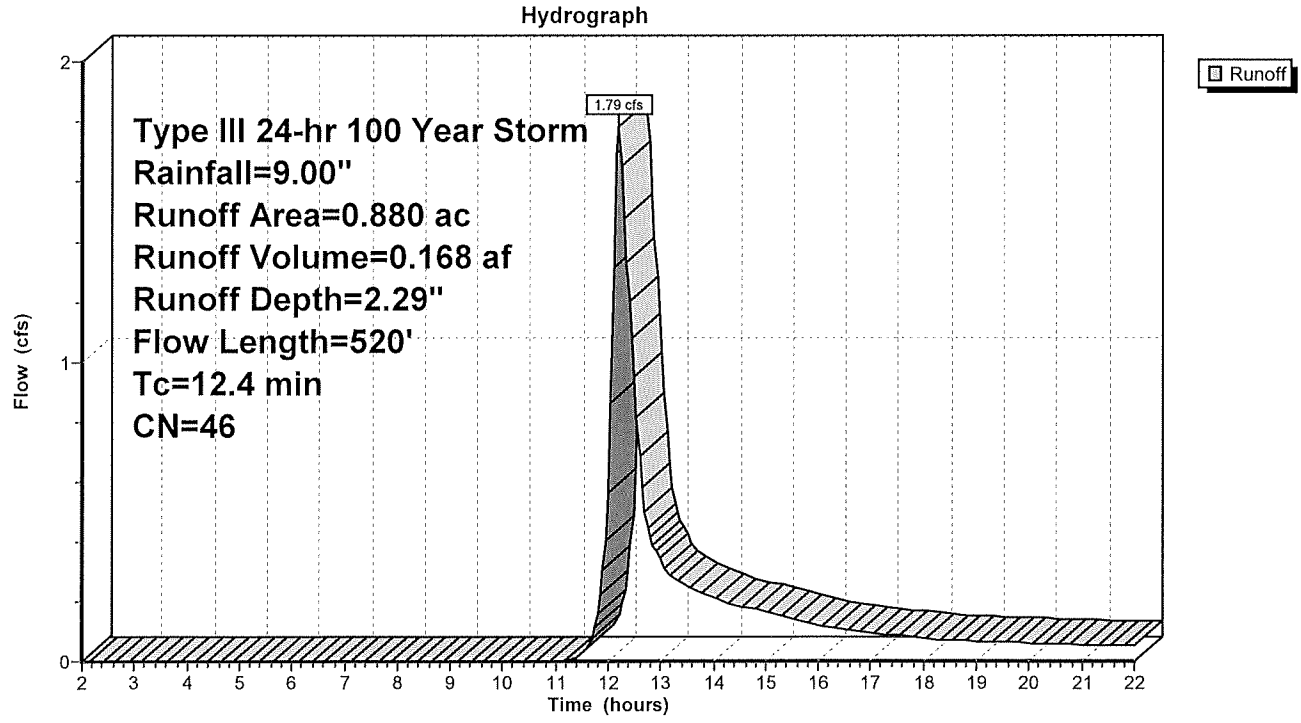
Runoff = 1.79 cfs @ 12.20 hrs, Volume= 0.168 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=9.00"

Area (ac)	CN	Description
0.700	39	>75% Grass cover, Good, HSG A
0.090	98	Existing Impervious Area
0.050	35	Brush, Fair, HSG A
0.040	56	Brush, Fair, HSG B
0.880	46	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
4.0	420	0.0300	1.7		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
12.4	520	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

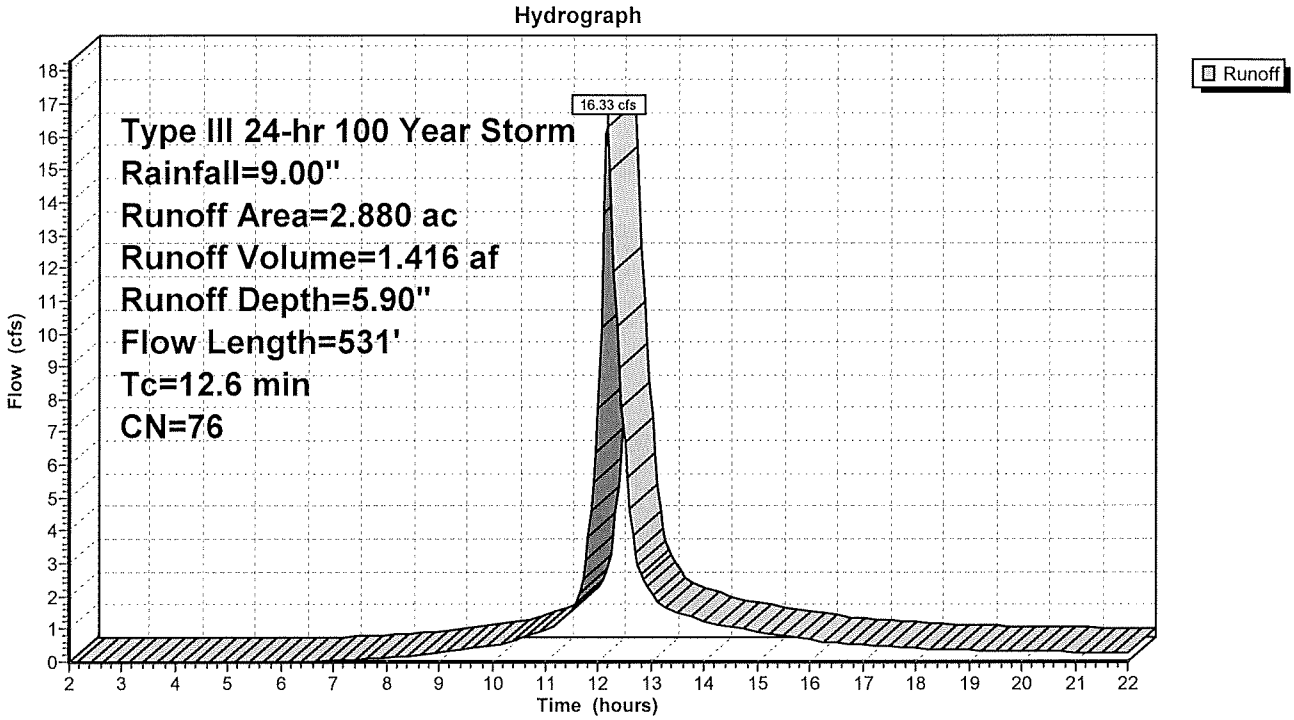
Runoff = 16.33 cfs @ 12.17 hrs, Volume= 1.416 af, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=9.00"

Area (ac)	CN	Description
0.770	39	>75% Grass cover, Good, HSG A
0.240	98	Existing Impervious Area
1.480	98	Proposed Impervious Area
0.130	35	Brush, Fair, HSG A
0.260	56	Brush, Fair, HSG B
2.880	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
1.6	107	0.0120	1.1		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
1.1	159	0.0140	2.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
0.7	60	0.0400	1.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.8	105	0.0190	2.1		**Shallow Concentrated Flow, Vegetated Swale** Grassed Waterway Kv= 15.0 fps
12.6	531	Total			

Subcatchment 2S: Subcatchment 2S

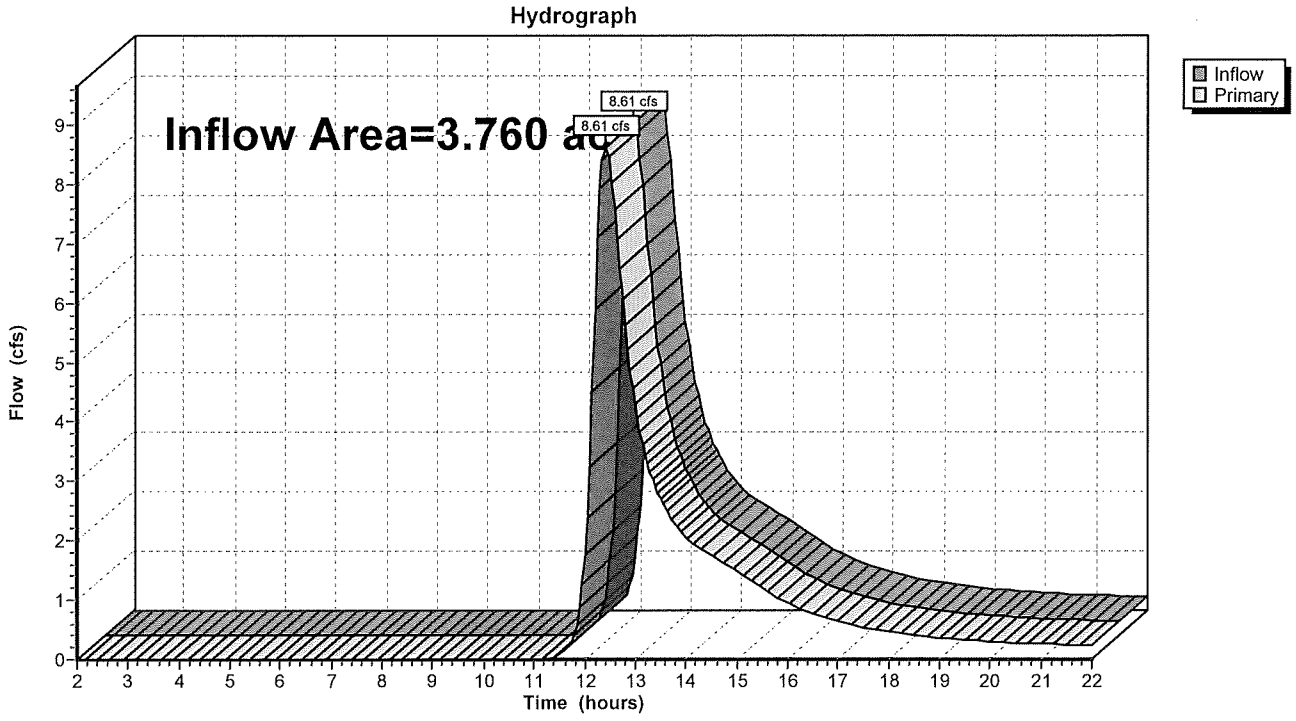


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 3.92" for 100 Year Storm event
Inflow = 8.61 cfs @ 12.42 hrs, Volume= 1.229 af
Primary = 8.61 cfs @ 12.42 hrs, Volume= 1.229 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Pond 2P: Infiltration Basin (Type I-2)

Inflow Area = 2.880 ac, Inflow Depth = 5.90" for 100 Year Storm event
Inflow = 16.33 cfs @ 12.17 hrs, Volume= 1.416 af
Outflow = 7.73 cfs @ 12.45 hrs, Volume= 1.254 af, Atten= 53%, Lag= 17.0 min
Discarded = 0.23 cfs @ 12.45 hrs, Volume= 0.193 af
Primary = 7.50 cfs @ 12.45 hrs, Volume= 1.061 af

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 264.98' @ 12.45 hrs Surf.Area= 9,688 sf Storage= 22,881 cf
Plug-Flow detention time= 105.2 min calculated for 1.254 af (89% of inflow)
Center-of-Mass det. time= 60.8 min (857.2 - 796.5)

#	Invert	Avail.Storage	Storage Description
1	262.00'	32,776 cf	**Custom Stage Data (Prismatic)** Listed below

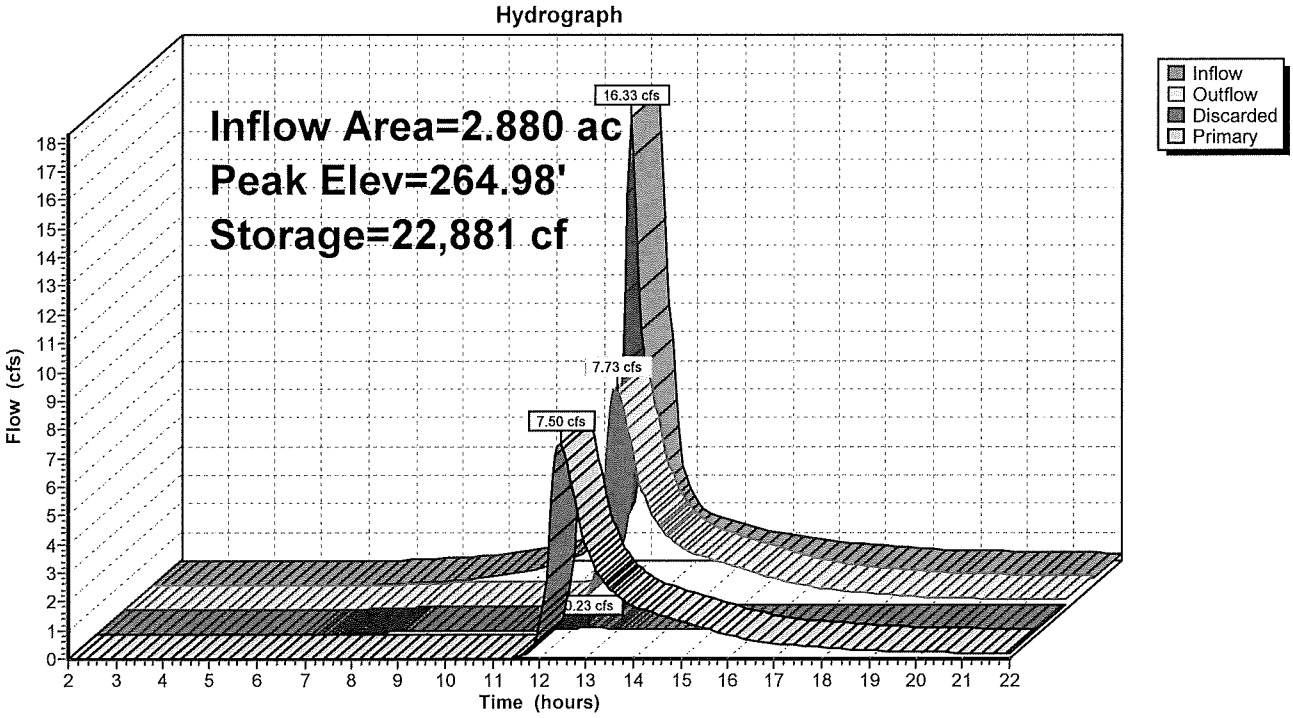
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
262.00	5,205	0	0
264.00	8,137	13,342	13,342
266.00	11,297	19,434	32,776

#	Routing	Invert	Outlet Devices
1	Primary	260.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 256.00' S= 0.0500 '/' n= 0.011 Cc= 0.900
2	Discarded	0.00'	**0.001400 fpm Exfiltration over entire Surface area**
3	Device 1	262.73'	**0.50' x 0.15' Vert. Orifice/Grate** C= 0.600
4	Device 1	263.05'	**8.0" Vert. Orifice/Grate** C= 0.600
5	Device 1	264.00'	**1.5' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
6	Device 1	265.00'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	265.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.23 cfs @ 12.45 hrs HW=264.98' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=7.49 cfs @ 12.45 hrs HW=264.98' (Free Discharge)
├─**1=Culvert** (Passes 7.49 cfs of 8.00 cfs potential flow)
│ ├─**3=Orifice/Grate** (Orifice Controls 0.53 cfs @ 7.1 fps)
│ ├─**4=Orifice/Grate** (Orifice Controls 2.12 cfs @ 6.1 fps)
│ ├─**5=Broad-Crested Rectangular Weir** (Weir Controls 4.83 cfs @ 3.3 fps)
│ └─**6=Orifice/Grate** (Controls 0.00 cfs)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin (Type I-2)



Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1S Runoff Area=0.880 ac Runoff Depth=0.00"
Flow Length=520' Tc=12.4 min CN=46 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.880 ac Runoff Depth=0.14"
Flow Length=531' Tc=12.6 min CN=76 Runoff=0.21 cfs 0.034 af

Pond 1P: Design Point 1P Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 2P: Infiltration Basin (Type I-2) Peak Elev=262.03' Storage=227 cf Inflow=0.21 cfs 0.034 af
Discarded=0.10 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.033 af

Total Runoff Area = 3.760 ac Runoff Volume = 0.034 af Average Runoff Depth = 0.11"

Subcatchment 1S: Subcatchment 1S

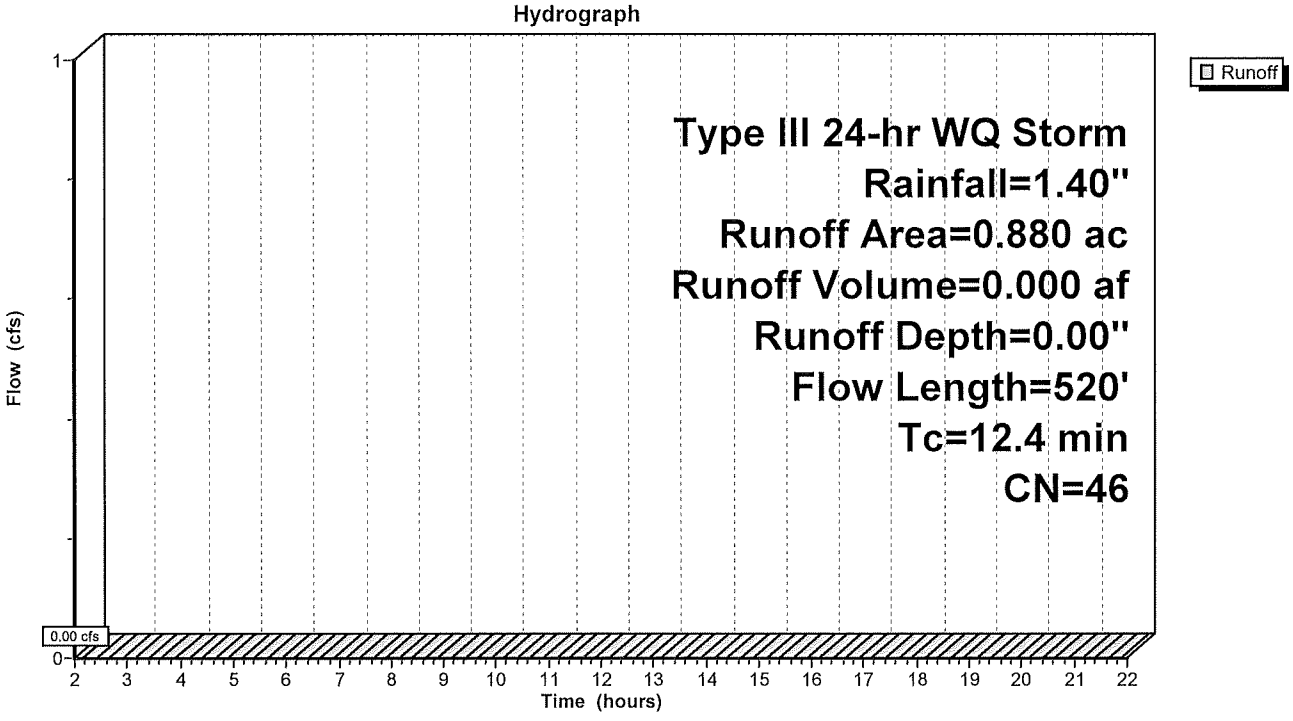
Runoff = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ Storm Rainfall=1.40"

Area (ac)	CN	Description
0.700	39	>75% Grass cover, Good, HSG A
0.090	98	Existing Impervious Area
0.050	35	Brush, Fair, HSG A
0.040	56	Brush, Fair, HSG B
0.880	46	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
4.0	420	0.0300	1.7		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
12.4	520	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

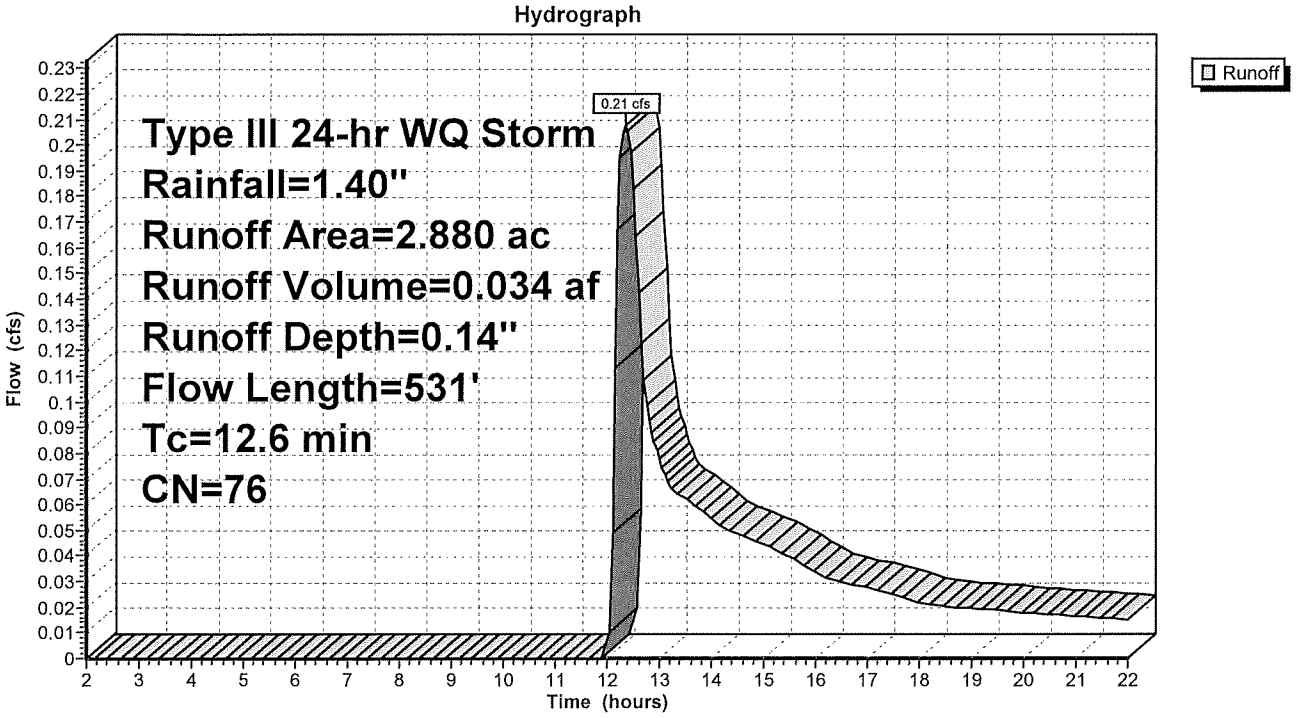
Runoff = 0.21 cfs @ 12.35 hrs, Volume= 0.034 af, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ Storm Rainfall=1.40"

Area (ac)	CN	Description
0.770	39	>75% Grass cover, Good, HSG A
0.240	98	Existing Impervious Area
1.480	98	Proposed Impervious Area
0.130	35	Brush, Fair, HSG A
0.260	56	Brush, Fair, HSG B
2.880	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0200	0.2		**Sheet Flow, Sheet Flow** Range n= 0.130 P2= 3.50"
1.6	107	0.0120	1.1		**Shallow Concentrated Flow, Shallow Concentrated Flow** Nearly Bare & Untilled Kv= 10.0 fps
1.1	159	0.0140	2.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Paved Kv= 20.3 fps
0.7	60	0.0400	1.4		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.8	105	0.0190	2.1		**Shallow Concentrated Flow, Vegetated Swale** Grassed Waterway Kv= 15.0 fps
12.6	531	Total			

Subcatchment 2S: Subcatchment 2S

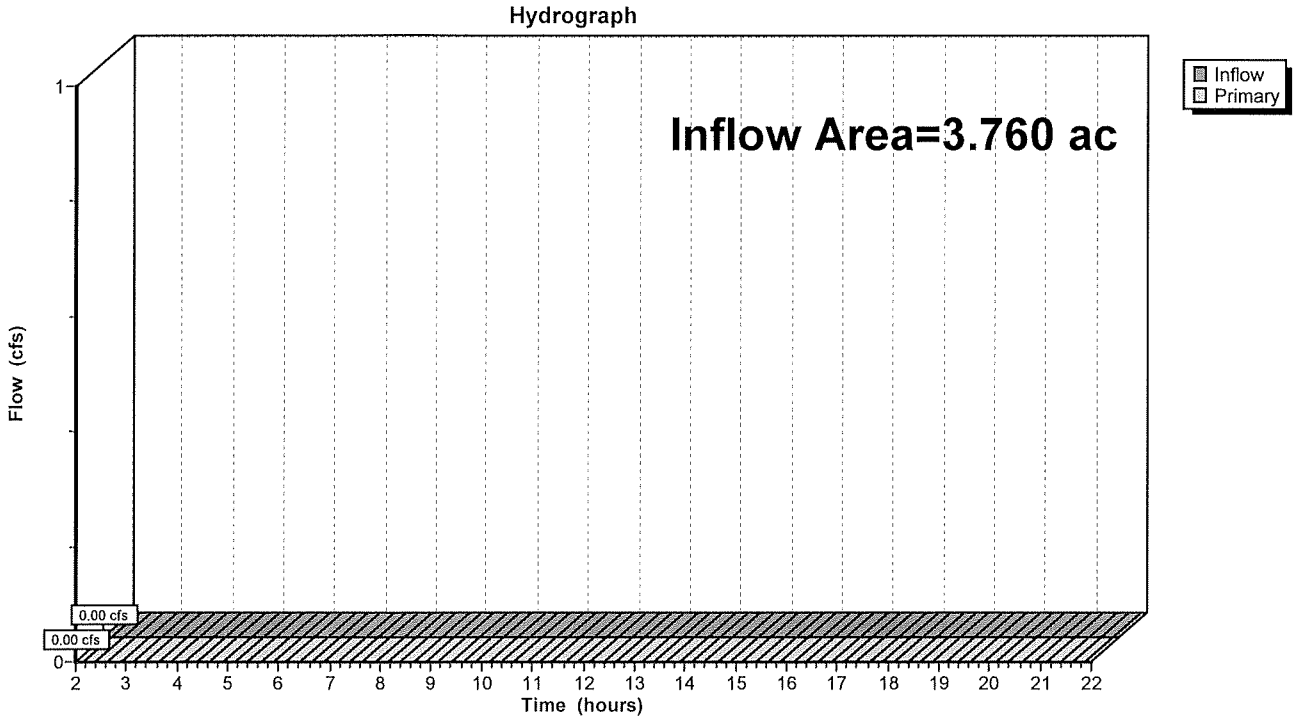


Pond 1P: Design Point 1P

Inflow Area = 3.760 ac, Inflow Depth = 0.00" for WQ Storm event
Inflow = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1P



Pond 2P: Infiltration Basin (Type I-2)

Inflow Area = 2.880 ac, Inflow Depth = 0.14" for WQ Storm event
Inflow = 0.21 cfs @ 12.35 hrs, Volume= 0.034 af
Outflow = 0.10 cfs @ 12.72 hrs, Volume= 0.033 af, Atten= 50%, Lag= 22.2 min
Discarded = 0.10 cfs @ 12.72 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 262.03' @ 12.72 hrs Surf.Area= 5,255 sf Storage= 227 cf
Plug-Flow detention time= 35.7 min calculated for 0.033 af (97% of inflow)
Center-of-Mass det. time= 26.1 min (931.7 - 905.7)

#	Invert	Avail.Storage	Storage Description
1	262.00'	32,776 cf	**Custom Stage Data (Prismatic)** Listed below

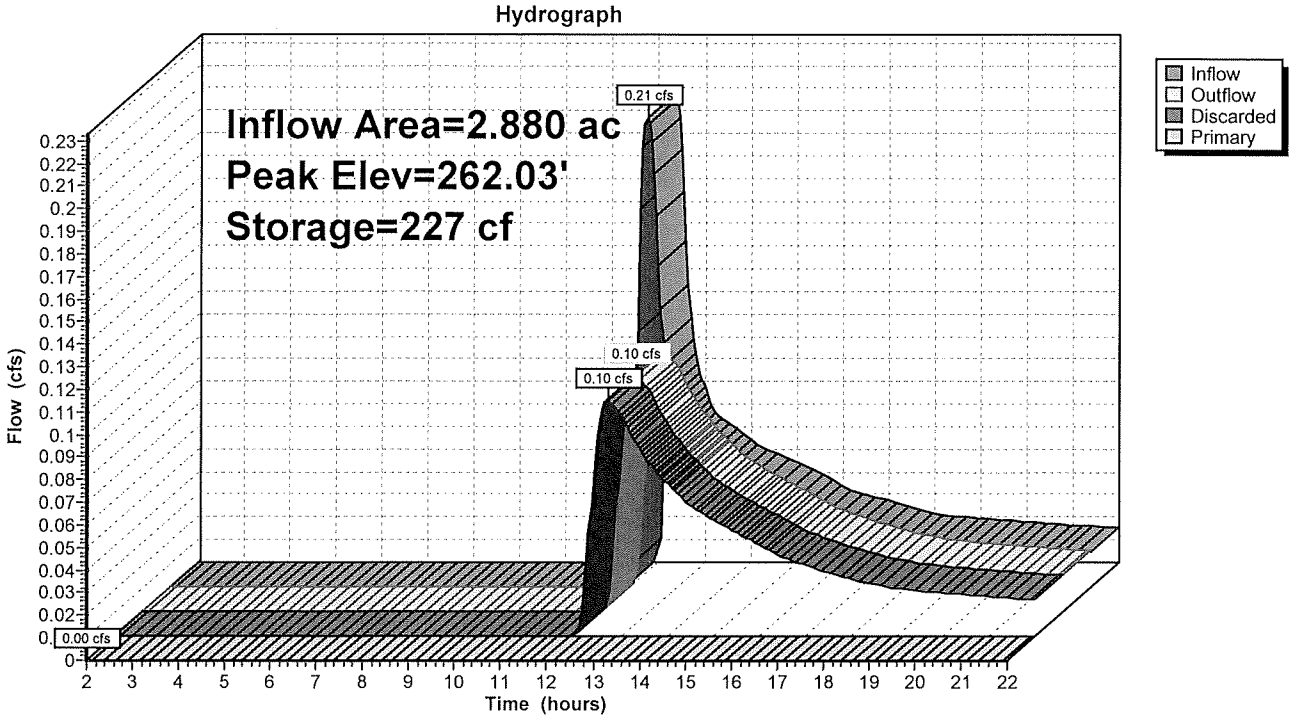
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
262.00	5,205	0	0
264.00	8,137	13,342	13,342
266.00	11,297	19,434	32,776

#	Routing	Invert	Outlet Devices
1	Primary	260.00'	**12.0" x 80.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 256.00' S= 0.0500 '/' n= 0.011 Cc= 0.900
2	Discarded	0.00'	**0.001400 fpm Exfiltration over entire Surface area**
3	Device 1	262.73'	**0.50' x 0.15' Vert. Orifice/Grate** C= 0.600
4	Device 1	263.05'	**8.0" Vert. Orifice/Grate** C= 0.600
5	Device 1	264.00'	**1.5' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
6	Device 1	265.00'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	265.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.12 cfs @ 12.72 hrs HW=262.03' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=262.00' (Free Discharge)
└─**1=Culvert** (Passes 0.00 cfs of 4.63 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  ├─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └─**6=Orifice/Grate** (Controls 0.00 cfs)
└─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Infiltration Basin (Type I-2)



APPENDIX 8

TR-20 Supporting Data

Appendix B Synthetic Rainfall Distributions and Rainfall Data Sources

The highest peak discharges from small watersheds in the United States are usually caused by intense, brief rainfalls that may occur as distinct events or as part of a longer storm. These intense rainstorms do not usually extended over a large area and intensities vary greatly. One common practice in rainfall-runoff analysis is to develop a synthetic rainfall distribution to use in lieu of actual storm events. This distribution includes maximum rainfall intensities for the selected design frequency arranged in a sequence that is critical for producing peak runoff.

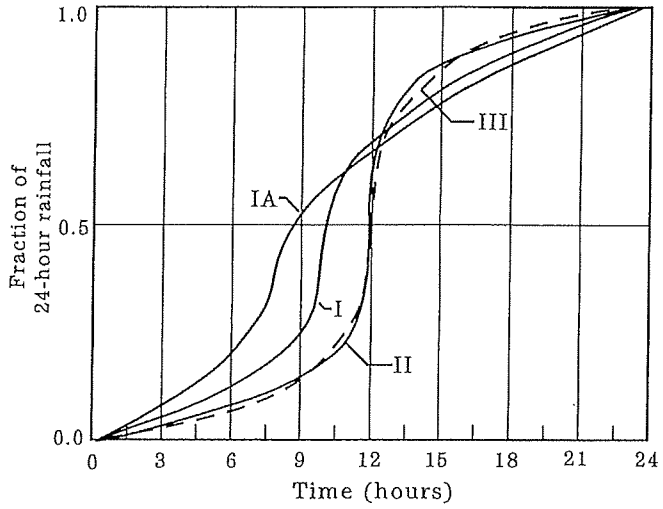
Synthetic rainfall distributions

The length of the most intense rainfall period contributing to the peak runoff rate is related to the time of concentration (T_c) for the watershed. In a hydrograph created with NRCS procedures, the duration of rainfall that directly contributes to the peak is about 170 percent of the T_c. For example, the most intense 8.5-minute rainfall period would contribute to the peak discharge for a watershed with a T_c of 5 minutes. The most intense 8.5-hour period would contribute to the peak for a watershed with a 5-hour T_c.

Different rainfall distributions can be developed for each of these watersheds to emphasize the critical rainfall duration for the peak discharges. However, to avoid the use of a different set of rainfall intensities for each drainage area size, a set of synthetic rainfall distributions having "nested" rainfall intensities was developed. The set "maximizes" the rainfall intensities by incorporating selected short duration intensities within those needed for longer durations at the same probability level.

For the size of the drainage areas for which NRCS usually provides assistance, a storm period of 24 hours was chosen the synthetic rainfall distributions. The 24-hour storm, while longer than that needed to determine peaks for these drainage areas, is appropriate for determining runoff volumes. Therefore, a single storm duration and associated synthetic rainfall distribution can be used to represent not only the peak discharges but also the runoff volumes for a range of drainage area sizes.

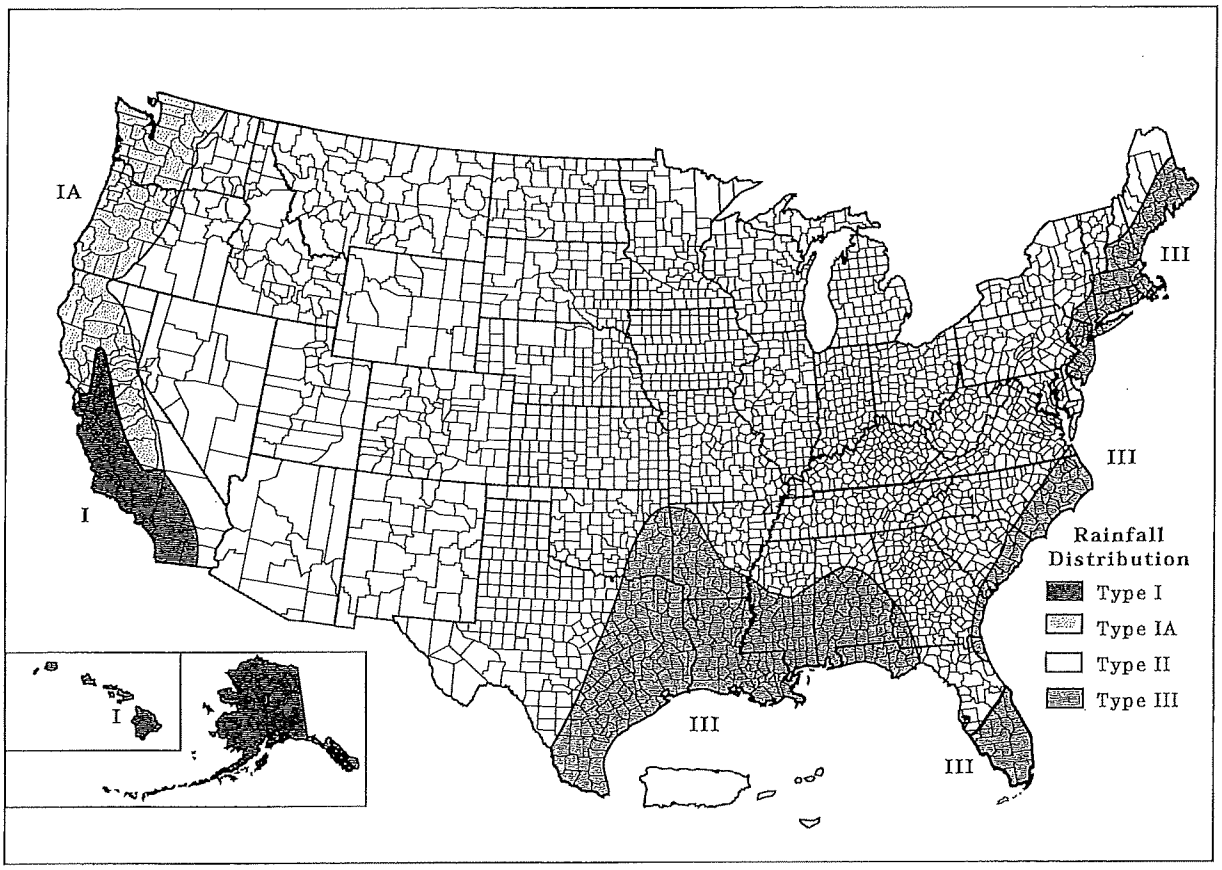
Figure B-1 SCS 24-hour rainfall distributions



The intensity of rainfall varies considerably during a storm as well as geographic regions. To represent various regions of the United States, NRCS developed four synthetic 24-hour rainfall distributions (I, IA, II, and III) from available National Weather Service (NWS) duration-frequency data (Hershfield 1061; Frederick et al., 1977) or local storm data. Type IA is the least intense and type II the most intense short duration rainfall. The four distributions are shown in figure B-1, and figure B-2 shows their approximate geographic boundaries.

Types I and IA represent the Pacific maritime climate with wet winters and dry summers. Type III represents Gulf of Mexico and Atlantic coastal areas where tropical storms bring large 24-hour rainfall amounts. Type II represents the rest of the country. For more precise distribution boundaries in a state having more than one type, contact the NRCS State Conservation Engineer.

Figure B-2 Approximate geographic boundaries for NRCS (SCS) rainfall distributions



Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

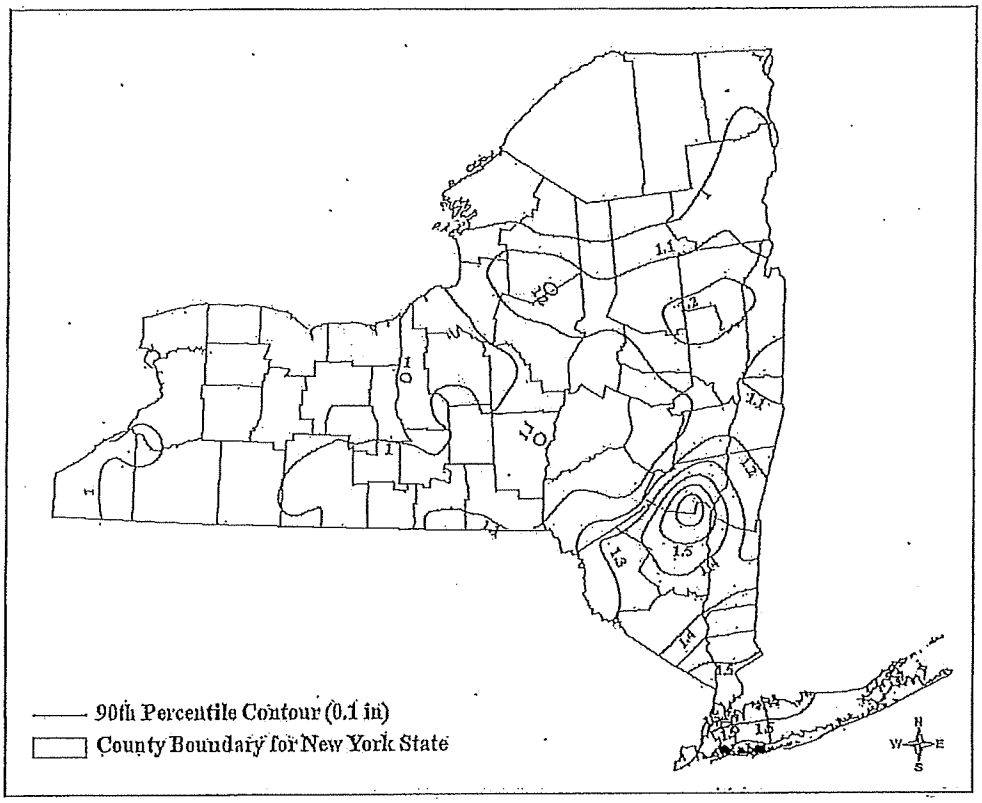
Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

Figure 4.1: 90th Percentile Rainfall in New York State (NYSDEC, 2013)

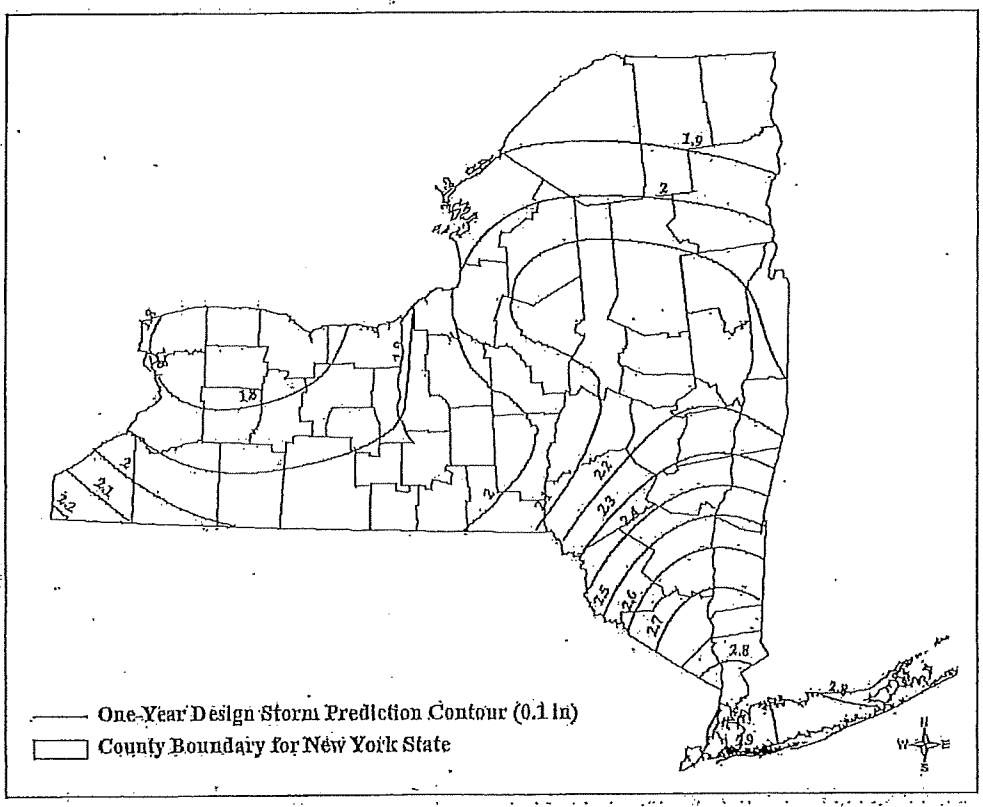


Basis of Design for Water Quality

As a basis for design, the following assumptions may be made:

Measuring Impervious Cover: the measured area of a site plan that does not have permanent vegetative or permeable cover shall be considered total impervious cover. Impervious cover is defined as all impermeable surfaces and includes: paved and gravel road surfaces, paved and gravel parking lots, paved driveways, building structures, paved sidewalks, and miscellaneous impermeable structures such as patios, pools, and sheds. Where site size makes direct measurement of impervious cover impractical, the land use/impervious cover relationships presented in Table 4.2 can be used to initially estimate impervious cover. In site specific planning impervious cover must be calculated based the specific proposed impervious cover.

Figure 4.2: One-Year Design Storm in New York State (NYSDEC, 2013)



Section 4.5 Overbank Flood Control Criteria (Q_p)

The primary purpose of the overbank flood control sizing criterion is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development (i.e., flow events that exceed the bankfull capacity of the channel, and therefore must spill over into the floodplain).

Overbank control requires storage to attenuate the post development 10-year, 24-hour peak discharge rate (Q_p) to predevelopment rates.

The overbank flood control requirement (Q_p) does not apply in certain conditions, including:

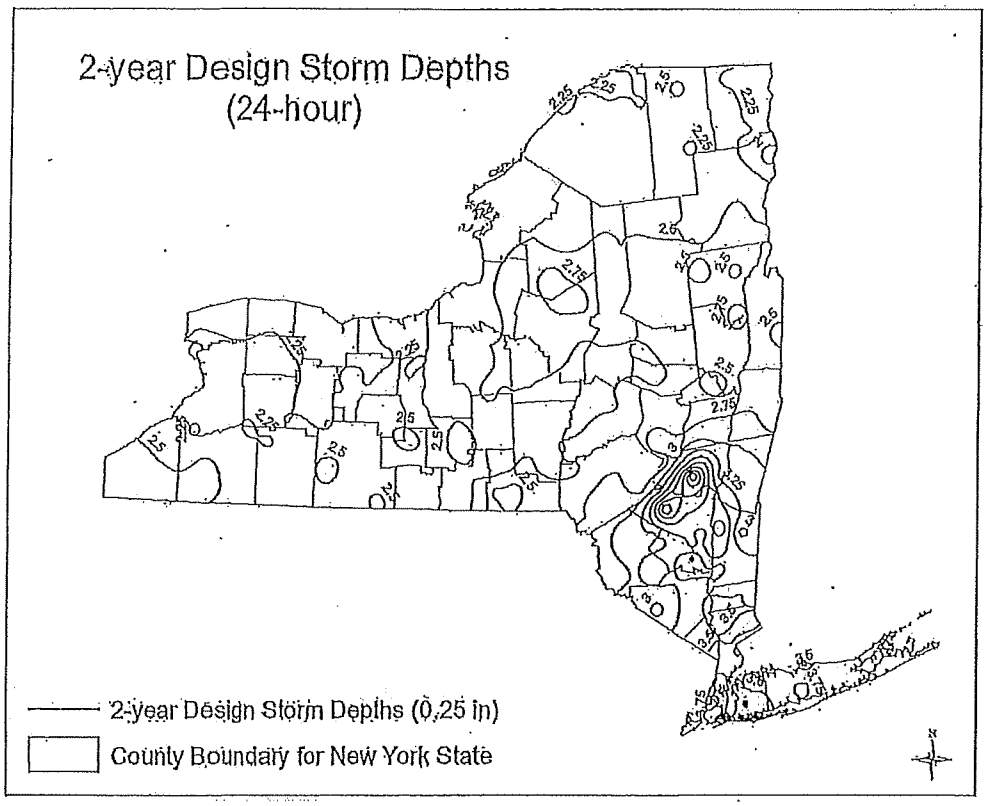
- The site discharges directly tidal waters or fifth order (fifth downstream) or larger streams. Refer to Section 4.3 for instructions.
- A downstream analysis reveals that overbank control is not needed (see section 4.10).

Basis for Design of Overbank Flood Control

When addressing the overbank flooding design criteria, the following represent the minimum basis for design:

closed conveyance systems. Note that some agencies or municipalities may use a different design storm for this purpose.

Figure 4.5: 2-Year Design Storm (2013)



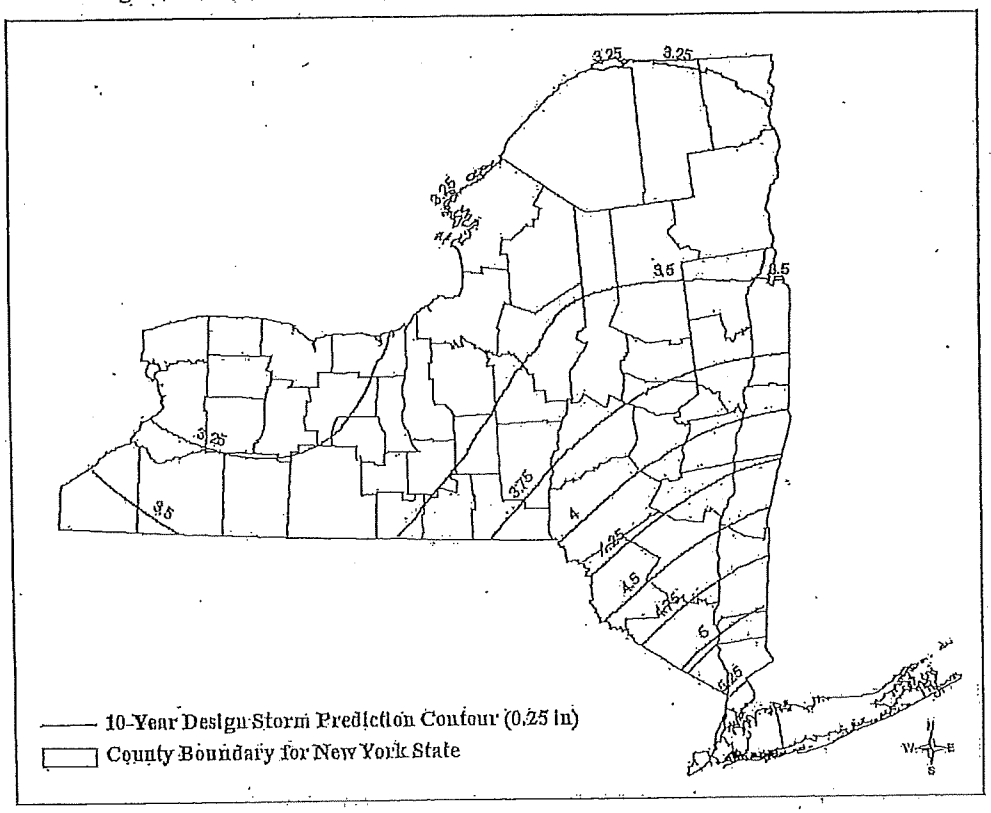
Section 4.9 Stream Order Identification

This section provides an example to help identify stream order based on Strahler-Horton Method. A network of streams drain each watershed. Streams can be classified according to their order in that network. A stream that has no tributaries or branches is defined as a first-order stream. When two first-order streams combine, a second-order stream is created, and so on. Figure 4.6 illustrates the stream order concept (Schueler, T. 1995).

Evaluation of stream order must be performed using the NHDplus dataset to determine if quantity controls do not apply. NHDPlus is an integrated suite of geospatial data sets that incorporate features of the National Hydrography Dataset (NHD) and the National Elevation Dataset (NED) at 1:100K scale. This application-ready data set is an outcome of a multi-agency effort aimed at developing many useful variables for water quality and quantity evaluation including stream order. Example maps are available on DEC website.

- TR-55 and TR-20 (or approved equivalent) will be used to determine peak discharge rates.
- When the predevelopment land use is agriculture, the curve number for the pre-developed condition shall be "taken as meadow".
- Off-site areas should be modeled as "present condition" for the 10-year storm event.
- Figure 4.3 indicates the depth of rainfall (24 hour) associated with the 10-year storm event throughout the State of New York.
- The length of overland flow used in t_c calculations is limited to no more than 150 feet for predevelopment conditions and 100 feet for post development conditions. On areas of extremely flat terrain (<1% average slope), this maximum distance is extended to 250 feet for predevelopment conditions and 150 feet for post development conditions.

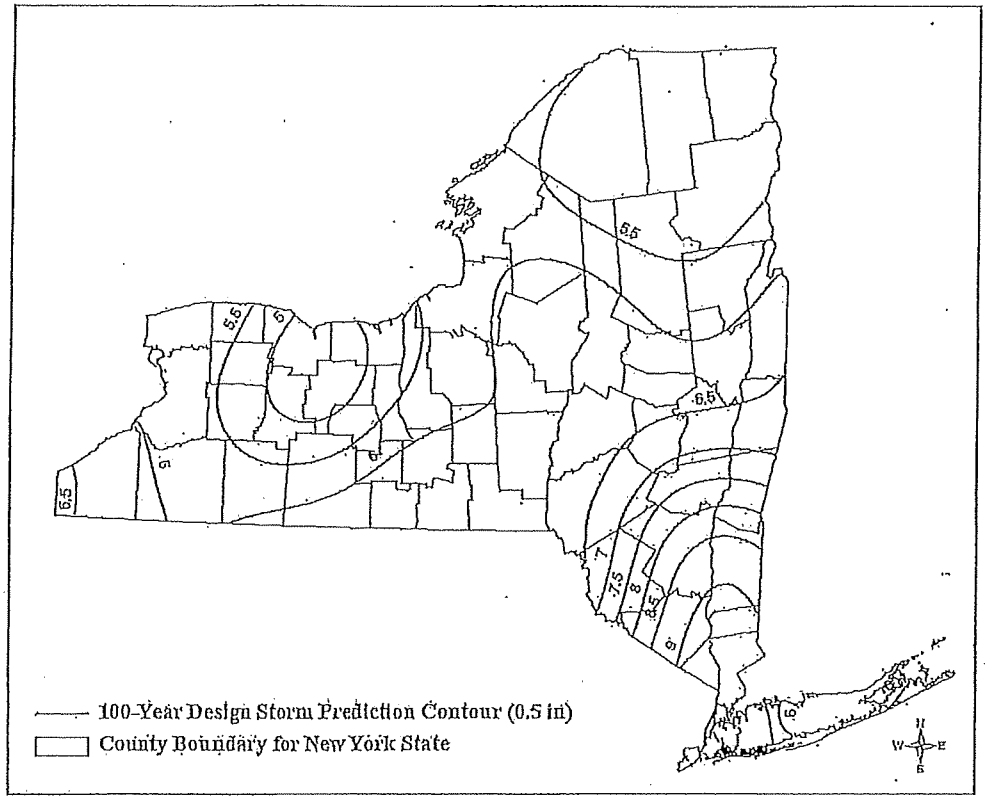
Figure 4.3: Ten-Year Design Storm in New York State (NYSDEC, 2013)



- When determining the storage required to reduce 100-year flood peaks, model off-site areas under current conditions.

- When determining storage required to safely pass the 100-year flood, model off-site areas under ultimate conditions.

Figure 4.4: One Hundred-Year Design Storm in New York State (NYSDEC, 2013)



Section 4.7 Alternative Method

New development causes changes to runoff volume, flow rates, timing of runoff and, most importantly, habitat destruction and degradation of the physical and chemical quality of the receiving waterbody. Traditionally, event based design storms are used for evaluation of hydrology and sizing of stormwater management practices. With an increasing need for assessment of the long term effects of development and maintenance of pre-development hydrology, the necessity of continuous simulation modeling as an effective tool for analysis and evaluation of flow-duration, downstream quality, quantity, biological, and hydro-habitat sustainability has been acknowledged.

USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Orange County, New York

Star Warehouse

August 18, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

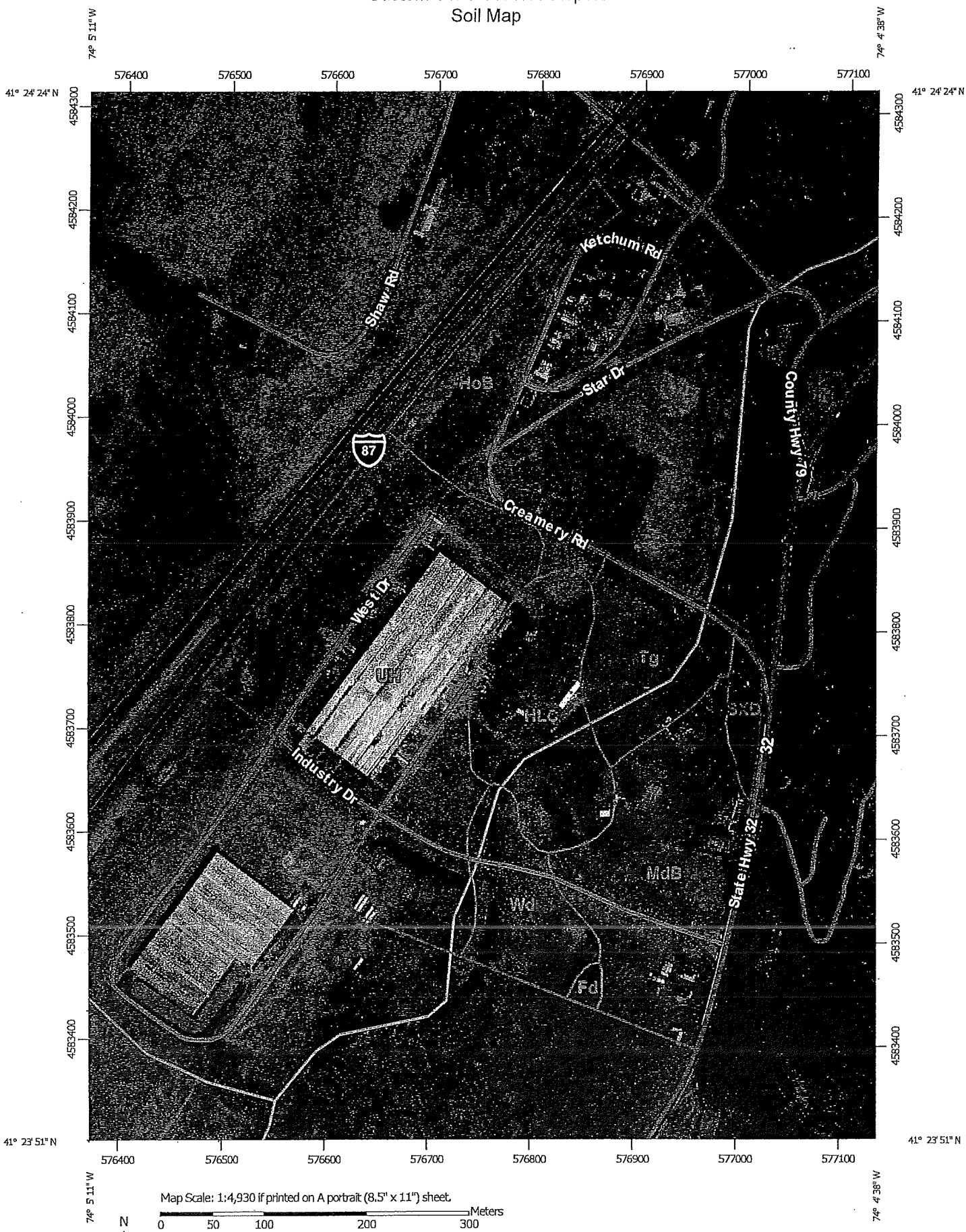
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,930 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, New York
Survey Area Data: Version 15, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Orange County, New York (NY071)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Fd	Fredon loam	0.2	0.5%
HLC	Hollis soils, sloping	6.6	12.5%
HoB	Hoosic gravelly sandy loam, 3 to 8 percent slopes	5.6	10.7%
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	9.8	18.8%
SXD	Swartswood and Mardin soils, moderately steep, very stony	1.0	1.9%
Tg	Tioga silt loam	4.7	9.0%
UH	Udorthents, smoothed	20.6	39.3%
Wd	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	3.8	7.3%
Totals for Area of Interest		52.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the

contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County, New York

Fd—Fredon loam

Map Unit Setting

National map unit symbol: 9vvd
Elevation: 250 to 1,200 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Fredon, poorly drained, and similar soils: 50 percent
Fredon, somewhat poorly drained, and similar soils: 25 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fredon, Poorly Drained

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy over sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 24 inches: very fine sandy loam
H3 - 24 to 60 inches: stratified gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D

Description of Fredon, Somewhat Poorly Drained

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread

Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy over sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 24 inches: very fine sandy loam
H3 - 24 to 60 inches: stratified gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D

Minor Components

Raynham

Percent of map unit: 5 percent

Hoosic

Percent of map unit: 5 percent

Castile

Percent of map unit: 5 percent

Chenango

Percent of map unit: 5 percent

Halsey

Percent of map unit: 5 percent
Landform: Depressions

HLC—Hollis soils, sloping

Map Unit Setting

National map unit symbol: 9vvh
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: A thin mantle of loamy till derived mainly from schist, granite, and gneiss

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material
H1 - 3 to 8 inches: gravelly loam
H2 - 8 to 18 inches: gravelly loam
H3 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D

Minor Components

Paxton

Percent of map unit: 5 percent

Charlton

Percent of map unit: 5 percent

Unnamed soils

Percent of map unit: 5 percent

Rock outcrop

Percent of map unit: 5 percent

HoB—Hoosic gravelly sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9vvl
Elevation: 100 to 1,100 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hoosic and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: gravelly sandy loam
H2 - 6 to 28 inches: very gravelly sandy loam
H3 - 28 to 60 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A

Minor Components

Castile

Percent of map unit: 5 percent

Chenango
Percent of map unit: 5 percent

Oakville
Percent of map unit: 5 percent

Fredon
Percent of map unit: 5 percent

MdB—Mardin gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v30j
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Mardin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mardin

Setting

Landform: Till plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 3 to 8 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D

Minor Components

Lordstown

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex
Across-slope shape: Linear

Volusia

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Concave
Across-slope shape: Linear

Bath

Percent of map unit: 5 percent
Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear

SXD—Swartswood and Mardin soils, moderately steep, very stony

Map Unit Setting

National map unit symbol: 2v30s
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Mardin, very stony, and similar soils: 40 percent
Swartswood, very stony, and similar soils: 40 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swartswood, Very Stony

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from quartzite, conglomerate, and sandstone

Typical profile

H1 - 0 to 2 inches: gravelly loam
H2 - 2 to 28 inches: gravelly fine sandy loam
H3 - 28 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 23 to 31 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C

Description of Mardin, Very Stony

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

A - 0 to 4 inches: gravelly silt loam
Bw - 4 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches

Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Minor Components

Lordstown

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear

Wurtsboro, very stony

Percent of map unit: 5 percent
Landform: Till plains, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex

Bath, very stony

Percent of map unit: 5 percent
Landform: Till plains, drumlinoid ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear

Volusia, very stony

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Linear

Tg—Tioga silt loam

Map Unit Setting

National map unit symbol: 9vx9
Elevation: 600 to 1,800 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F

Frost-free period: 135 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tioga and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tioga

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 25 inches: silt loam
C - 25 to 40 inches: silt loam
2C - 40 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A

Minor Components

Udifluvents

Percent of map unit: 5 percent

Suncook

Percent of map unit: 5 percent

Barbour

Percent of map unit: 5 percent

Middlebury

Percent of map unit: 5 percent

UH—Udorthents, smoothed

Map Unit Setting

National map unit symbol: 9vxc
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Typical profile

H1 - 0 to 4 inches: channery loam
H2 - 4 to 70 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Raynham

Percent of map unit: 5 percent

Wurtsboro

Percent of map unit: 5 percent

Alden

Percent of map unit: 5 percent
Landform: Depressions

Bath

Percent of map unit: 5 percent

Fredon

Percent of map unit: 5 percent

Wd—Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2srgt
Elevation: 160 to 1,970 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Wayland and similar soils: 60 percent
Wayland, very poorly drained, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wayland

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 21 inches: silt loam
Cg1 - 21 to 28 inches: silt loam
Cg2 - 28 to 47 inches: silt loam
Cg3 - 47 to 54 inches: silt loam
Cg4 - 54 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 13.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Description of Wayland, Very Poorly Drained

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

A - 0 to 9 inches: mucky silt loam
Bg - 9 to 21 inches: silt loam
Cg1 - 21 to 28 inches: silt loam
Cg2 - 28 to 47 inches: silt loam
Cg3 - 47 to 54 inches: silt loam
Cg4 - 54 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 13.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Minor Components

Holderton

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

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APPENDIX 9

Stormwater Quality and Runoff Reduction – Calculations & Supporting Data

Star Warehouse

Water Quality Volume (WQ_v) Calculation for Project Site with Offsite Areas Removed

Utilize 90% Rule:

$$WQ_v = [(P) (R_v) (A)] / 12$$

WQ_v = Water Quality Volume (acre-feet)

$R_v = 0.05 + 0.009 (I)$

I = Impervious Cover (Percent)

P = 90% Rainfall Event Number = 1.4 inches

A = Drainage Area in acres

Calculate Impervious Cover (%):

Drainage Area (A) =	3.76	acres
Impervious area within Site Area =	1.80	acres
Impervious Cover (I) =	47.9	%

Calculate Volumetric Runoff Coefficient (R_v):

$$R_v = 0.05 + 0.009 (I)$$

R_v =	0.48	
Use R_v ->	0.48	

90% Rainfall Event Number Utilized:

P =	1.4	inches

Calculate Water Quality Volume:

$$WQ_v = [(P) (R_v) (A)] / 12$$

WQ_v =	0.211	acre-feet
=	9188	ft^3

Star Warehouse

Minimum Runoff Reduction Volume (RRv) Calculation

$$RRv = [(P) (R_{v*}) (Ai)] / 12$$

RRv = Runoff Reduction Volume (acre-feet)

$R_v = 0.05 + 0.009 (I)$

(Where I = 100%)

I = Impervious Cover (Percent)

P = 90% Rainfall Event Number = 1.4 inches

Ai = Impervious Cover Targeted for Runoff Reduction = (S) (Aic)

Aic = Total Area of New Impervious Cover

S = Hydrologic Soil Group (HSG) Specific Reduction Factor

S for HSG A =0.55

S for HSG B =0.40

S for HSG C =0.30

S for HSG D =0.20

Calculate Specific Reduction Factor (S)

Total Drainage Area (A) =	3.76	acres
Total Area of HSG A	3.37	acres
Total Area of HSG B	0.39	acres
Total Area of HSG C	0.00	acres
Total Area of HSG D	0.00	acres

$$S = [(HSG\ A)(0.55) + (HSG\ B)(0.40) + (HSG\ C)(0.30) + (HSG\ D)(0.20)] / A$$

$$S = 0.5344$$

Calculate Impervious Cover Targeted for Runoff Reduction (Ai)

$$Ai = (S) (Aic)$$

Aic = Total Area of New Impervious Cover = 1.48 acres

Ai = 0.79 acres

Calculate Volumetric Runoff Coefficient (R_v):

$$R_v = 0.05 + 0.009 (I)$$

R_v = 0.95

90% Rainfall Event Number Utilized:

P = 1.4 inches

Calculate Minimum Runoff Reduction Volume:

$$RRv = [(P) (R_v) (Ai)] / 12$$

RRv = 0.088 acre-feet

RRv = 3819 ft^3

Star Warehouse

Infiltration Basin Design (Pond 2P)

Step 1: Calculate the Water Quality Volume (WQ_v)

$$WQ_v = [\ (P)\ (R_v)\ (A)\ ] / 12$$

WQ_v = Water Quality Volume (acre-feet)

P = 90% Rainfall Event Number = 1.4 inches

$R_v = 0.05 + 0.009\ (I)$

I = Impervious Cover (Percent) =	60	%
A = Drainage Area =	2.88	acres

WQ_v =	0.20	ac-ft
WQ_v =	8635.33	ft^3

Step 2: Determine the minimum bottom area of the infiltration basin:

$$A = V_W/d_b$$

V_w = design volume	8635.33	ft^3
d_b = depth of the basin	4.0	ft

Minimum A =	2158.83	ft^2
Provided A =	5205.00	ft^2

Step 3: Determine size of pretreatment:

Pretreatment size = 1/4 of the WQ_v =	2159	ft^3
Provided size =	2417	ft^3

Star Warehouse

Infiltration Basin (Pond 2P) Storage Volumes

Pond 2P Sedimentation Basin Volume					
Contour Elevation	Depth	Incremental Vol. Avg. End (CU.FT.)	Cumulative Vol. Avg. End (CU.FT.)	Incremental Vol. Conic (CU.FT.)	Cumulative Vol. Conic (CU.FT.)
262	N/A	N/A	0.00	N/A	0.00
264	2.00	582.59	582.59	474.70	474.70
266	4.00	1834.43	2417.02	1783.94	2258.64

Pond 2P (Infiltration Basin) Total Storage Volume					
Contour Elevation	Depth	Incremental Vol. Avg. End (CU.FT.)	Cumulative Vol. Avg. End (CU.FT.)	Incremental Vol. Conic (CU.FT.)	Cumulative Vol. Conic (CU.FT.)
262	N/A	N/A	0.00	N/A	0.00
264	2.00	13342.05	13342.05	13233.28	13233.28
266	4.00	19433.61	32775.66	19347.46	32580.74

Proposed Pond 2P Channel Protection Volume Calculation

Step 1: Calculate Stream Channel Protection Volume (Cp_v):

Stream Channel Protection Volume (Cp_v) Calculated using HydroCAD Software:

$Cp_v =$ 0.203 acre-feet

** **Stream Channel protection requirements are achieved on site through the proposed infiltration system by infiltration of the entire Cp_v.**

Star Warehouse

Runoff Reduction Volume (RRv) Summary:

Total RRv Calculated =

Total RRv Required per Calculation = 9,188 ft^3

Minimum RRv Required per Calculation = 3,819 ft^3

RRv Provided Utilizing Runoff Reduction Practices = 4,855 ft^3

:. Meets Minimum RRv Required, Utilized SMP for remaining RRv:

Remaining Required RRv:

Total RRv Required - RRv Provided Utilizing GI = 4,333 ft^3

PIETRZAK & PFAU, LLC

SOIL INFILTRATION TEST RESULTS

JOB NO.: 29106.01

PROJECT NAME: STAR WAREHOUSE

DATE: 1/5/2016

TOWN: CORNWALL

WEATHER: 17°, SUNNY

COUNTY: ORANGE

PERFORMED BY: NR, TP, LO

WITNESSED BY:

LOT NO.	TEST HOLE	DEPTH (IN.)		TEST RUN HR. 1	TEST RUN HR. 2	TEST RUN HR. 3	TEST RUN HR. 4	INFILTRATION RATE (IN.)	COMMENTS
	1	48"	FINISH					1.5"	
			START						
			TOTAL	3.0"	2.0"	1.5"	1.5"		
	2	48"	FINISH					0.5"	
			START						
			TOTAL	1.0"	0.5"	0.5"	0.5"		
			FINISH						
			START						
			TOTAL						
			FINISH						
			START						
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			TOTAL						
			FINISH						
			START						
			TOTAL						

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Aug 23 2016

Existing 12 Inch HDPE Culvert

Circular

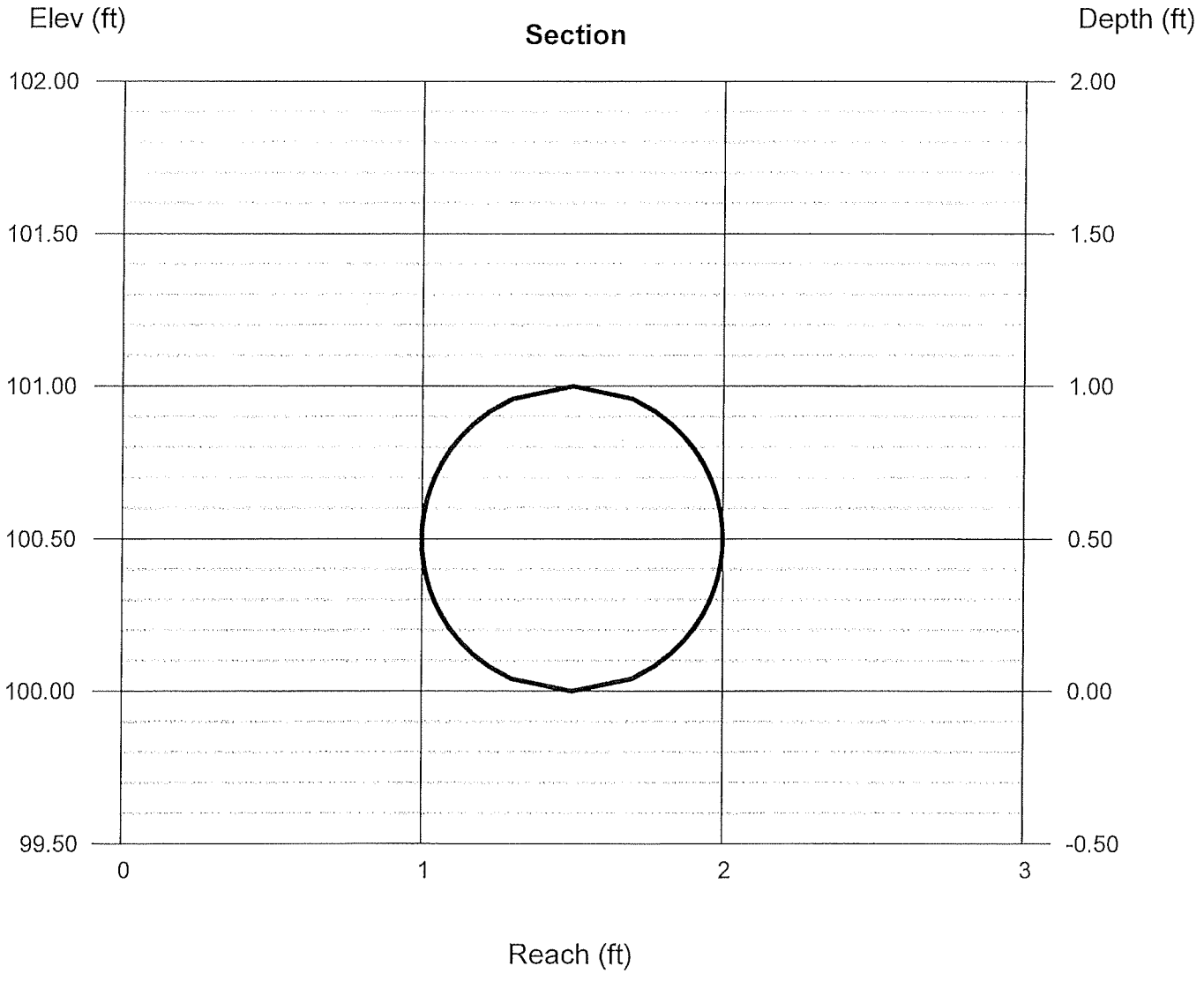
Diameter (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 2.70
N-Value	= 0.011

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 1.00

Highlighted

Depth (ft)	= 1.00
Q (cfs)	= 6.916
Area (sqft)	= 0.79
Velocity (ft/s)	= 8.81
Wetted Perim (ft)	= 3.14
Crit Depth, Yc (ft)	= 0.98
Top Width (ft)	= 0.00
EGL (ft)	= 2.21



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Aug 23 2016

Existing Creamery Hill Roadside Swale

Trapezoidal

Bottom Width (ft)	= 2.40
Side Slopes (z:1)	= 2.45, 2.45
Total Depth (ft)	= 1.85
Invert Elev (ft)	= 100.00
Slope (%)	= 0.80
N-Value	= 0.150

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.40

Highlighted

Depth (ft)	= 0.67
Q (cfs)	= 1.400
Area (sqft)	= 2.71
Velocity (ft/s)	= 0.52
Wetted Perim (ft)	= 5.95
Crit Depth, Yc (ft)	= 0.21
Top Width (ft)	= 5.68
EGL (ft)	= 0.67

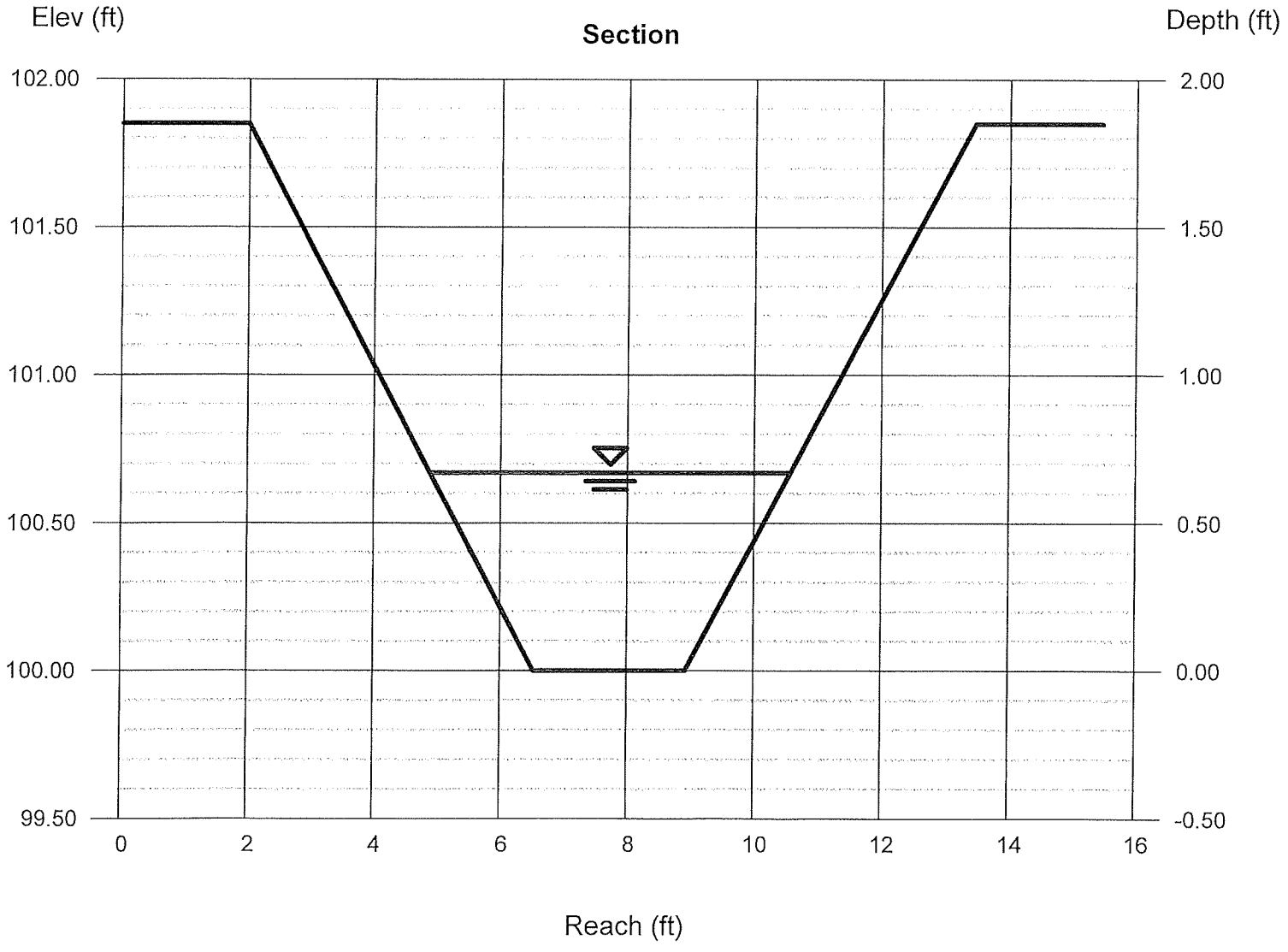
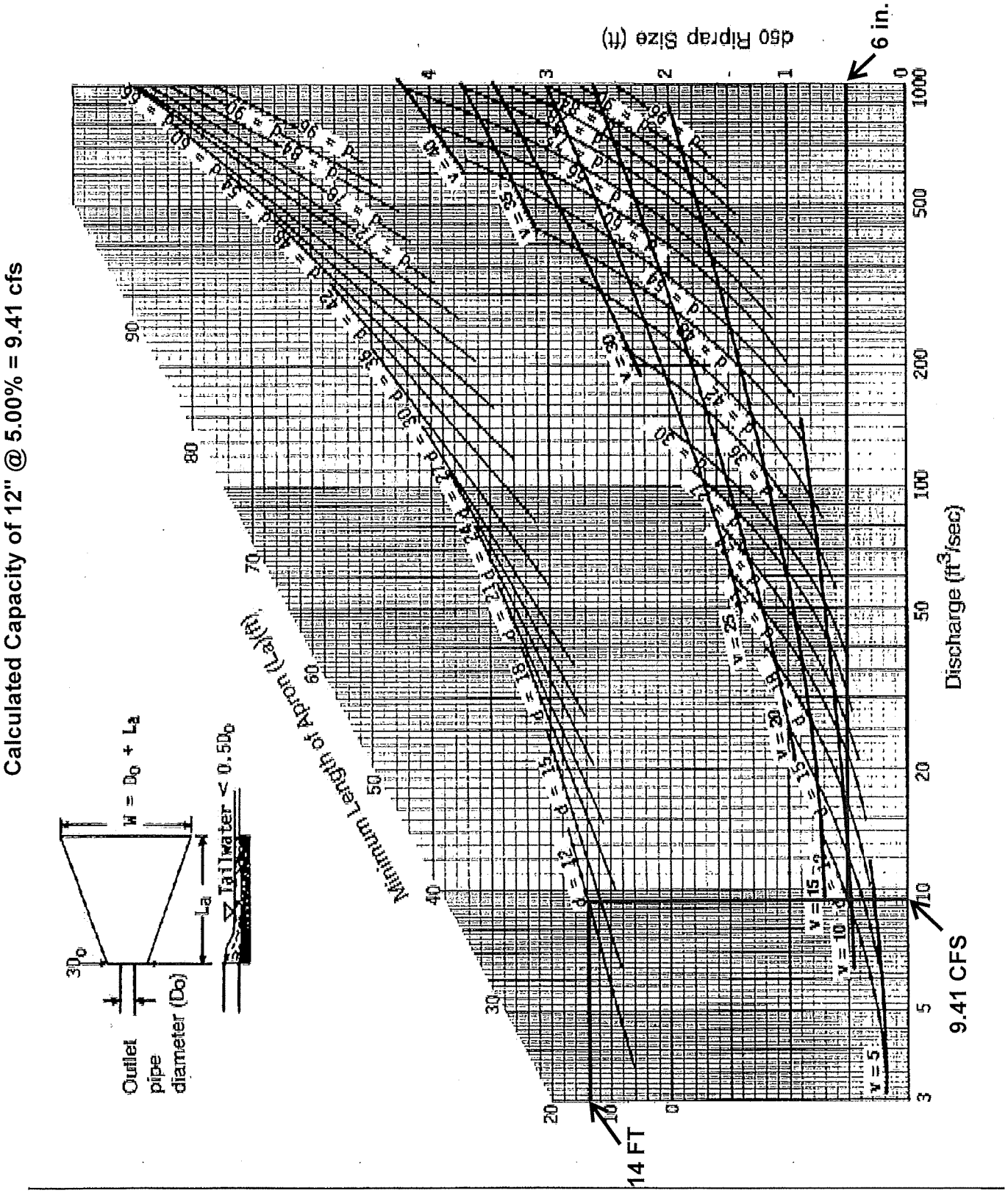


Figure 5B.12
Outlet Protection Design—Minimum Tailwater Condition
(Design of Outlet Protection from a Round Pipe Flowing Full, Minimum Tailwater Condition: $T_w < 0.5D_o$) (USDA - NRCS)



New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

Deep-Ripping and Decompaction

April 2008

New York State
Department of Environmental Conservation

Document Prepared by:

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Land Resource Consultant and Environmental Compliance Monitor
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Alternative Stormwater Management
Deep-Ripping and Decompaction

Description

The two-phase practice of 1) "Deep Ripping;" and 2) "Decompaction" (deep subsoiling), of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression; i.e.: soil compaction or the substantial increase in the bulk density of the soil material.

Deep Ripping and Decompaction are key factors which help in restoring soil pore space and permeability for water infiltration. Conversely, the physical actions of cut-and-fill work, land grading, the ongoing movement of construction equipment and the transport of building materials throughout a site alter the architecture and structure of the soil, resulting in: the mixing of layers (horizons) of soil materials, compression of those materials and diminished soil porosity which, if left unchecked, severely impairs the soil's water holding capacity and vertical drainage (rainfall infiltration), from the surface downward.

In a humid climate region, compaction damage on a site is virtually guaranteed over the duration of a project. Soil in very moist to wet condition when compacted, will have severely reduced permeability. Figure 1 displays the early stage of the deep-ripping phase (Note that all topsoil was stripped prior to construction access, and it remains stockpiled until the next phase – decompaction – is complete). A heavy-duty tractor is pulling a three-shank ripper on the first of several series of incrementally deepening passes through the construction access corridor's densely compressed subsoil material. Figure 2 illustrates the approximate volumetric composition of a loam surface soil when conditions are good for plant growth, with adequate natural pore space for fluctuating moisture conditions.

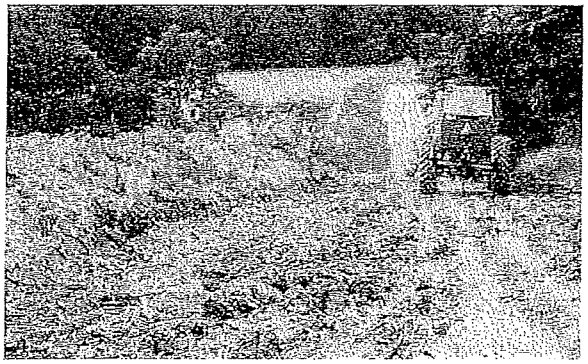


Fig. 1. A typical deep ripping phase of this practice, during the first in a series of progressively deeper "rips" through severely compressed subsoil.

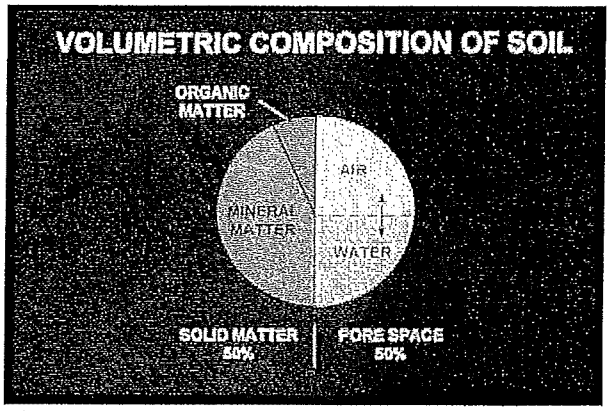


Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

Recommended Application of Practice

The objective of Deep Ripping and Decompaction is to effectively fracture (vertically and laterallly) through the thickness of the physically compressed subsoil material (see Figure 3), restoring soil porosity and permeability and aiding infiltration to help reduce runoff. Together with topsoil stripping, the "two-phase" practice of Deep Ripping and Decompaction first became established as a "best management practice" through ongoing success on commercial farmlands affected by heavy utility construction right-of-way projects (transmission pipelines and large power lines).

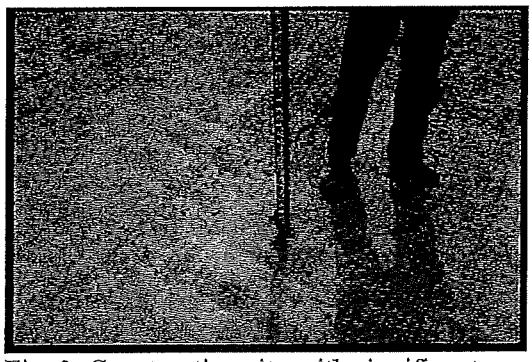


Fig. 3. Construction site with significant compaction of the deep basal till subsoil extends 24 inches below this exposed cut-and-fill work surface.

Soil permeability, soil drainage and cropland productivity were restored. For broader construction application, the two-phase practice of Deep Ripping and Decompaction is best adapted to areas impacted with significant soil compaction, on contiguous open portions of large construction sites and inside long, open construction corridors used as temporary access over the duration of construction. Each mitigation area should have minimal above-and-below-ground obstructions for the easy avoidance and maneuvering of a large tractor and ripping/decompacting implements. Conversely, the complete two-phase practice is not recommended in congested or obstructed areas due to the limitations on tractor and implement movement.

Benefits

Aggressive "deep ripping" through the compressed thickness of exposed subsoil before the replacement/respreading of the topsoil layer, followed by "decompaction," i.e.: "sub-soiling," through the restored topsoil layer down into the subsoil, offers the following benefits:

- Increases the project (larger size) area's direct surface infiltration of rainfall by providing the open site's mitigated soil condition and lowers the demand on concentrated runoff control structures

- Enhances direct groundwater recharge through greater dispersion across and through a broader surface than afforded by some runoff-control structural measures

- Decreases runoff volume generated and provides hydrologic source control

- May be planned for application in feasible open locations either alone or in

conjunction with plans for structural practices (e.g., subsurface drain line or infiltration basin) serving the same or contiguous areas

- Promotes successful long-term revegetation by restoring soil permeability, drainage and water holding capacity for healthy (rather than restricted) root-system development of trees, shrubs and deep rooted ground cover, minimizing plant drowning during wet periods and burnout during dry periods.

Feasibility/Limitations

The effectiveness of Deep Ripping and Decompaction is governed mostly by site factors such as: the original (undisturbed) soil's hydrologic characteristics; the general slope; local weather/timing (soil moisture) for implementation; the space-related freedom of equipment/implement maneuverability (noted above in **Recommended Application of Practice**), and by the proper selection and operation of tractor and implements (explained below in **Design Guidance**). The more notable site-related factors include:

Soil

In the undisturbed condition, each identified soil type comprising a site is grouped into one of four categories of soil hydrology, Hydrologic Soil Group A, B, C or D, determined primarily by a range of characteristics including soil texture, drainage capability when thoroughly wet, and depth to water table. The natural rates of infiltration and transmission of soil-water through the undisturbed soil layers for Group A is "high" with a low runoff potential while soils in Group B are moderate in infiltration and the transmission of soil-water with a moderate runoff potential, depending somewhat on slope. Soils in Group C have slow rates of infiltration and transmission of soil-water and a moderately high runoff potential influenced by soil texture and slope; while soils in Group D have exceptionally slow rates of infiltration and transmission of soil-water, and high runoff potential.

In Figure 4, the profile displays the undisturbed horizons of a soil in Hydrologic Soil Group C and the naturally slow rate of infiltration through the subsoil. The slow rate of infiltration begins immediately below the topsoil horizon (30 cm), due to the limited amount of macro pores, e.g.: natural subsoil fractures, worm holes and root channels. Infiltration after the construction-induced mixing and compression of such subsoil material is virtually absent; but can be restored back to this natural level with the two-phase practice of deep ripping and decompaction, followed by the permanent establishment of an appropriate, deep taproot

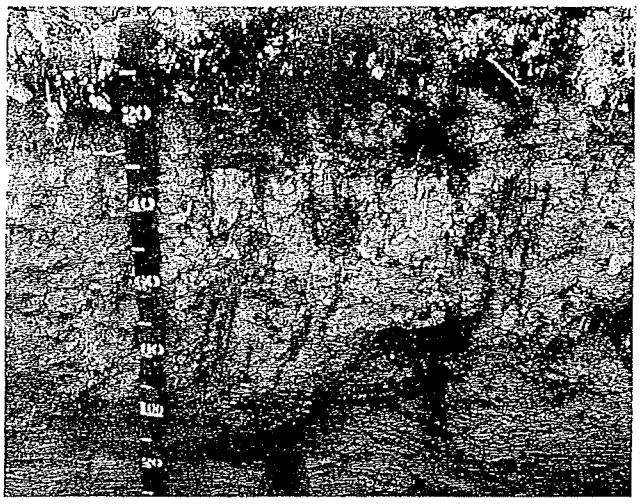


Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

lawn/ground cover to help maintain the restored subsoil structure. Infiltration after construction-induced mixing and compression of such subsoil material can be notably rehabilitated with the Deep Ripping and Decompaction practice, which prepares the site for the appropriate long-term lawn/ground cover mix including deep taproot plants such as clover, fescue or trefoil, etc. needed for all rehabilitated soils.

Generally, soils in Hydrologic Soil Groups A and B, which respectively may include deep, well-drained, sandy-gravelly materials or deep, moderately well-drained basal till materials, are among the easier ones to restore permeability and infiltration, by deep ripping and decompaction. Among the many different soils in Hydrologic Soil Group C are those unique glacial tills having a natural fragipan zone, beginning about 12 to 18 inches (30 – 45cm), below surface. Although soils in Hydrologic Soil Group C do require a somewhat more carefully applied level of the Deep Ripping and Decompaction practice, it can greatly benefit such affected areas by reducing the runoff and fostering infiltration to a level equal to that of pre-disturbance.

Soils in Hydrologic Soil Group D typically have a permanent high water table close to the surface, influenced by a clay or other highly impervious layer of material. In many locations with clay subsoil material, the bulk density is so naturally high that heavy trafficking has little or no added impact on infiltration; and structural runoff control practices rather than Deep Ripping and Decompaction should be considered.

The information about Hydrologic Soil Groups is merely a general guideline. Site-specific data such as limited depths of cut-and-fill grading with minimal removal or translocation of the inherent subsoil materials (as analyzed in the county soil survey) or, conversely, the excavation and translocation of deeper, unconsolidated substratum or consolidated bedrock materials (unlike the analyzed subsoil horizons' materials referred to in the county soil survey) should always be taken into account.

Sites made up with significant quantities of large rocks, or having a very shallow depth to bedrock, are not conducive to deep ripping and decompation (subsoiling); and other measures may be more practical.

Slope

The two-phase application of 1) deep ripping and 2) decompaction (deep subsoiling), is most practical on flat, gentle and moderate slopes. In some situations, such as but not limited to temporary construction access corridors, inclusion areas that are moderately steep along a project's otherwise gentle or moderate slope may also be deep ripped and decompacted. For limited instances of moderate steepness on other projects, however, the post-construction land use and the relative alignment of the potential ripping and decompaction work in relation to the lay of the slope should be reviewed for safety and practicality. In broad construction areas predominated by moderately steep or steep slopes, the practice is generally not used.

Local Weather/Timing/Soil Moisture

Effective fracturing of compressed subsoil material from the exposed work surface, laterally and vertically down through the affected zone is achieved only when the soil material is moderately dry to moderately moist. Neither one of the two-phases, deep ripping nor decompaction (deep

subsoiling), can be effectively conducted when the soil material (subsoil or replaced topsoil) is in either a "plastic" or "liquid" state of soil consistency. Pulling the respective implements legs through the soil when it is overly moist only results in the "slicing and smearing" of the material or added "squeezing and compression" instead of the necessary fracturing. Ample drying time is needed for a "rippable" soil condition not merely in the material close to the surface, but throughout the material located down to the bottom of the physically compressed zone of the subsoil.

The "poor man's Atterberg field test" for soil plasticity is a simple "hand-roll" method used for quick, on-site determination of whether or not the moisture level of the affected soil material is low enough for: effective deep ripping of subsoil; respreading of topsoil in a friable state; and final decompaction (deep subsoiling). Using a sample of soil material obtained from the planned bottom depth of ripping, e.g.: 20 - 24 inches below exposed subsoil surface, the sample is hand rolled between the palms down to a 1/8-inch diameter thread. (Use the same test for stored topsoil material before respreading on the site.) If the respective soil sample crumbles apart in segments no greater than 3/8 of an inch long, by the time it is rolled down to 1/8 inch diameter, it is low enough in moisture for deep ripping (or topsoil replacement), and decompaction. Conversely, as shown in Figure 5, if the rolled sample stretches out in increments greater than 3/8 of an inch long before crumbling, it is in a "plastic" state of soil consistency and is too wet for subsoil ripping (as well as topsoil replacement) and final decompaction.

Fig. 5. Augered from a depth of 19 inches below the surface of the replaced topsoil, this subsoil sample was hand rolled to a 1/8-inch diameter. The test shows the soil at this site stretches out too far without crumbling; it indicates the material is in a plastic state of consistence, too wet for final decompaction (deep subsoiling) at this time.

Design Guidance

Beyond the above-noted site factors, a vital requirement for the effective Deep Ripping and Decompaction (deep subsoiling), is implementing the practice in its distinct, two-phase process:

1) Deep rip the affected thickness of exposed subsoil material (see Figure 10 and 11), aggressively fracturing it before the protected topsoil is reapplied on the site (see Figure 12); and

2) Decompact (deep subsoil), simultaneously through the restored topsoil layer and the upper half of the affected subsoil (Figure 13). The second phase, "decompaction," mitigates the partial recompaction which occurs during the heavy process of topsoil spreading/grading. Prior to deep ripping and decompacting the site, all construction activity, including construction equipment and material storage, site cleanup and trafficking (Figure 14), should be finished; and the site closed off to further disturbance. Likewise, once the practice is underway and the area's soil permeability and

rainfall infiltration are being restored, a policy limiting all further traffic to permanent travel lanes is maintained.

The other critical elements, outlined below, are: using the proper implements (deep, heavy-duty rippers and subsoilers), and ample pulling-power equipment (tractors); and conducting the practice at the appropriate speed, depth and pattern(s) of movement.

Note that an appropriate plan for the separate practice of establishing a healthy perennial ground cover, with deep rooting to help maintain the restored soil structure, should be developed in advance. This may require the assistance of an agronomist or landscape horticulturist.

Implements

Avoid the use of all undersize implements. The small-to-medium, light-duty tool will, at best, only "scarify" the uppermost surface portion of the mass of compacted subsoil material. The term "chisel plow" is commonly but incorrectly applied to a broad range of implements. While a few may be adapted for the moderate subsoiling of non-impacted soils, the majority are less durable and used for only lighter land-fitting (see Figure 6).

Fig. 6. A light duty chisel implement, not adequate for either the deep ripping or decompaction (deep subsoiling) phase.

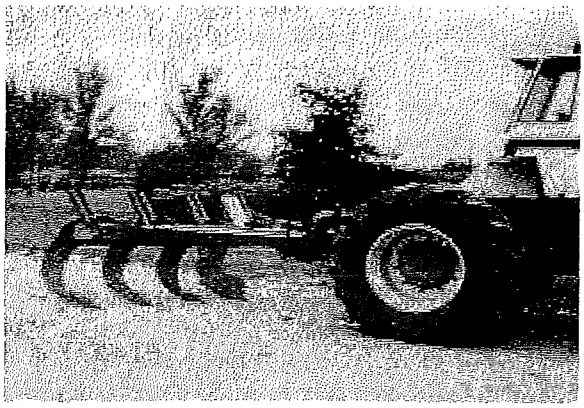


Fig. 7. One of several variations of an agricultural ripper. This unit has long, rugged shanks mounted on a steel V-frame for deep, aggressive fracturing through Phase 1.

Use a "heavy duty" agricultural-grade, deep ripper (see Figures 7,9,10 and 11) for the first phase: the lateral and vertical fracturing of the mass of exposed and compressed subsoil, down and through, to the bottom of impact, prior to the replacement of the topsoil layer. (Any oversize rocks which are uplifted to the subsoil surface during the deep ripping phase are picked and removed.) Like the heavy-duty class of implement for the first phase, the decompaction (deep subsoiling) of Phase 2 is conducted with the heavy-duty version of the deep subsoiler. More preferable is the angled-leg variety of deep subsoiler (shown in Figures 8 and 13). It minimizes the inversion of the subsoil and topsoil layers while laterally and vertically fracturing the upper half of the previously ripped subsoil layer and all of the topsoil layer by delivering a momentary, wave-like "lifting and shattering" action up through the soil layers as it is pulled.

Pulling-Power of Equipment

Use the following rule of thumb for tractor horsepower (hp) whenever deep ripping and decompacting a significantly impacted site: For both types of implement, have at least 40 hp of tractor pull available for each mounted shank/ leg.

Using the examples of a 3-shank and a 5-shank implement, the respective tractors should have 120 and 200 hp available for fracturing down to the final depth of 20-to-24 inches per phase. Final depth for the deep ripping in Phase 1 is achieved incrementally by a progressive series of passes (see Depth and Patterns of Movement, below); while for Phase 2, the full operating depth of the deep subsoiler is applied from the beginning.

The operating speed for pulling both types of implement should not exceed 2 to 3 mph. At this slow and managed rate of operating speed, maximum functional performance is sustained by the tractor and the implement performing the soil fracturing. Referring to Figure 8, the implement is the 6-leg version of the deep angled-leg subsoiler. Its two outside legs are "chained up" so that only four legs will be engaged (at the maximum depth), requiring no less than 160 hp, (rather than 240 hp) of pull. The 4-wheel drive, articulated-frame tractor in Figure 8 is 174 hp. It will be decompacting this unobstructed, former construction access area simultaneously through 11 inches of replaced topsoil and the upper 12 inches of the previously deep-ripped subsoil. In constricted areas of Phase 1) Deep Ripping, a medium-size tractor with adequate hp, such as the one in Figure 9 pulling a 3-shank deep ripper, may be more maneuverable.

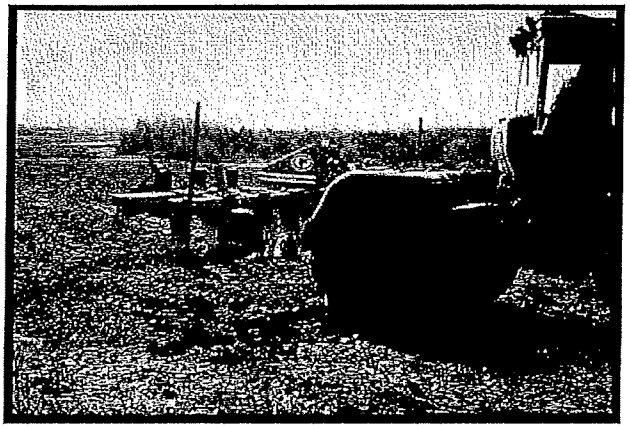


Fig. 8. A deep, angled-leg subsoiler, ideal for Phase 2 decompaction of after the topsoil layer is graded on top of the ripped subsoil.

Fig. 9. This medium tractor is pulling a 3-shank deep ripper. The severely compacted construction access corridor is narrow, and the 120 hp tractor is more maneuverable for Phase 1 deep ripping (subsoil fracturing), here.

Some industrial-grade variations of ripping implements are attached to power graders and bulldozers. Although highly durable, they are generally not recommended. Typically, the shanks or "teeth" of these rippers are too short and stout; and they are mounted too far apart to achieve the well-distributed type of lateral and vertical fracturing of the soil materials necessary to restore soil permeability and infiltration. In addition, the power graders and bulldozers, as pullers, are far less maneuverable for turns and patterns than the tractor.

Depth and Patterns of Movement

As previously noted both Phase 1 Deep Ripping through significantly compressed, exposed subsoil and Phase 2 Decompaction (deep subsoiling) through the replaced topsoil and upper subsoil need to be performed at maximum capable depth of each implement. With an implement's guide wheels attached, some have a "normal" maximum operating depth of 18 inches, while others may go deeper. In many situations, however, the tractor/implement operator must first remove the guide wheels and other non essential elements from the implement. This adapts the ripper or the deep subsoiler for skillful pulling with its frame only a few inches above surface, while the shanks or legs, fracture the soil material 20-to-24 inches deep.

There may be construction sites where the depth of the exposed subsoil's compression is moderate, e.g.: 12 inches, rather than deep. This can be verified by using a ¾ inch cone penetrometer and a shovel to test the subsoil for its level of compaction, incrementally, every three inches of increasing depth. Once the full thickness of the subsoil's compacted zone is finally "pieced" and there is a significant drop in the psi measurements of the soil penetrometer, the depth/thickness of compaction is determined. This is repeated at several representative locations of the construction site. If the thickness of the site's subsoil compaction is verified as, for example, ten inches, then the Phase 1 Deep Ripping can be correspondingly reduced to the implement's minimum operable depth of 12 inches. However, the Phase 2 simultaneous Decompation (subsoiling) of an 11 inch thick layer of replaced topsoil and the upper subsoil should run at the subsoiling implements full operating depth.

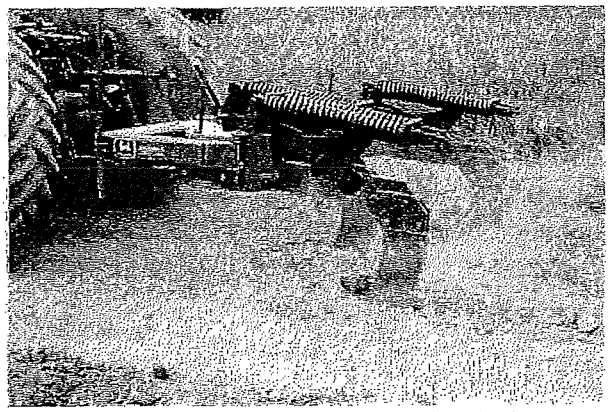


Fig. 10. An early pass with a 3-shank deep ripper penetrating only 8 inches into this worksite's severely compressed subsoil.

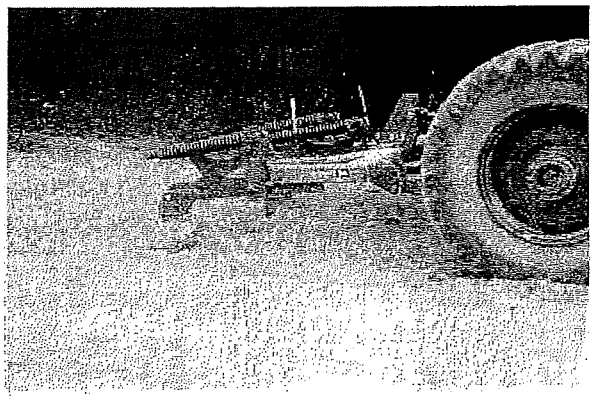


Fig. 11. A repeat run of the 3-shank ripper along the same patterned pass area as Fig. 9; here, incrementally reaching 18 of the needed 22 inches of subsoil fracture.

Typically, three separate series (patterns) are used for both the Phase 1 Deep Ripping and the Phase 2 Decompaction on significantly compacted sites. For Phase 1, each series begins with a moderate depth of rip and, by repeat-pass, continues until full depth is reached. Phase 2 applies the full depth of Decompation (subsoiling), from the beginning.

Every separate series (pattern) consists of parallel, forward-and-return runs, with each progressive

pass of the implement's legs or shanks evenly staggered between those from the previous pass. This compensates for the shank or leg-spacing on the implement, e.g., with 24-to-30 inches between each shank or leg. The staggered return pass ensures lateral and vertical fracturing actuated every 12 to 15 inches across the densely compressed soil mass.

Large, Unobstructed Areas

For larger easy areas, use the standard patterns of movement:

- The first series (pattern) of passes is applied lengthwise, parallel with the longest spread of the site; gradually progressing across the site's width, with each successive pass.

- The second series runs obliquely, crossing the first series at an angle of about 45 degrees.

- The third series runs at right angle (or 90 degrees), to the first series to complete the fracturing and shattering on severely compacted sites, and avoid leaving large unbroken blocks of compressed soil material. (In certain instances, the third series may be optional, depending on how thoroughly the first two series loosen the material and eliminate large chunks/blocks of material as verified by tests with a ¾-inch cone penetrometer.)

Fig. 12. Moderately dry topsoil is being replaced on the affected site now that Phase 1 deep ripping of the compressed subsoil is complete.

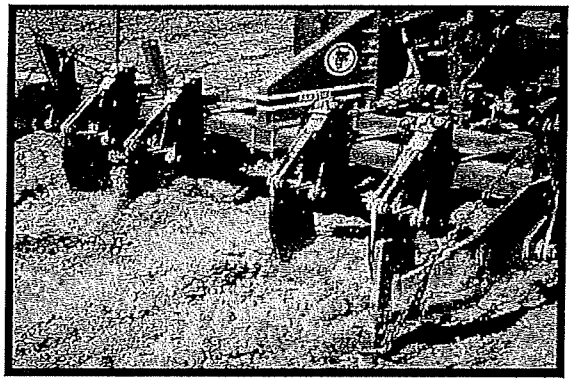


Fig. 13. The same deep, angled-leg subsoiler shown in Fig. 7 is engaged at maximum depth for Phase 2, decompaction (deep soiling), of the replaced topsoil and the upper subsoil materials.

Corridors

In long corridors of limited width and less maneuverability than larger sites, e.g.: along compacted areas used as temporary construction access, a modified series of pattern passes are used.

- First, apply the same initial lengthwise, parallel series of passes described above.

- A second series of passes makes a broad "S" shaped pattern of rips, continually and gradually alternating the "S" curves between opposite edges inside the compacted corridor.

- The third and final series again uses the broad, alternating S pattern, but it is "flip-flopped" to continually cross the previous S pattern along the corridor's centerline. This final series of the S pattern curves back along the edge areas skipped by the second series.

Maintenance and Cost

Once the two-phase practice of Deep Ripping and Decompation is completed, two items are essential for maintaining a site's soil porosity and permeability for infiltration. They are: planting and maintaining the appropriate ground cover with deep roots to maintain the soil structure (see Figure 15); and keeping the site free of traffic or other weight loads.

Note that site-specific choice of an appropriate vegetative ground-cover seed mix, including the proper seeding ratio of one or more perennial species with a deep taproot system and the proper amount of lime and soil nutrients (fertilizer mix) adapted to the soil-needs, are basic to the final practice of landscaping, i.e: surface tillage, seeding/planting/fertilizing and culti-packing or mulching is applied. The "maintenance" of an effectively deep-ripped and decompacted area is generally limited to the successful perennial (long-term) landscape ground cover; as long as no weight-bearing force of soil compaction is applied.

Fig. 14. The severely compacted soil of a temporary construction yard used daily by heavy equipment for four months; shown before deep ripping, topsoil replacement, and decompaction.

Fig. 15. The same site as Fig. 14 after deep ripping of the exposed subsoil, topsoil replacement, decompaction through the topsoil and upper subsoil and final surface tillage and revegetation to maintain soil permeability and infiltration.

The Deep Ripping and Decompaction practice is, by necessity, more extensive than periodic subsoiling of farmland.The cost of deep ripping and decompacting (deep subsoiling), will vary according to the depth and severity of soil-material compression and the relative amount of tractor and implement time that is required. In some instances, depending on open maneuverability, two-to-three acres of compacted project area may be deep-ripped in one day. In other situations of more severe compaction and - or less maneuverability, as little as one acre may be fully ripped in a day. Generally, if the Phase 1) Deep Ripping is fully effective, the Phase 2) Decompaction should be completed in 2/3 to 3/4 of the time required for Phase 1.

Using the example of two acres of Phase 1) Deep Ripping in one day, at $1800 per day, the net cost is $900 per acre. If the Phase 2) Decompacting or deep subsoiling takes 3/4 the time as Phase 1, it costs $675 per acre for a combined total of $1575 per acre to complete the practice (these figures do not include the cost of the separate practice of topsoil stripping and replacement). Due to the many variables, it must be recognized that cost will be determined by the specific conditions or constraints of the site and the availability of proper equipment.

Resources

Publications:

- American Society of Agricultural Engineers. 1971. *Compaction of Agricultural Soils.* ASAE.
- Brady, N.C., and R.R. Weil. 2002. *The Nature and Properties of Soils. 13th ed.* Pearson Education, Inc.
- Baver, L.D. 1948. *Soil Physics.* John Wiley & Sons.
- Carpachi, N. 1987 (1995 fifth printing). *Excavation and Grading Handbook, Revised. 2nd ed.* Craftsman Book Company
- Ellis, B. (Editor). 1997. Safe & Easy Lawn Care: The Complete Guide to Organic Low Maintenance Lawn. Houghton Mifflin.
- Harpstead, M.I., T.J. Sauer, and W.F. Bennett. 2001. *Soil Science Simplified. 4th ed.* Iowa State University Press.
- Magdoff, F., and H. van Es. 2000. *Building Soils for Better Crops. 2nd ed.* Sustainable Agricultural Networks
- McCarthy, D.F. 1993. *Essentials of Soil Mechanics and Foundations, Basic Geotechnics 4th ed.* Regents/Prentice Hall.
- Plaster, E.J. 1992. *Soil Science & Management. 3rd ed.* Delmar Publishers.
- Union Gas Limited, Ontario, Canada. 1984. *Rehabilitation of Agricultural Lands, Dawn-Kerwood Loop Pipeline; Technical Report.* Ecological Services for Planning, Ltd.; Robinson, Merritt & Devries, Ltd. and Smith, Hoffman Associates, Ltd.
- US Department of Agriculture in cooperation with Cornell University Agricultural Experiment Station. Various years. *Soil Survey of (various names) County, New York.* USDA.

Internet Access:

- Examples of implements:

V-Rippers. Access by internet search of *John Deere Ag -New Equipment for 915* (larger-frame model) *V-Rippe;* and, *for 913* (smaller-frame model) *V-Ripper.* Deep, angled-leg subsoiler. Access by internet search of: B*igham Brothers Shear Bolt Paratill-Subsoiler.* http://salesmanual.deere.com/sales/salesmanual/en_NA/primary_tillage/2008/feature/rippers/915v_pattern_frame.html?sbu=ag&link=prodcat Last visited March 08.

- Soils data of USDA Natural Resources Conservation Service. *NRCS Web Soil Survey.* http://websoilsurvey.nrcs.usda.gov/app/ and *USDA-NRCS Official Soil Series Descriptions; View by Name.* http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi . *Last visited Jan. 08.*
- Soil penetrometer information. Access by internet searches of: *Diagnosing Soil Compaction using a Penetrometer (soil compaction tester), PSU Extension;* as well as *Dickey-john Soil Compaction Tester.* http://www.dickey-johnproducts.com/pdf/SoilCompactionTest.pdf and http://cropsoil.psu.edu/Extension/Facts/uc178pdf Last visited Sept. 07

APPENDIX 10

Draft Stormwater Site Inspection Form

INSPECTION NOTES/
SITE PLAN/SKETCH

Inspector (print name) **Date of Inspection**

Qualified Professional (print name) **Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions
Yes No NA
[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing
Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Runoff Control Practices

1. Excavation Dewatering
Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales
Yes No NA
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Runoff Control Practices (continued)

4. Stone Check Dam
Yes No NA
[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles
Yes No NA
[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation
Yes No NA
[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Stabilized Construction Entrance
Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence
Yes No NA
[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices)

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch. (side slopes seeded & mulched. some washout has occured)
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:
1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

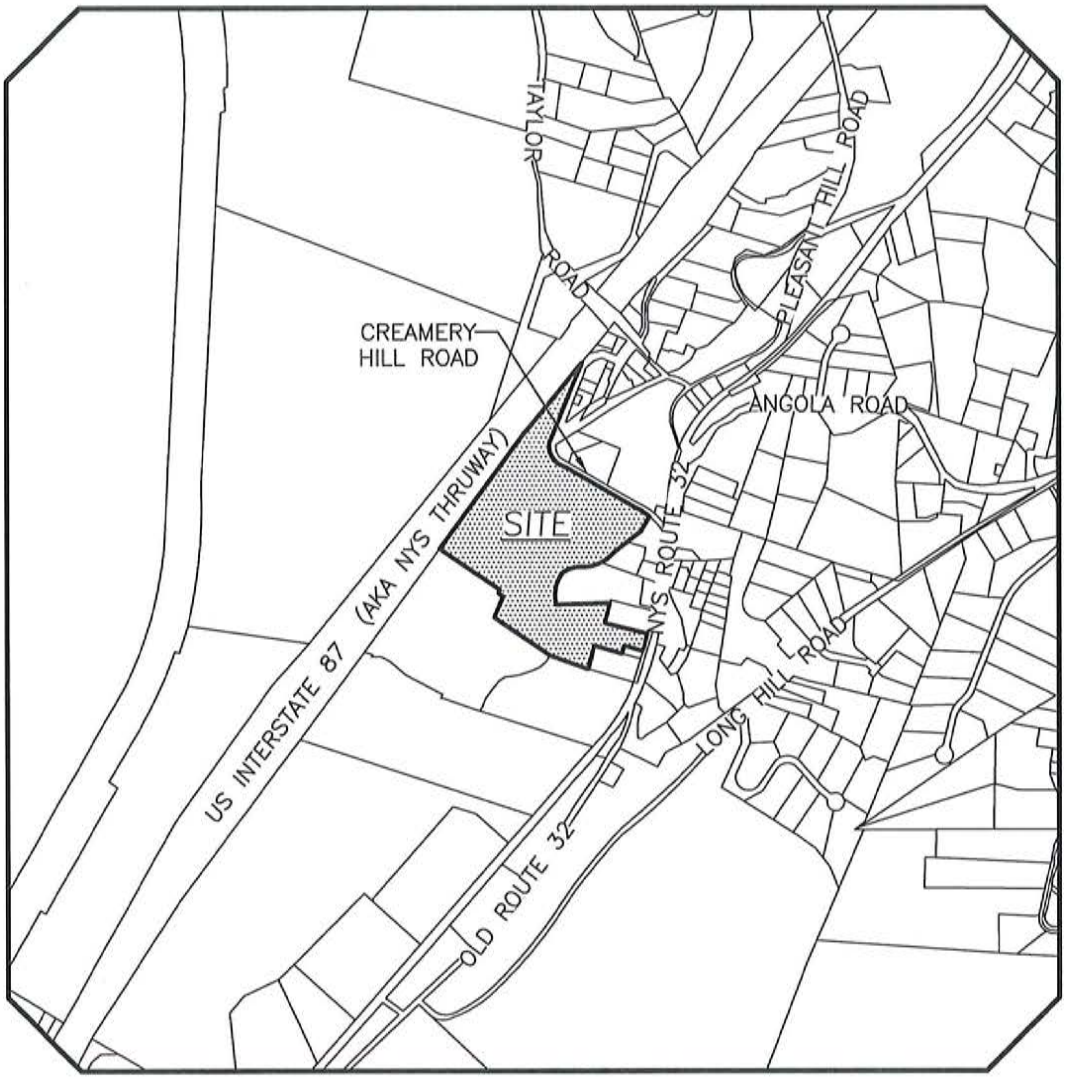
Modification & Reason:

APPENDIX D

Existing Water System Modification Report

Appendix 1

Location Map



LOCATION MAP

SCALE: 1" =1,500'

Appendix 2

Water Usage Logs

Star Warehouse Water Usage January 2013 - November 2014				
Date	Average Daily Rate of Treated Water (gpd)	Average Daily Rate of Treated Water (gpm)	Peak Day Rate of Treated Water (gpd)	Peak Day Rate of Treated Water (gpm)
January 2013	703	0.49	2,770	1.92
February 2013	1,459	1.01	3,920	2.72
March 2013	1,242	0.86	6,090	4.23
April 2013	1,265	0.88	4,750	3.30
May 2013	1,417	0.98	6,500	4.51
June 2013	1,706	1.18	6,710	4.66
July 2013	2,652	1.84	13,080	9.08
August 2013	1,672	1.16	5,300	3.68
September 2013	1,337	0.93	12,800	8.89
October 2013	2,265	1.57	7,700	5.35
November 2013	1,347	0.94	8,620	5.99
December 2013	2,150	1.49	17,760	12.33
January 2014	3,992	2.77	20,450	14.20
February 2014	4,576	3.18	32,560	22.61
March 2014	7,823	5.43	32,050	22.26
April 2014	5,463	3.79	23,800	16.53
May 2014	3,448	2.39	17,490	12.15
June 2014	1,638	1.14	10,190	7.08
July 2014	2,011	1.40	9,830	6.83
August 2014	1,284	0.89	5,620	3.90
September 2014	1,215	0.84	3,750	2.60
October 2014	1,075	0.75	7,540	5.24
November 2014	1,349	0.94	4,890	3.40

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water (Type(s))
Star Warehouse	Jan-13	2/5/2013	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1		1.32					Yes	91%	No	DS		
2		0.63					Yes	91%	No	DS		
3		0.64					Yes	91%	Yes	DS		
4		0.63					Yes	91%	No	DS		
5												
6												
7		1.27					Yes	89%	No	DS		
8		0.64					Yes	91%	No	DS		
9		0.64					Yes	91%	No	DS		
10		0.64					Yes	91%	No	DS		
11		0.64					Yes	91%	No	DS		
12												
13												
14		1.27					Yes	92%	Yes	DS		
15		0.64					Yes	92%	No	DS		
16		0.64					Yes	92%	No	DS		
17		2.77					Yes	92%	No	DS		
18		0.41					Yes	92%	No	DS		
19												
20												
21		1.27					Yes	92%	No	DS		
22		0.79					Yes	92%	No	DS		
23		0.79					Yes	92%	No	DS		
24		0.79					Yes	90%	No	DS		
25		0.79					Yes	90%	No	DS		
26												
27												
28		2.37					Yes	92%	Yes	DS		
29		0.80					Yes	92%	No	DS		
30		0.79					Yes	92%	No	DS		
31		0.64					Yes	92%	No	DS		
Total		21.785										
AVG...		0.703						91%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 1/28/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 2/4/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month and Year	Water Source Type(s) Used
Star Warehouse	01.13	☐ Surface ☑ Grd ☐ Purch/Pdt ☐ Trtng treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town / Village**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	870,050	YES	91%	NO	[illegible]	
2	870,954	YES	91%	NO	[illegible]	
3	871,589	YES	91%	YES	[illegible]	CLEAN EYE ONLY
4	872,223	YES	91%	NO	[illegible]	
5						
6						
7	873,493	YES	89%	NO	[illegible]	
8	874,128	YES	91%	NO	[illegible]	
9	874,763	YES	91%	NO	[illegible]	
10	875,398	YES	91%	NO	[illegible]	
11	876,033	YES	91%	NO	[illegible]	
12						
13						
14	877,303	YES	92%	YES	[illegible]	FILTER + UV
15	877,938	YES	92%	NO	[illegible]	
16	878,573	YES	92%	NO	[illegible]	
17	881340	YES	92%	NO	[illegible]	
18	881,748	YES	92%	NO	[illegible]	
19						
20						
21	883,018	YES	92%	NO	[illegible]	
22	883,810	YES	92%	NO	[illegible]	
23	884,603	YES	92%	NO	[illegible]	
24	885,396	YES	90%	NO	[illegible]	
25	886,189	YES	90%	NO	[illegible]	
26						
27						
28	888,568	YES	92%	YES	[illegible]	CLEAN UV EYE ONLY
29	889360	YES	92%	NO	[illegible]	
30	890,154	YES	92%	NO	[illegible]	
31	890,789	YES	92%	NO	[illegible]	

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Feb-13	3/6/2013	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		1.931					Yes	92%	No	DS		
2												
3												
4		3.92					Yes	92%	No	DS		
5		1.52					Yes	92%	No	DS		
6		1.52					Yes	92%	No	DS		
7		1.52					Yes	92%	No	DS		
8		1.52					Yes	92%	No	DS		
9												
10												
11		3.05					Yes	91%	Yes	DS		
12		1.52					Yes	91%	No	DS		
13		1.52					Yes	91%	No	DS		
14		1.52					Yes	91%	No	DS		
15		1.52					Yes	91%	No	DS		
16												
17												
18		3.04					Yes	91%	No	DS		
19		1.52					Yes	91%	No	DS		
20		1.52					Yes	91%	No	DS		
21		1.52					Yes	91%	No	DS		
22		1.52					Yes	91%	No	DS		
23												
24												
25		3.04					Yes	91%	Yes	DS		
26		4.57					Yes	92%	No	DS		
27		1.52					Yes	92%	No	DS		
28		1.52					Yes	92%	No	DS		
29												
30												
31												
Total		40.865										
AVG.		1.459						91%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 1/28/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 3/6/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month	Source Water Type (s)
Star Warehouse	02, 13	☐ Surface Ind ☐ GWUDI ☐ Alog treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Water Treatment Plant Name**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	892,730	Yes	92%	No	JS	
2						
3						
4	896,640	Yes	92%	No	JS	
5	898,162	Yes	92%	No	JS	
6	899,684	Yes	92%	No	JS	
7	901,206	Yes	92%	No	JS	
8	902,728	Yes	92%	No	JS	
9						
10						
11	905,772	Yes	91%	Yes	JS	CLEAN EYE ONLY
12	907,294	Yes	91%	No	JS	
13	908,816	Yes	91%	No	JS	
14	910,338	Yes	91%	No	JS	
15	911,860	Yes	91%	No	JS	
16						
17						
18	914,404	Yes	92%	No	JS	
19	916,426	Yes	92%	No	JS	
20	917,948	Yes	92%	No	JS	
21	919,470	Yes	92%	No	JS	
22	920,992	Yes	92%	No	JS	
23						
24						
25	924,036	Yes	92%	Yes	JS	CHANGE FILTER + EYE CLEANED
26	928,610	Yes	92%	No	JS	
27	930,132	Yes	92%	No	JS	
28	931,654	Yes	92%	No	JS	
29						
30						
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Mar-13	4/9/2013	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		1.396					Yes	92%	No	DS		
2	Closed											
3	Closed											
4		6.09					Yes	94%	No	DS		
5		1.52					Yes	94%	No	DS		
6		2.23					Yes	94%	No	DS		
7		2.27					Yes	94%	No	DS		
8		2.16					Yes	93%	No	DS		
9	Closed											
10	Closed											
11		4.65					Yes	92%	No	DS		
12		1.23					Yes	91%	No	DS		
13		1.77					Yes	94%	No	DS		
14		1.77					Yes	94%	No	DS		
15		0.47					Yes	94%	No	DS		
16	Closed											
17	Closed											
18		4.50					Yes	94%	No	DS		
19		1.77					Yes	94%	No	DS		
20		1.77					Yes	94%	No	DS		
21		1.77					Yes	94%	No	DS		
22		0.40					Yes	94%	No	DS		
23	Closed											
24	Closed											
25		2.85					Yes	94%	No	DS		
26	Closed											
27	Closed											
28	Closed											
29	Closed											
30	Closed											
31	Closed											
Total		38.516										
AVG.		1.242						94%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 4/12/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: _____ Date: 4/8/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water Type(s)
Star Warehouse	03, 13	☐ Surface ☑ GW ☐ GWUDI ☐ 4-log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/o subsequent chlorination
Public Water Supply ID Number	**County**	**Village or City**
3530230	ORANGE.	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	933,050	Yes	92%	NO	JS	
2						
3						
4	934,158	Yes	94%	Yes	JS	CHANGE Filter NEW Tube
5	940 660	Yes	94%	NO	JS	
6	942 890	Yes	94%	NO	JS	
7	945 162	Yes	94%	NO	JS	
8	947 320	Yes	93%	NO	JS	
9						
10						
11	951 873	Yes	92%	NO	JS	
12	953100	Yes	91%	Yes	JS	CLEAN UV Add SALT CHANGE
13	954870	Yes	94%	NO	JS	
14	956 640	Yes	94%	NO	JS	
15	957 110	Yes	94%	NO	JS	
16						
17						
18	961,610	Yes	94%	NO	JS	
19	963,380	Yes	94%	NO	JS	
20	965,150	Yes	94%	NO	JS	
21	966,920	Yes	94%	NO	JS	
22	967,320	Yes	94%	NO	JS	
23						
24						
25	970170	Yes	94%	NO	JS	CHANGE Filter Add SALT
26	Closed					
27	CLOSED					
28	CLOSED					
29	Closed					
30						
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Apr-13	5/1/2013	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination

Public Water Supply ID Number	County	Town/Village or City
3530230	ORANGE	CORNWALL

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1	Closed								No	DS		
2	Closed											
3	Closed											
4		3.65					Yes	90%	No	DS		
5		1.87					Yes	95%	No	DS		
6	Closed											
7	Closed											
8		4.75					Yes	94%	No	DS		
9		2.48					Yes	939%	No	DS		
10		0.19					Yes	94%	No	DS		
11		1.75					Yes	94%	No	DS		
12		2.23					Yes	94%	No	DS		
13	Closed											
14	Closed											
15		2.13					Yes	89%	No	DS		
16		1.44					Yes	94%	No	DS		
17		1.16					Yes	94%	No	DS		
18		1.40					Yes	94%	No	DS		
19		1.86					Yes	94%	No	DS		
20	Closed											
21	Closed											
22		1.97					Yes	94%	No	DS		
23		1.52					Yes	94%	No	DS		
24		1.26					Yes	94%	No	DS		
25		0.60					Yes	94%	No	DS		
26		2.65					Yes	94%	No	DS		
27	Closed											
28	Closed											
29		3.26					Yes	94%	No	DS		
30		1.90					Yes	94%	No	DS		
31												
Total		37.96										
AVG.		1.265						138%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 4/12/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 5/1/2013 Operator Grade Level: II-B, C, D

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PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year		Source Water Type(s)
Star Warehouse	04, 13		☐ Surface ☑ Grd ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**		**Town/Village/City**
3530230	ORANGE		CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	Closed					
2	Closed					
3	Closed					
4	973720	Yes	90%	Yes	TS	Add 2 bags salt cleaned
5	975590	Yes	95%	No	TS	
6						
7						
8	980340	Yes	94%	No	TS	
9	982823	Yes	93%	No	TS	
10	983010	Yes	94%	No	TS	
11	984760	Yes	98%	No	TS	
12	986990	Yes	94%	No	TS	
13						
14						
15	989120	Yes	89%	Yes	TS	cleaned Tube Added Salt
16	990560	Yes	94%	No	TS	
17	991720	Yes	94%	No	TS	
18	993124	Yes	94%	No	TS	
19	994982	Yes	94%	No	TS	
20						
21						
22	996950	Yes	94%	No	TS	
23	998465	Yes	94%	No	TS	
24	999723	Yes	94%	No	TS	
25	1000320	Yes	94%	No	TS	
26	1002970	Yes	94%	No	TS	
27						
28						
29	1006232	Yes	94%	No	TS	
30	1008130	Yes	94%	No	TS	
31						

Date UV quartz sleeve last cleaned: ________ Date UV lamp replaced: ________ Alarm activation (yes or no) If "yes," date ________

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	May-13	6/4/2013	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination

Public Water Supply ID Number	County	Town, Village, or City
3330230	ORANGE	CORNWALL

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		1.195					Yes	94%	No	DS		
2		0.795					Yes	94%	No	DS		
3		2.34					Yes	94%	Yes	DS		
4	Closed											
5	Closed											
6		2.89					Yes	94%	No	DS		
7		1.90					Yes	94%	No	DS		
8		0.88					Yes	94%	No	DS		
9		1.42					Yes	92%	No	DS		
10		0.33					Yes	94%	No	DS		
11	Closed											
12	Closed											
13		5.79					Yes	92%	No	DS		
14	Closed											
15	Closed											
16	Closed											
17		4.99					Yes	94%	No	DS		
18	Closed											
19	Closed											
20		2.61					Yes	89%	Yes	DS		
21		1.55					Yes	94%	No	DS		
22		1.83					Yes	94%	No	DS		
23		1.59					Yes	94%	No	DS		
24		1.80					Yes	94%	No	DS		
25	Closed											
26	Closed											
27		6.50					Yes	94%	No	DS		
28		2.20					Yes	94%	No	DS		
29		1.13					Yes	94%	No	DS		
30		1.04					Yes	94%	No	DS		
31		1.15					Yes	94%	No	DS		
Total		43.92										
AVG.		1.417						93.6%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/20/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P Klopchin Date: 6/4/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water (Type Code)
Star Warehouse	05, 2013	☐ Surface ☑ GW ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town/City**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	1009325	Yes	94%	NO	TS	
2	1010120	Yes	94%	NO	TS	
3	1012460	Yes	94%	Yes	TS	CLEAN TUBE CHANGE FILTER
4						
5						
6	1015350	Yes	94%	NO	TS	
7	1017250	Yes	94%	NO	TS	
8	1018132	Yes	94%	NO	TS	
9	1019550	Yes	92%	Yes	TS	CHANGE FILTER + CLEAN UV
10	1019880	Yes	94%	[illegible]	TS	
11				NO		
12				NO		
13	1025670	Yes	92%	[illegible]	TS	
14	CLOSED					
15	CLOSED					
16	CLOSED					
17	1030657	Yes	94%	NO	TS	
18						
19						
20	1033265	Yes	89%	Yes	TS	CLEAN TUBE ADD (BALLAST)
21	1034810	Yes	94%	NO	TS	
22	1036635	Yes	94%	NO	TS	
23	1038324	Yes	94%	NO	TS	
24	1040028	Yes	94%	NO	TS	
25						
26						
27	1046532	Yes	94%	NO	TS	
28	1048732	Yes	94%	NO	TS	
29	1049865	Yes	94%	NO	TS	
30	1050400	Yes	94%	NO	TS	
31	1052050	Yes	94%	NO	TS	

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Jun-13	7/3/2013	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1	Closed											
2	Closed											
3		4.10					Yes	94%	No	DS		
4		3.37					Yes	94%	No	DS		
5		1.57					Yes	94%	No	DS		
6		1.09					Yes	94%	No	DS		
7		2.13					Yes	94%	No	DS		
8	Closed											
9	Closed											
10		3.33					Yes	94%	No	DS		
11		1.65					Yes	94%	No	DS		
12		2.64					Yes	94%	No	DS		
13		2.76					Yes	94%	No	DS		
14	Closed											
15	Closed											
16	Closed											
17		3.21					Yes	94%	No	DS		
18		2.36					Yes	92%	Yes	DS		
19		1.86					Yes	94%	No	DS		
20		3.21					Yes	94%	No	DS		
21		1.81					Yes	94%	No	DS		
22	Closed											
23	Closed											
24		5.12					Yes	94%	No	DS		
25		1.61					Yes	94%	No	DS		
26		0.23					Yes	94%	No	DS		
27		2.43					Yes	94%	No	DS		
28		6.71					Yes	94%	No	DS		
29	Closed											
30	Closed											
31												
Total		51.18										
AVG.		1.706						93.9%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 6/18/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 7/2/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year		Source Water Type(s)
Star Warehouse	06/13		☐ Surface ☑ GW ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**		**Facility Name**
3530230	ORANGE		CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						
2						
3	105615 0	Yes	94%	NO	JS	
4	105 95 20	Yes	94%	NO	JS	
5	106 1090	Yes	94%	NO	JS	CHANGE FILTER
6	106 2175	Yes	94%	NO	JS	ADD CAL SALT 2 BAGS
7	106 4300	Yes	94%	NO	JS	
8						
9						
10	106 7630	Yes	94%	NO	JS	
11	106 9280	Yes	94%	NO	JS	
12	107 1920	Yes	94%	NO	JS	
13	107 4680	Yes	94%	NO	JS	
14						
15						
16						
17	107 7890	Yes	94%	NO	JS	
18	108 0250	Yes	92%	Yes	JS	CLEAN UV CHANGE FILTER
19	108 2110	Yes	94%	NO	JS	
20	108 5320	Yes	94%	NO	JS	
21	108 7130	Yes	94%	NO	JS	ADD 2 BAGS SALT
22						
23						
24	109 2250	Yes	94%	NO	JS	
25	109 3860	Yes	94%	NO	JS	
26	109 5090	Yes	94%	NO	JS	CHANGED FILTER
27	109 6520	Yes	94%	NO	JS	
28	110 3230	Yes	94%	NO	JS	
29						
30						
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Jul-13	8/2/2013	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		6.23					Yes	94%	No	DS		
2		1.76					Yes	94%	No	DS		
3		2.13					Yes	94%	No	DS		
4	Closed											
5	Closed											
6	Closed											
7	Closed											
8		9.69					Yes	94%	Yes	DS		
9		3.93					Yes	94%	No	DS		
10		3.73					Yes	94%	No	DS		
11		3.91					Yes	94%	No	DS		
12	Closed											
13	Closed											
14	Closed											
15		13.08					Yes	89%	No	DS		
16		3.23					Yes	92%	No	DS		
17		2.89					Yes	84%	Yes	DS		
18		3.71					Yes	96%	No	DS		
19		1.47					Yes	98%	No	DS		
20	Closed											
21	Closed											
22		10.68					Yes	97%	No	DS		
23		1.86					Yes	91%	Yes	DS		
24		2.13					Yes	94%	No	DS		
25		1.90					Yes	96%	No	DS		
26		1.46					Yes	94%	No	DS		
27	Closed											
28												
29		5.86					Yes	89%	Yes	DS		
30		1.35					Yes	88%	No	DS		
31		2.10					Yes	94%	Yes	DS		
Total		82.2										
AVG.		2.652						93.0%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 7/31/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 8/1/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Water Type(s)
Star Warehouse	07/13	☐ Surface ☑ Ground ☐ Mixed ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**City/Town**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	1108460	Yes	94%	No	JS	
2	1110220	Yes	94%	No	JS	
3	1112350	Yes	94%	No	JS	
4	Closed					
5	Closed					
6						
7						
8	1121940	Yes	94%	Yes	JS	Clean UV
9	1125870	Yes	94%	No	JS	
10	1129600	Yes	94%	No	JS	
11	1133510	Yes	94%	No	JS	
12						Change well pump
13						
14						
15	1146590	Yes	89%	No	JS	Change Filter
16	1149820	Yes	92%	No	JS	Add salt
17	1152710	Yes	84%	Yes	JS	Clean UV
18	1156420	Yes	96%	No	JS	
19	1157890	Yes	98%	No	JS	
20						
21						
22	1168770	Yes	97%	No	JS	
23	1170630	Yes	91%	Yes	JS	Clean UV
24	1172760	Yes	94%	No	JS	Change salt
25	1174660	Yes	96%	No	JS	
26	1176120	Yes	94%	No	JS	
27						
28						
29	1181980	Yes	89%	Yes	JS	Change Filter Clean UV
30	1183330	Yes	88%	No	JS	
31	1185430	Yes	94%	Yes	JS	Clean UV Quartz Sleeve

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no): If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Aug-13	9/4/2013	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		1.97					Yes	94%	No	DS		
2		0.9					Yes	94%	No	DS		
3	Closed											
4	Closed											
5		4.02					Yes	94%	No	DS		
6		2.28					Yes	94%	No	DS		
7		1.70					Yes	94%	No	DS		
8		1.94					Yes	94%	No	DS		
9		2.42					Yes	94%	No	DS		
10	Closed											
11	Closed											
12		5.30					Yes	94%	No	DS		
13		1.27					Yes	94%	No	DS		
14		2.15					Yes	94%	No	DS		
15		1.85					Yes	94%	No	DS		
16		2.27					Yes	94%	Yes	DS		
17	Closed											
18	Closed											
19		4.35					Yes	92%	No	DS		
20		1.98					Yes	96%	No	DS		
21		2.19					Yes	96%	No	DS		
22		1.14					Yes	94%	No	DS		
23		2.22					Yes	94%	No	DS		
24	Closed											
25	Closed											
26		4.49					Yes	94%	No	DS		
27		1.41					Yes	94%	No	DS		
28		3.37					Yes	94%	No	DS		
29		1.17					Yes	94%	No	DS		
30		1.44					Yes	94%	No	DS		
31	Closed											
Total		51.83										
AVG.		1.672						94.1%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 8/19/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: _____ Date: 9/3/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Yr		Source Water (SW/GW)
Star Warehouse	08/13		☐ Surface ☑ GW ☐ GWUDI ☐ Disinfection required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID No.	County		Village/City/Town
3530230	ORANGE		CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	118740	YES	94%	NO	JS	
2	118820	YES	94%	NO	JS	
3						
4						
5	119320	YES	94%	NO	JS	Added 1 BAG SALT
6	119460	YES	94%	NO	JS	
7	119680	YES	94%	NO	JS	
8	119820	YES	94%	NO	JS	
9	120060	YES	94%	NO	JS	
10						
11						
12	120960	YES	94%	NO	JS	
13	120730	YES	94%	NO	JS	
14	120980	YES	94%	NO	JS	
15	121230	YES	94%	NO	JS	
16	121560	YES	94%	YES	JS	CHANGE FILTER ADDED SALT
17						
18						
19	121780	YES	92%	YES	JS	CLEAN LEV
20	121830	YES	94%	NO	JS	
21	122020	YES	94%	NO	JS	
22	122360	YES	94%	NO	JS	
23	122580	YES	94%	NO	JS	
24						
25						
26	122870	YES	94%	NO	JS	
27	123180	YES	94%	NO	JS	
28	123460	YES	94%	NO	JS	
29	123820	YES	94%	NO	JS	
30	123760	YES	94%	NO	JS	
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Sep-13	10/3/2013	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1	Closed											
2	Closed											
3		8.44					Yes	94%	Yes	DS		
4		0.60					Yes	94%	No	DS		
5	Closed											
6	Closed											
7	Closed											
8	Closed											
9		12.80					Yes	88%	Yes	DS		
10		1.72					Yes	92%	No	DS		
11		1.13					Yes	92%	No	DS		
12		1.76					Yes	94%	Yes	DS		
13		1.11					Yes	94%	No	DS		
14	Closed											
15	Closed											
16		1.53					Yes	94%	No	DS		
17		2.38					Yes	94%	No	DS		
18		1.86					Yes	94%	Yes	DS		
19	Closed											
20	Closed											
21	Closed											
22	Closed											
23	Closed											
24	Closed											
25	Closed											
26	Closed											
27	Closed											
28	Closed											
29	Closed											
30		6.89					Yes	92%	No	DS		
31												
Total		40.12										
AVG.		1.337						92.9%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 9/12/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 10/1/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	System Type
Star Warehouse *	09/13	☐ Surface ☑ GW ☐ GWUDI ☐ Disinfection required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Village**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						
2	LABOR DAY	—	—	—	—	—
3	1245700	YES	94%	YES	TS	CHANGE FILTER Hold 2 BAGS AD
4	1246200	YES	94%	NO	TS	
5	CLOSED	Holid	AY			
6	CLOSED	Holid	AY			
7						
8						
9	1259000	YES	88%	YES	TS	CHANGE FILTER CLEANED
10	1260720	YES	92%	NO	TS	
11	1261850	YES	92%	NO	TS	
12	1263610	YES	94%	YES	TS	WATER LEAK IN G FLAT BULB BLACK CHANGED BULB
13	1264720	YES	94%	NO	TS	
14						
15						
16	1266250	YES	94%	NO	TS	
17	1268630	YES	94%	NO	TS	
18	1270490	YES	94%	NO	TS	
19	CLOSED		Holid	AY		
20	CLOSED		Holid	AY		
21						
22						
23	CLOSED					
24	CLOSED					
25	CLOSED					
26	CLOSED		Holid	AY		
27	CLOSED		Holid	AY		
28						
29						
30	1277380	YES	92%	NO	TS	
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Oct-13	11/1/2013	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**		**Town, Village, or City**
3530230	ORANGE		CORNWALL

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		3.03					Yes	92%	No	DS		
2		1.62					Yes	92%	No	DS		
3		1.88					Yes	92%	No	DS		
4		1.77					Yes	92%	No	DS		
5	Closed											
6	Closed											
7		5.40					Yes	94%	Yes	DS		
8		3.45					Yes	92%	No	DS		
9		1.69					Yes	92%	No	DS		
10		1.70					Yes	92%	No	DS		
11		1.54					Yes	94%	No	DS		
12	Closed											
13	Closed											
14		7.70					Yes	94%	No	DS		
15		2.46					Yes	94%	No	DS		
16		1.70					Yes	94%	No	DS		
17		1.65					Yes	94%	No	DS		
18		2.61					Yes	92%	No	DS		
19	Closed											
20	Closed											
21		5.58					Yes	94%	No	DS		
22		4.06					Yes	94%	No	DS		
23		3.26					Yes	94%	No	DS		
24		1.62					Yes	94%	No	DS		
25		2.35					Yes	94%	No	DS		
26	Closed											
27	Closed											
28		5.95					Yes	94%	Yes	DS		
29		3.72					Yes	94%	No	DS		
30		2.61					Yes	94%	No	DS		
31		2.65					Yes	94%	No	DS		
Total		70.2										
AVG.		2.265					N	93.3%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 9/12/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 11/1/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water Type(s)
Star Warehouse *	10, 13	☐Surface ☑GW ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Water Supply Type**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	1280410	YES	92%	NO	[illegible]	
2	1282230	YES	92%	NO	[illegible]	
3	1284110	YES	92%	NO	[illegible]	
4	1285880	YES	92%	NO	[illegible]	Add 2 BAGS SALT
5						
6						
7	1291280	YES	94%	YES	[illegible]	CHANGE FILTER CLEAN UV
8	1294730	YES	92%	NO	[illegible]	
9	1296420	YES	92%	NO	[illegible]	
10	1298120	YES	92%	NO	[illegible]	
11	1299660	YES	94%	YES	[illegible]	CLEAN UV EYE
12						
13						
14	1307360	YES	94%	NO	[illegible]	
15	1309820	YES	94%	NO	[illegible]	
16	1311520	YES	94%	NO	[illegible]	
17	1313170	YES	94%	NO	[illegible]	ADD 2 BAGS SALT
18	1315780	YES	92%	NO	[illegible]	CHANGE FILTER CLEAN EYE
19						
20						
21	1321360	YES	94%	NO	[illegible]	
22	1325420	YES	94%	NO	[illegible]	
23	1328680	YES	94%	NO	[illegible]	
24	1330300	YES	94%	NO	[illegible]	
25	1332650	YES	94%	NO	[illegible]	
26						
27						
28	1338600	YES	94%	YES	[illegible]	CHANGE FILTER CLEANED UV
29	1342320	YES	94%	NO	[illegible]	
30	1344930	YES	94%	NO	[illegible]	
31	1347580	YES	94%	NO	[illegible]	

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Nov-13	12/3/2013	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1	Closed											
2	Closed											
3	Closed											
4		8.62					Yes	94%	Yes	DS		
5		1.54					Yes	94%	No	DS		
6		2.02					Yes	94%	No	DS		
7		1.92					Yes	94%	No	DS		
8		0.84					Yes	94%	No	DS		
9	Closed											
10	Closed											
11		3.22					Yes	94%	No	DS		
12		1.15					Yes	94%	No	DS		
13		2.54					Yes	94%	No	DS		
14		1.50					Yes	94%	No	DS		
15		1.19					Yes	94%	No	DS		
16	Closed											
17	Closed											
18		2.57					Yes	94%	No	DS		
19		2.15					Yes	94%	No	DS		
20		0.25					Yes	94%	No	DS		
21		3.52					Yes	94%	No	DS		
22		4.26					Yes	94%	No	DS		
23	Closed											
24	Closed											
25		1.45					Yes	94%	No	DS		
26		1.08					Yes	94%	No	DS		
27		0.60					Yes	94%	No	DS		
28	Closed											
29	Closed											
30	Closed											
31												
Total		40.42										
AVG.		1.347					N	94.0%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 11/4/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 12/3/2013 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Yr	Source Water Type(s)
Star Warehouse	11/13	☐ Surface ☒ Grd ☐ Purchased ☐ Treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	County	Village or City
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						No Power / Power outage
2						
3						
4	1356200	Yes	94%	Yes	JS	Change Filter / Tube / Bulb
5	1357740	Yes	94%	No	JS	
6	1359760	Yes	94%	No	JS	
7	1361680	Yes	94%	No	JS	
8	1362520	Yes	94%	No	JS	
9						
10						
11	1365240	Yes	94%	No	JS	
12	1366890	Yes	94%	No	JS	
13	1369430	Yes	94%	No	JS	
14	1370930	Yes	94%	No	JS	
15	1372120	Yes	94%	No	JS	
16						
17						
18	1374690	Yes	94%	No	JS	
19	1376840	Yes	94%	No	JS	Added 3 Bags Salt
20	1377090	Yes	94%	No	JS	
21	1380610	Yes	94%	No	JS	All oil water separator tanks
22	1384870	Yes	94%	No	JS	
23						
24						
25	1386320	Yes	94%	No	JS	
26	1387400	Yes	94%	No	JS	
27	1388000	Yes	94%	No	JS	
28	Thanksgiving	—	—	—	—	—
29	Closed	—	—	—	—	—
30						
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Dec-14	1/8/2014	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1	Closed											
2		1.77					Yes	94%	No	DS		
3		2.17					Yes	94%	No	DS		
4		4.24					Yes	94%	No	DS		
5		2.76					Yes	94%	No	DS		
6		1.38					Yes	94%	No	DS		
7	Closed											
8	Closed											
9		5.95					Yes	94%	No	DS		
10		2.03					Yes	94%	No	DS		
11		2.76					Yes	94%	No	DS		
12		1.81					Yes	94%	No	DS		
13		1.69					Yes	94%	No	DS		
14	Closed											
15	Closed											
16		3.84					Yes	94%	No	DS		
17		1.58					Yes	94%	No	DS		
18		2.08					Yes	94%	No	DS		
19		1.92					Yes	94%	No	DS		
20		1.66					Yes	94%	No	DS		
21	Closed											
22	Closed											
23		17.76					Yes	94%	No	DS		
24	Closed											
25	Closed											
26		3.90					Yes	94%	No	DS		
27		0.78					Yes	94%	No	DS		
28	Closed											
29	Closed											
30		1.78					Yes	94%	No	DS		
31		4.89					Yes	94%	No	DS		
Total		66.65										
AVG.		2.150					N	94.0%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 11/4/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 1/8/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water Supply (PWS) Name	Report Month/Year	
Star Warehouse	12, 13	☐ Surface ☑ GW ☐ Purchased ☐ Plug treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID (PWS ID) Number	**County**	**Town/Village**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1		[illegible]	[illegible]	[illegible]	[illegible]	
2	1389770	Yes	94%	NO	[illegible]	
3	1391940	Yes	94%	NO	[illegible]	
4	1396180	Yes	94%	NO	[illegible]	
5	1398942	Yes	94%	NO	[illegible]	
6	1400320	Yes	94%	NO	[illegible]	
7						
8						
9	1406270	Yes	94%	NO	[illegible]	
10	1408300	Yes	94%	NO	[illegible]	Add 2 BAGS SALT
11	1411060	Yes	94%	NO	[illegible]	
12	1412870	Yes	94%	NO	[illegible]	
13	1414560	Yes	94%	NO	[illegible]	
14						
15						
16	1418400	Yes	94%	NO	[illegible]	
17	1419980	Yes	94%	NO	[illegible]	
18	1422060	Yes	94%	NO	[illegible]	
19	1423980	Yes	94%	NO	[illegible]	
20	1425540	Yes	94%	NO	[illegible]	
21						
22						
23	1443300	Yes	94%	NO	[illegible]	Add 1 BAG OF SALT
24						
25						
26	1447200	Yes	94%	NO	[illegible]	
27	1447980	Yes	94%	NO	[illegible]	
28						
29						
30	1449760	Yes	94%	NO	[illegible]	
31	1451650	Yes	94%	NO	[illegible]	

*Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water (Type(s))
Star Warehouse	Jan-14	2/4/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1	Closed											
2		13.31					Yes	94%	No	DS		
3		1.682					Yes	94%	No	DS		
4	Closed											
5	Closed											
6		5.05					Yes	94%	No	DS		
7		1.68					Yes	94%	No	DS		
8		1.68					Yes	94%	No	DS		
9		1.68					Yes	94%	No	DS		
10		1.68					Yes	94%	No	DS		
11	Closed											
12	Closed											
13		3.36					Yes	94%	No	DS		
14		3.32					Yes	94%	No	DS		
15		2.35					Yes	94%	No	DS		
16		4.87					Yes	94%	No	DS		
17		2.41					Yes	94%	No	DS		
18	Closed											
19	Closed											
20		20.45					Yes	94%	No	DS		
21		11.14					Yes	94%	No	DS		
22		4.54					Yes	94%	No	DS		
23		5.85					Yes	94%	No	DS		
24		2.42					Yes	94%	No	DS		
25	Closed											
26	Closed											
27		10.61					Yes	94%	No	DS		
28		4.33					Yes	94%	No	DS		
29		4.25					Yes	94%	No	DS		
30		11.82					Yes	94%	No	DS		
31		5.25					Yes	94%	No	DS		
Total		123.74										
AVG.		3.992						94.0%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 11/4/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 2/4/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Report Month	Facility Source Water (Well ID #)
Star Warehouse	01, 14	☐Surface ☑Gar ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID No. (PWS ID)	**County**	**Village or City**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						
2	1467960	Yes	94%	No	TS	
3	1469642					
4						
5						
6	1474688	Yes	94%	NO	TS	
7	1476370	Yes	94%	NO	TS	
8	1478052	Yes	94%	NO	TS	
9	1479736	Yes	94%	NO	TS	
10	1481418	Yes	94%	NO	TS	
11						
12						
13	1484780	Yes	94%	NO	TS	
14	1488100	Yes	94%	NO	TS	
15	1490450	Yes	94%	NO	TS	
16	1495322	Yes	94%	NO	TS	
17	1497730	Yes	94%	NO	TS	
18						
19						
20	1518180	Yes	94%	NO	TS	Added 2 BAGS SALT
21	1529320	Yes	94%	NO	TS	
22	1533860	Yes	94%	NO	TS	
23	1539710	Yes	94%	NO	TS	
24	1542130	Yes	94%	NO	TS	
25						
26						
27	1552740	Yes	94%	NO	TS	
28	1557070	Yes	94%	NO	TS	
29	1561320	Yes	94%	NO	TS	
30	1573140	Yes	94%	NO	TS	
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Feb-14	3/4/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town/Village or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1	Closed											
2	Closed											
3		5.12					Yes	94%	No	DS		
4		2.08					Yes	94%	No	DS		
5	Closed											
6		12.08					Yes	94%	No	DS		
7		5.21					Yes	94%	No	DS		
8	Closed											
9	Closed											
10		5.58					Yes	94%	No	DS		
11		3.02					Yes	94%	No	DS		
12		2.25					Yes	94%	No	DS		
13	Closed											
14	Closed											
15	Closed											
16	Closed											
17		21.70					Yes	94%	No	DS		
18		4.87					Yes	94%	No	DS		
19		3.02					Yes	94%	No	DS		
20		1.96					Yes	94%	No	DS		
21		5.73					Yes	94%	No	DS		
22	Closed											
23	Closed											
24		32.56					Yes	94%	No	DS		
25		3.24					Yes	94%	No	DS		
26		9.49					Yes	94%	No	DS		
27		7.27					Yes	94%	No	DS		
28		2.94					Yes	94%	No	DS		
29												
30												
31												
Total		128.12										
AVG.		4.576						94.0%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 11/4/2013 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 3/4/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Report Month	Source Water Type (s)
Star Warehouse *	02 14	☐ Surface ☑ GW ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Village or City (if applicable)**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						
2						
3	1578260	Yes	94%	NO	TS	
4	1580340	Yes	94%	No	TS	
5	CLOSED	SNOW				
6	1592420	Yes	94%	No	TS	
7	1597630	Yes	94%	NO	TS	
8						
9						
10	1603210	Yes	94%	No	TS	
11	1606230	Yes	94%	No	TS	
12	1608480	Yes	94%	No	TS	Add 1 BAG SALT
13	SNOW CLOSED					
14	SNOW CLOSED					
15						
16						
17	1630180	Yes	94%	NO	TS	
18	1635050	Yes	94%	NO	TS	
19	1638070	Yes	94%	NO	TS	
20	1640030	Yes	94%	NO	TS	
21	1645760	Yes	94%	NO	TS	
22						
23						
24	1678320	Yes	94%	NO	TS	
25	1681560	Yes	94%	NO	TS	Change Filter 1 BAG SALT
26	1691050	Yes	94%	NO	TS	
27	1698320	Yes	94%	NO	TS	
28	1701260	Yes	94%	NO	TS	
29						
30						
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Mar-14	4/7/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1	Closed											
2	Closed											
3		29.54					Yes	94%	No	DS		
4		10.04					Yes	94%	No	DS		
5		2.99					Yes	94%	No	DS		
6		5.79					Yes	94%	No	DS		
7		1.40					Yes	94%	No	DS		
8	Closed											
9	Closed											
10		32.05					Yes	94%	No	DS		
11		6.57					Yes	94%	No	DS		
12		3.64					Yes	94%	No	DS		
13		14.54					Yes	94%	No	DS		
14		6.38					Yes	94%	No	DS		
15	Closed											
16	Closed											
17		29.46					Yes	94%	No	DS		
18		9.66					Yes	94%	No	DS		
19		2.39					Yes	94%	No	DS		
20		7.54					Yes	94%	No	DS		
21		4.57					Yes	94%	No	DS		
22	Closed											
23	Closed											
24		18.44					Yes	92%	No	DS		
25		12.46					Yes	89%	Yes	DS		
26		7.22					Yes	94%	No	DS		
27		7.34					Yes	94%	No	DS		
28		6.37					Yes	94%	No	DS		
29	Closed											
30	Closed											
31		24.13					Yes	94%	No	DS		
Total		242.52										
AVG.		7.823						93.7%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 3/25/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: _____ Date: 4/7/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water Type(s)
Star Warehouse	03.14	☐ Surface ☑ GW ☐ GWUDI ☐ Hbg treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**
3330230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	[illegible]					
2						
3	1730800	Yes	94%	NO	TS	
4	174 0840	Yes	94%	No	TS	
5	174 3830	Yes	94%	NO	TS	
6	174 9620	Yes	94%	NO	TS	
7	175 1020	Yes	94%	NO	TS	
8						
9						
10	1783070	Yes	94%	NO	TS	
11	1789640	Yes	94%	NO	TS	
12	179 3280	Yes	94%	NO	TS	
13	180 78 20	Yes	94%	NO	TS	
14	181 4200	Yes	94%	NO	TS	
15						
16						
17	1893660	Yes	94%	NO	TS	
18	185 3320	Yes	94%	NO	TS	
19	185 5710	Yes	94%	NO	TS	
20	186 3250	Yes	94%	NO	TS	
21	186 78 20	Yes	94%	NO	TS	
22						
23						
24	1886260	Yes	92%	NO	TS	
25	1898720	Yes	89%	Yes	TS	CHANGE Filter cleaning tube
26	1905940	Yes	94%	NO	TS	
27	191 3280	Yes	94%	NO	TS	
28	191 9680	Yes	94%	NO	TS	
29						
30						
31	1943780	Yes	94%	NO	TS	

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Apr-14	5/9/2014	☐ Surface ☑ Ground ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination

Public Water Supply ID Number	County	Town, Village, or City
3530230	ORANGE	CORNWALL

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		7.02					Yes	94%	No	DS		
2		10.26					Yes	94%	No	DS		
3		7.31					Yes	94%	No	DS		
4		7.31					Yes	94%	No	DS		
5	Closed											
6	Closed											
7		17.54					Yes	94%	No	DS		
8		6.77					Yes	94%	No	DS		
9		7.31					Yes	94%	No	DS		
10		7.31					Yes	94%	No	DS		
11		6.63					Yes	94%	No	DS		
12	Closed											
13	Closed											
14		23.19					Yes	94%	No	DS		
15	Closed											
16	Closed											
17		1.69					Yes	94%	No	DS		
18	Closed											
19	Closed											
20	Closed											
21	Closed											
22	Closed											
23		17.66					Yes	94%	No	DS		
24		2.94					Yes	94%	No	DS		
25		0.00					Yes	94%	No	DS		
26	Closed											
27	Closed											
28		23.80					Yes	100%	No	DS		
29		7.15					Yes	100%	No	DS		
30		8.01					Yes	99%	No	DS		
31												
Total		163.9										
AVG.	Closed	5.463						95.0%				
	Closed											

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 3/25/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: _____ Date: 5/9/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Report Month/Year		Source Water Type(s)
Star Warehouse	04.14		☐ Surface ☑ GW ☐ GWUDI ☐ Mfg treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**		**Town, Village or City**
3530230	ORANGE		CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	1950800	Yes	94%	No	JS	
2	1961060	Yes	94%	No	JS	
3	1968370	Yes	94%	No	JS	
4	1975680	Yes	94%	No	JS	
5						
6						
7	1993220	Yes	94%	No	JS	
8	2001990	Yes	94%	No	JS	
9	2009300	Yes	94%	No	JS	
10	2016610	Yes	94%	No	JS	
11	2023240	Yes	94%	No	JS	
12						
13						
14	2046430	Yes	94%	No	JS	
15	CLOSED	Holidays				
16						
17	2048120	Yes	94%	No	JS	
18						
19						
20						
21	CLOSED	Holidays				
22						
23	2065777	Yes	94%	No	JS	
24	2068719	Yes	94%	No	JS	
25	2068720	Yes	94%	No	JS	
26						
27						
28	2092520	Yes	100%	No	JS	
29	2099670	Yes	101%	No	JS	
30	2107680	Yes	94%	No	JS	
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	May-14	6/9/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination

Public Water Supply ID Number	County	Town, Village, or City
3530230	ORANGE	CORNWALL

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1		7.19					Yes	94%	No	DS		
2		6.33					Yes	94%	No	DS		
3	Closed											
4	Closed											
5		12.02					Yes	94%	No	DS		
6		4.50					Yes	94%	No	DS		
7		10.94					Yes	94%	No	DS		
8		4.14					Yes	94%	No	DS		
9		4.03					Yes	94%	No	DS		
10	Closed											
11	Closed											
12		17.49					Yes	85%	No	DS		
13		4.16					Yes	94%	Yes	DS		
14		2.23					Yes	94%	No	DS		
15		2.42					Yes	94%	No	DS		
16		0.13					Yes	94%	No	DS		
17	Closed											
18	Closed											
19		0.04					Yes	94%	No	DS		
20		0.97					Yes	94%	No	DS		
21		7.38					Yes	94%	No	DS		
22		4.91					Yes	94%	No	DS		
23		2.23					Yes	94%	No	DS		
24	Closed											
25	Closed											
26	Closed											
27		4.00					Yes	94%	No	DS		
28		1.16					Yes	94%	No	DS		
29		2.56					Yes	94%	No	DS		
30		1.14					Yes	94%	No	DS		
31	Closed											
Total		99.99										
AVG.		3.448						93.6%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/13/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 6/9/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water Type(s)
Star Warehouse	05/14	☐Surface ☑GU ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination

Public Water Supply ID Number	County	Town, Village or City
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	2114870	Yes	94%	No	JS	
2	2121200	Yes	94%	No	JS	
3						
4						
5	2133220	Yes	94%	No	JS	
6	2137720	Yes	94%	No	JS	
7	2148660	Yes	94%	No	JS	
8	2152800	Yes	94%	No	JS	
9	2156830	Yes	94%	No	JS	
10						
11						
12	2174320	Yes	85%	No	JS	
13	2178480	Yes	94%	Yes	JS	CHANGE FILTER
14	2180710	Yes	94%	No	JS	
15	2183130	Yes	94%	No	JS	
16	2183260	Yes	94%	No	JS	
17						
18						
19	2183300	Yes	94%	No	JS	
20	2184270	Yes	94%	No	JS	
21	2191650	Yes	94%	No	JS	
22	2191659	Yes	94%	No	JS	
23	2198790	Yes	94%	No	JS	
24						
25						
26	CLOSED					
27	2202790	Yes	94%	No	JS	
28	2203970	Yes	94%	No	JS	
29	2206530	Yes	94%	No	JS	
30	2207670	Yes	94%	No	JS	
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Jun-14	7/2/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter 70% >	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		4.18					Yes	94%	No	DS		
2	Closed											
3	Closed											
4	Closed											
5	Closed											
6	Closed											
7	Closed											
8	Closed											
9		0.11					Yes	94%	No	DS		
10		10.19					Yes	94%	No	DS		
11		2.26					Yes	94%	No	DS		
12		2.42					Yes	94%	No	DS		
13		1.64					Yes	94%	No	DS		
14	Closed											
15	Closed											
16		4.02					Yes	85%	No	DS		
17		3.05					Yes	94%	Yes	DS		
18		1.72					Yes	94%	No	DS		
19		2.62					Yes	94%	No	DS		
20		1.21					Yes	94%	No	DS		
21	Closed											
22	Closed											
23		4.55					Yes	94%	No	DS		
24		1.19					Yes	94%	No	DS		
25		2.15					Yes	94%	No	DS		
26		1.21					Yes	94%	No	DS		
27		2.41					Yes	94%	No	DS		
28	Closed											
29	Closed											
30		4.23					Yes	94%	No	DS		
31												
Total		49.15										
AVG.		1.638						93.5%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/13/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 7/2/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water Type(s)
Star Warehouse	06/14	☐ Surface ☑ GW ☐ GWUDI ☐ Reg treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						
2	2211850	Yes	94%	NO	✓	
3						
4	CLOSED		NO DAY			
5						
6						
7						
8						
9	2211960	Yes	94%	NO	✓	
10	2212250	Yes	94%	NO	✓	CHANGE FILTER
11	2224400	Yes	94%	NO	✓	
12	2226820	Yes	94%	NO	✓	
13	2228460	Yes	94%	NO	✓	
14						
15						
16	2232460	Yes	94%	NO	✓	
17	2235530	Yes	94%	NO	✓	
18	2237250	Yes	94%	NO	✓	
19	2239870	Yes	94%	NO	✓	ADD 2 BAGS SALT
20	2241080	Yes	94%	NO	✓	
21						
22						
23	2245630	Yes	94%	NO	✓	
24	2246820	Yes	94%	NO	✓	
25	2248970	Yes	94%	NO	✓	
26	2250180	Yes	94%	NO	✓	
27	2252590	Yes	94%	NO	✓	
28						
29						
30	2256820	Yes	94%	NO	✓	
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Jul-14	8/7/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		2.83					Yes	94%	No	DS		
2		1.388					Yes	94%	No	DS		
3		2.502					Yes	94%	No	DS		
4	Closed											
5	Closed											
6	Closed											
7		0.68					Yes	94%	No	DS		
8		1.72					Yes	94%	No	DS		
9		3.28					Yes	94%	No	DS		
10		3.28					Yes	94%	No	DS		
11		3.28					Yes	94%	No	DS		
12	Closed											
13	Closed											
14		0.83					Yes	94%	No	DS		
15		3.28					Yes	94%	No	DS		
16		1.86					Yes	94%	No	DS		
17		1.42					Yes	94%	No	DS		
18		1.74					Yes	94%	No	DS		
19	Closed											
20	Closed											
21		2.83					Yes	94%	No	DS		
22		1.33					Yes	94%	No	DS		
23		1.78					Yes	94%	No	DS		
24		1.99					Yes	94%	No	DS		
25		0.85					Yes	94%	No	DS		
26	Closed											
27	Closed											
28		3.96					Yes	94%	No	DS		
29		0.91					Yes	94%	No	DS		
30		1.28					Yes	94%	No	DS		
31		2.35					Yes	94%	No	DS		
Total		62.35										
AVG.		2.011						94%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/13/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 8/7/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water Type (1)
Star Warehouse	07.14	☐ Surface ☑ GW ☐ GWUDI ☐ Mfg treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination

Public Water Supply ID Number	County	Town, Village or City
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	2259650	Yes	94%	NO		
2	2261038	Yes	94%	NO		
3	2263540	Yes	94%	NO		
4	Closed		Holiday			
5						
6						
7	2272220	Yes	94%	NO		
8	2273940	Yes	94%	NO		
9	2277216	Yes	94%	NO		
10	2280492	Yes	94%	NO		
11	2283768	Yes	94%	NO		
12						
13						[illegible]
14	2293596	Yes	87%	NO		Replace Filter
15	2296872	Yes	94%	NO		
16	2298730	Yes	94%	NO		
17	2300150	Yes	94%	NO		Add 2 BAGS SALT
18	2301890	Yes	94%	NO		
19						
20						
21	2304720	Yes	94%	NO		
22	2306050	Yes	94%	NO		
23	2307830	Yes	94%	NO		
24	2309820	Yes	94%	NO		
25	2310670	Yes	94%	NO		
26						
27						
28	2314630	Yes	94%	NO		
29	2315540	Yes	94%	NO		
30	2316820	Yes	94%	NO		
31	2319170	Yes	94%	NO		

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Aug-14	9/8/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1		0.65					Yes	94%	No	DS		
2	Closed											
3	Closed											
4		3.17					Yes	94%	No	DS		
5		1.58					Yes	94%	No	DS		
6		1.58					Yes	94%	No	DS		
7		1.58					Yes	94%	No	DS		
8		1.59					Yes	94%	No	DS		
9	Closed											
10	Closed											
11		3.64					Yes	94%	No	DS		
12		0.86					Yes	94%	No	DS		
13		2.07					Yes	94%	No	DS		
14		0.93					Yes	94%	No	DS		
15		1.01					Yes	94%	No	DS		
16	Closed											
17	Closed											
18		3.16					Yes	94%	No	DS		
19		0.79					Yes	94%	No	DS		
20		2.18					Yes	94%	No	DS		
21		1.93					Yes	94%	No	DS		
22		0.32					Yes	94%	No	DS		
23	Closed											
24	Closed											
25		5.62					Yes	94%	No	DS		
26		0.84					Yes	94%	No	DS		
27		0.82					Yes	94%	No	DS		
28		2.18					Yes	94%	No	DS		
29		0.75					Yes	94%	No	DS		
30												
31												
Total		37.25										
AVG.		1.284						94%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/13/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 9/8/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year	Source Water Type(s)
Star Warehouse	08/14	☐ Surface ☑ Grd ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	2319820	Yes	94%	No	TG	
2						
3						
4	2322986	Yes	94%	No	TG	
5	2324569	Yes	94%	No	TG	
6	2326152	Yes	94%	No	TG	
7	2327735	Yes	94%	No	TG	
8	2329320	Yes	94%	No	TG	
9						
10						
11	2332960	Yes	94%	No	TG	
12	2333820	Yes	94%	No	TG	
13	2335890	Yes	94%	No	TG	DAVID CAN TAKE TODAY
14	2336820	Yes	94%	No	TG	
15	2337830	Yes	94%	No	TG	
16						
17						
18	2340990	Yes	94%	No	TG	3 BAGS SALT
19	2341780	Yes	94%	No	TG	
20	2343940	Yes	94%	No	TG	
21	2345890	Yes	94%	No	TG	
22	2346210	Yes	94%	No	TG	CHANGE FILTER
23						
24						
25	2351830	Yes	94%	No	TG	
26	2352970	Yes	94%	No	TG	
27	2353490	Yes	94%	No	TG	
28	2355670	Yes	94%	No	TG	
29	2356420	Yes	94%	No	TG	
30						
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Sep-14	10/3/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free						
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)	Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
1	Closed											
2		3.72					Yes	94%	No	DS		
3		1.72					Yes	94%	No	DS		
4		1.56					Yes	94%	No	DS		
5		2.00					Yes	94%	No	DS		
6	Closed											
7	Closed											
8		3.13					Yes	94%	No	DS		
9	Closed											
10	Closed											
11		3.76					Yes	100%	No	DS		
12		2.02					Yes	98%	No	DS		
13	Closed											
14	Closed											
15		2.03					Yes	96%	No	DS		
16		0.77					Yes	95%	No	DS		
17		2.34					Yes	95%	No	DS		
18		2.39					Yes	95%	No	DS		
19		0.38					Yes	95%	No	DS		
20	Closed											
21	Closed											
22		3.09					Yes	95%	No	DS		
23		2.62					Yes	95%	No	DS		
24		0.48					Yes	95%	No	DS		
25		0.83					Yes	95%	No	DS		
26		2.18					Yes	94%	No	DS		
27	Closed											
28	Closed											
29		0.82					Yes	93%	No	DS		
30		0.72					Yes	95%	No	DS		
31												
Total		36.45										
AVG.		1.215						95%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/13/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 10/3/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Yr	Source Water Type(s)
Star Warehouse	09, 14	☐ Surface ☑ GW ☐ GWUDI ☐ 4log treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						
2	2360140	Yes	94%	NO	JS	
3	2361860	Yes	94%	NO	JS	
4	2363420	Yes	94%	NO	JS	
5	2365920	Yes	94%	NO	JS	
6						
7						
8	2368550	Yes	94%	NO	JS	CHANGE FILTER ADDED 2 BOTTLES H
9	~~2372300~~	~~Yes~~	~~100%~~			
10						
11	2372-300	YES	100%	NO	MF	
12	2374320	YES	98%	NO	MF	
13						
14						
15	2376350	YES	96%	NO	MF	
16	2377120	Yes	96%	NO	JS	
17	2379460	YES	95%	NO	MF	
18	2381850	Yes	95%	NO	JS	
19	2382230	Yes	95%	NO	JS	
20						
21						
22	2385320	Yes	95%	NO	JS	
23	2387840	Yes	95%	NO	JS	
24	2388320	Yes	95%	NO	JS	
25	2389150	YES	95%	NO	MF	
26	2391330	YES	94%	NO	MF	
27						
28						
29	2392-150	YES	93%	NO	MF	ADD 1 BA & SALT
30	2392870	Yes	95%	NO	JS	
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Oct-14	11/3/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village, or City**	
3530230	ORANGE	CORNWALL	

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1		0.91					Yes	95%	No	DS		
2		1.32					Yes	95%	No	DS		
3		0.62					Yes	95%	No	DS		
4	Closed											
5	Closed											
6		1.53					Yes	95%	No	DS		
7		1.56					Yes	95%	No	DS		
8		0.93					Yes	95%	No	DS		
9	Closed											
10	Closed											
11	Closed											
12	Closed											
13	Closed											
14	Closed											
15	Closed											
16	Closed											
17	Closed											
18	Closed											
19	Closed											
20		7.54					Yes	94%	No	DS		
21		2.36					Yes	94%	No	DS		
22		1.92					Yes	94%	No	DS		
23		2.04					Yes	94%	No	DS		
24		1.03					Yes	94%	No	DS		
25	Closed											
26	Closed											
27		5.19					Yes	94%	No	DS		
28		1.52					Yes	94%	No	DS		
29		1.06					Yes	94%	No	DS		
30		2.47					Yes	94%	No	DS		
31		1.33					Yes	94%	No	DS		
Total		33.33										
AVG.		1.075						94%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/13/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 11/3/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Report for Month/Year	Source Water Type(s)
Star Warehouse	10, 14	☐ Surface ☑ GW ☐ GWUDI ☐ Treatment Required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**	**Town, Village or City**
3530230	ORANGE	CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1	2393780	Yes	95%	NO	✓	
2	2395100	Yes	95%	NO	✓	
3	2395720	Yes	95%	NO	✓	Added 2 BAGS SALT ABOVE [illegible]
4						
5						
6	2397250	Yes	95%	NO	✓	
7	2398810	Yes	95%	NO	✓	
8	2399740	Yes	95%	NO	✓	
9	Holiday	—	—	—	—	
10	Holiday	—	—	—	—	
11						
12						
13	Holiday	—	—	—	—	
14	Holiday	—	—	—	—	
15	Holiday	—	—	—	—	
16	Holiday	—	—	—	—	
17	Holiday	—	—	—	—	
18						
19						
20	2407280	Yes	94%	NO	✓	Added 2 BAGS of SALT
21	2409640	Yes	94%	NO	✓	
22	2411560	Yes	94%	NO	✓	
23	2413600	Yes	94%	NO	✓	
24	2414630	Yes	94%	NO	✓	
25						
26						
27	2419820	Yes	94%	NO	✓	
28	2421340	Yes	94%	NO	✓	
29	2422400	Yes	94%	NO	✓	
30	2424870	Yes	94%	NO	✓	
31	2426200	Yes	94%	NO	✓	

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

Water System Operation Report

For Systems that Treat with Chlorine and/or Ultraviolet Radiation

Public Water System Name	Reporting Month/Year	Date Report Submitted	Source Water Type(s)
Star Warehouse	Nov-14	12/8/2014	☐Surface ☑Ground ☐GWUDI ☐4log treatment required ☐Purchase with subsequent chlorination ☐Purchase w/out subsequent chlorination

Public Water Supply ID Number	County	Town, Village, or City
3530230	ORANGE	CORNWALL

DATE	Source(s) in use	Treated water volume (1,000 gallons/day)	Chlorination				Ultraviolet Radiation / Other Treatments					
			Gaseous		Liquid	Free Chlorine residual at entry point (mg/l)	UV Unit Active (Yes/No)	Intensity Meter > 70%	Quartz Sleeve Cleaned (Yes/No)	Checked by (Initials)		
			Cylinder weight (lbs.)	Chlorine used per day (lbs.)	Hypochlorite added to crock (gallons or quarts)							
1	CLOSED											
2	CLOSED											
3		4.89					Yes	94%	No	DS		
4		1.83					Yes	94%	No	DS		
5		1.93					Yes	94%	No	DS		
6		1.74					Yes	94%	No	DS		
7		1.57					Yes	94%	No	DS		
8	CLOSED											
9	CLOSED											
10		4.54					Yes	94%	No	DS		
11		2.24					Yes	94%	No	DS		
12		1.88					Yes	94%	No	DS		
13		2.60					Yes	94%	No	DS		
14		1.61					Yes	94%	No	DS		
15	CLOSED											
16	CLOSED											
17		2.77					Yes	94%	No	DS		
18		2.06					Yes	94%	No	DS		
19		1.37					Yes	94%	No	DS		
20		1.92					Yes	94%	No	DS		
21		0.67					Yes	94%	No	DS		
22	CLOSED											
23	CLOSED											
24		1.99					Yes	94%	No	DS		
25		0.42					Yes	94%	No	DS		
26		1.75					Yes	94%	No	DS		
27	CLOSED											
28	CLOSED											
29	CLOSED											
30	CLOSED											
31												
Total		37.78										
AVG.		1.349						94%				

Chlorine Mix Ratio = _____ quarts/gallons of _____ % chlorine added to _____ gallons of water in crock

Date UV quartz sleeve last cleaned: 5/13/2014 Date UV lamp replaced: 10/19/2012 Alarm activation (yes or no) If "yes," date of activation _____

Reported by: JOSEPH P. KLOPCHIN Title: Designated Operator NYS DOH Operator Number: NY0032000

Signature: Joseph P. Klopchin Date: 12/8/2014 Operator Grade Level: II-B, C, D

PLEASE FAX REPORT BY THE 6th to 845 294-3099

Public Water System Name	Reporting Month/Year		Source Water Type(s)
Star Warehouse	11, 14		☐ Surface ☑ GW ☐ GWUDI ☐ Stop treatment required ☐ Purchase with subsequent chlorination ☐ Purchase w/out subsequent chlorination
Public Water Supply ID Number	**County**		**Town, Village or City**
3330230	ORANGE		CORNWALL

DATE	Flow Meter Reading	ULTRAVIOLET RADIATION				COMMENTS
		UV Unit Active (Yes or No)	Intensity Meter >70%	Quartz Sleeve Cleaned (Yes or No)	Checked By (Initials)	
1						
2						
3	2431090	Yes	94%	NO	✓	
4	2433820	Yes	94%	NO	✓	
5	243 4850	YES	94%	NO	✓	
6	243 6590	YES	94%	NO	✓	
7	243 8160	YES	94%	NO	✓	Added 3 BAGS SALT
8						
9						
10	244 2700	YES	94%	NO	✓	
11	244 4940	YES	94%	NO	✓	
12	244 6820	YES	94%	NO	✓	
13	244 8420	YES	94%	NO	✓	
14	245 1030	YES	94%	NO	✓	
15						
16						
17	245 3800	YES	94%	NO	✓	
18	245 5860	YES	94%	NO	✓	
19	245 7230	YES	94%	NO	✓	
20	245 9150	YES	94%	NO	✓	
21	246 0820	YES	94%	NO	✓	
22						
23						
24	246 1810	YES	94%	NO	✓	
25	246 2230	YES	94%	NO	✓	
26	246 3980	YES	94%	NO	✓	
27	CLOSED	—	—	—	—	
28	CLOSED	—	—	—	—	
29						
30						
31						

Date UV quartz sleeve last cleaned: _____ Date UV lamp replaced: _____ Alarm activation (yes or no) If "yes," date _____

Appendix 3

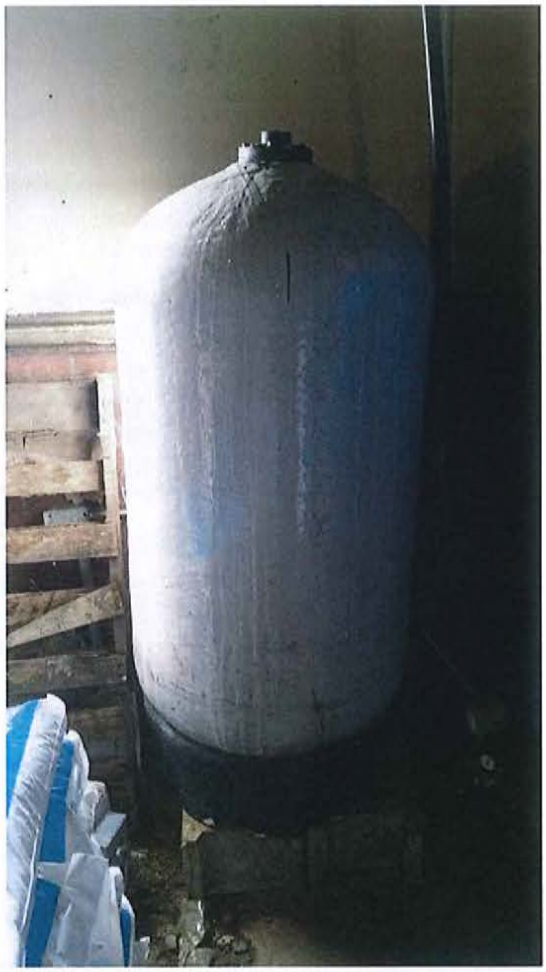
Existing Water System Photographs

View of Water Supply Well from Treatment Area

Dual Pro-Source Plus 119 Gallon Steel Pressure Tanks

Pressure Switch, Gauge, and Drain Tap

Pressure Switch, Gauge, and Drain Tap



Existing Offline Pressure Tank

Water Meter Gauge

Water Meter Gauge Located Next to Dual Pressure Tanks

View of Water Treatment Components Including Aqua-Pure Water Filter, Master MP-MBA-60T-1 Water Softener, and Sterilight Platinum SPV-950 UV Treatment

Aqua-Pure Water Filter Model No. AP801/AP801T

Water Softener Connection

Sterilight Platinum SPV-950 UV Treatment

Sterilight Platinum UV Electronic ICE Controller

15 Gallon 9er Minute Flow Restrictor Located Below UV Treatment

Blow-up of 15 Gallon per Minute Flow Restrictor

Sterilight UV Solenoid Valve and Ball Valve

Second View of Water Treatment Components

New Check Valve between Treatment and Relocated Raw Water Tap Installed in April 2015

Second View of New Check Valve and Relocated Raw Water Tap

View of 1-1/4" PVC Piping To and From the Storage Tank Area and To the Distribution System

Supply Well Control Unit

Water Storage Area Including Two 5,000 Gallon Poly Storage Tanks, Two Booster Pumps, Control Panel, and Water Pressure Tank

View of Side by Side 5,000 Poly Storage Tanks

Piping Configuration for Poly Storage Tanks

Dual Goulds 3656/3756 S-Group 1x2-8 Booster Pumps

Dual Goulds 3656/3756 S-Group 1x2-8 Booster Pumps

Flex-Lite FL 40 119 Gallon Composite Pressure Tank

Pressure Gauge Reading at Flex-Lite FL40 Pressure Tank

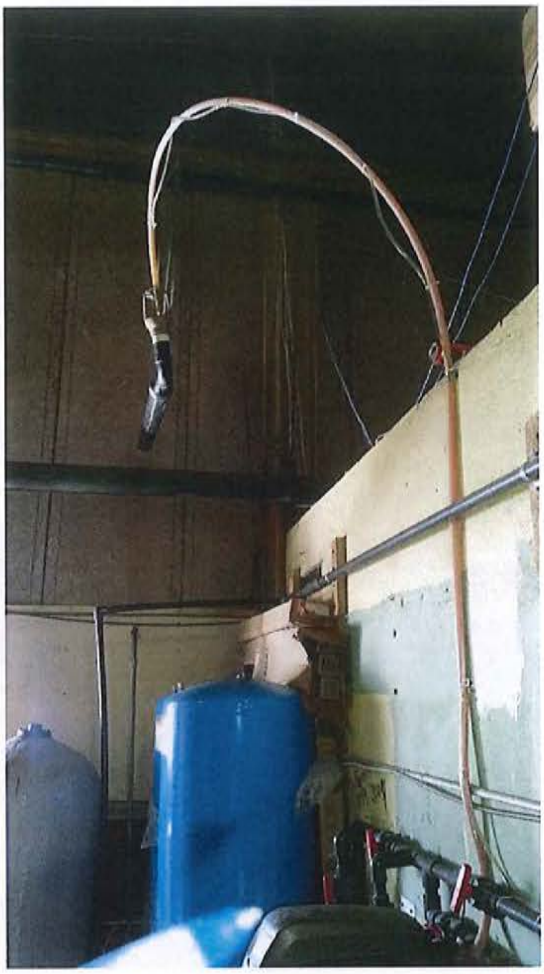
View of Check Valve, Pressure Switch, Pressure Gauge and Drain Tap at Flex-Lite FL40 Pressure Tank

Emergency Overflow of Dual 5,000 Gallon Poly Storage Tanks

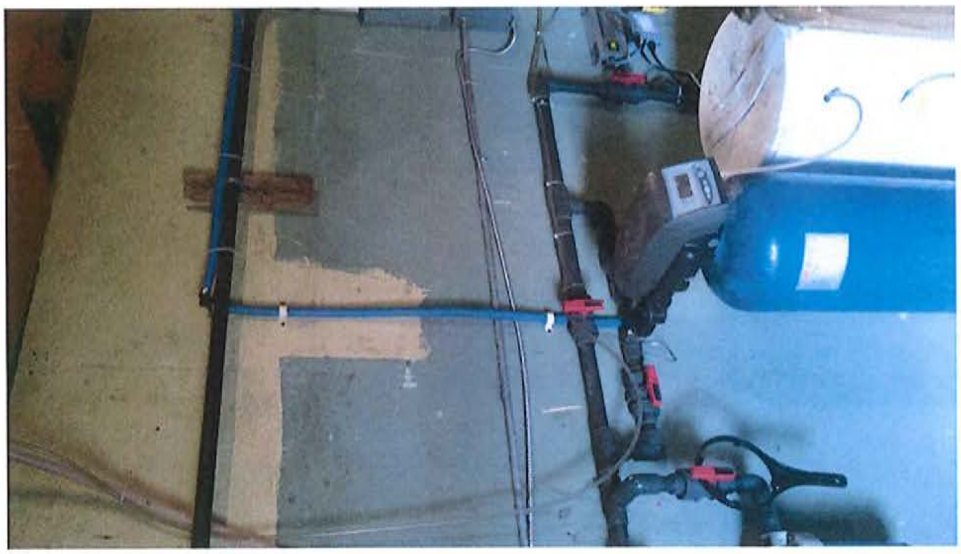
Control Panel

Control Panel Alarm

View of 1-1/4" PVC Piping To and From Storage



Water Softener Backwash Discharge Pipe as of February 2015



Revised Water Softener Backwash Discharge Pipe (Blue ¾" Pipe) Completed in April 2015

Revised Water Softener Backwash Discharge Pipe (Blue ¾" Pipe) Completed in April 2015

Revised Water Softener Backwash Discharge Pipe (Blue ¾" Pipe) Connection to 2" PVC Outlet Pipe Completed in April 2015

Revised Water Softener Backwash Discharge Pipe (Blue ¾" Pipe) Connection to 2" PVC Outlet Pipe Completed in April 2015

Water Softener Backwash Pipe connection to Existing Tile Field as of February 2015

Revised Water Softener Backwash Discharge Pipe Connection to Existing Tile Field Completed in April 2015. Pipe was Rerouted Through Building to Avoid Future Breakage.

Appendix 4

Equipment Cut Sheets

PRO-SOURCE® PLUS Premium Steel Tanks

Heavy gauge steel

APPLICATIONS

Residential Water Systems

Industrial, Commercial and Agricultural

SPECIFICATIONS

Shell: Heavy-gauge steel

Base: High-impact composite, ABS

Finish: Electrostatically applied, baked-on polyester paint

Water Cell: One-piece seamless PVC, made from FDA listed material

Flange: 304SS

Service Connection: NPT threads, integral to flange

Air Valve: Nickel-plated brass, threaded for ease of service

NSF/ANSI 61 Drinking Water

Stainless Steel Service Connection – "The Professional's Choice"
Metal Air Valve Assembly – "Field-Serviceable"
125 PSI Maximum Operating Pressure – Four Sizes: PSP50, PSP62, PSP85 and PSP119

In order to provide the best products possible, specifications are subject to change.

ORDERING INFORMATION

Catalog Number	Maximum Capacity Gal./Liter	Diameter* Inch/cm	Height* Inch/cm	Precharge PSI/kPa	Connection Size Female	Drawdown In Gallons/Liters			Weight Lbs./kg	Maximum Operating PSI
						20-40	30-50	40-60		
VERTICAL MODELS										
PSP19S-T02	19/72	20/51	21/53.3	40/276	1" NPT	6.9/26.1	5.8/21.9	5.0/18.9	49/22.2	100
PSP19T-T02	19/72	16/40.6	27.5/70	40/276	1" NPT	6.9/26.1	5.8/21.9	5.0/18.9	44/20.0	100
PSP32-T03	32/121	16/40.6	43/109	40/276	1" NPT	11.6/43.9	9.8/37.1	8.5/32.2	60/27.2	100
PSP35-T05	35/133	20/51	33/84	40/276	1" NPT	12.7/48.1	10.7/40.5	9.3/35.2	70/31.8	100
PSP50-T50	50/189	24/61	32.5/83	40/276	1-1/4" NPT	18.3/69.3	15.5/58.7	13.4/50.7	88/39.9	125
PSP62-T51	62/235	24/61	39.5/100	40/276	1-1/4" NPT	21.4/81.0	18.3/69.3	16.0/60.6	116/52.6	125
PSP85-T52	85/322	24/61	51/130	40/276	1-1/4" NPT	30/113.6	26/98.4	22.0/83.3	128/58.1	125
PSP119-TR50	119/450	24/61	68/173	40/276	1-1/4" NPT	41.3/156.3	35.4/134.0	31.0/117.3	140/63.5	125

*Subject to change without notice.
Maximum Liquid Temperature:120°F (49°C)
Maximum External (Ambient) Temperature:125°F (52°C)

PRO-SOURCE® PLUS Premium Steel Tanks

Heavy gauge steel

FEATURES

Service Connection: 304 stainless steel.

Air Valve: Nickel-plated brass.

Maximum Operating Pressure: 100 PSI on 16" and 20" tanks; 125 PSI on 24" tanks.

Heavy-Gauge Metal Construction: Sturdy "welded wrapper and head design." Built to last.

Polyester Paint Finish: Electrostatically powder-painted, then oven-baked for a smooth high-gloss, appliance-quality finish. Resists corrosion.

Elongated, Seamless Water Cell:
- Controlled 2-dimensional cell expansion.
- Rugged, seamless "water cell" prevents the most common cause of pump failure – "waterlogging."
- Water never touches the steel tank material.
- Translucent bag material facilitates manufacturing quality control inspection.

NEW Stainless Service Connection:
- Corrosion-resistant.
- Stainless steel – the professional's choice.

Integral Standpipe: Promotes complete flushing of the water entering/exiting the tank.

Nitrogen-Rich Precharge: Decreases air permeation three to four times over straight air precharge.

40 PSI Precharge: Ready for use with 40/60 pressure range systems. Enables installer to reduce pressure depending on pressure switch setting.

Sturdy Base: Tested-tough composite construction.

TANK SIZING RULE:

Size tank for one gallon of drawdown for each gallon per minute at pump capacity.

Example: For a 1 HP, 20 GPM unit pumping 20 gallons per minute on a 30-50 pressure switch setting, the properly sized Pro-Source® PLUS tank is a PSP85-T52 which has a 26 gallon drawdown.

CHART A: TANK SELECTION CHART

Pump GPM	SYSTEM PRESSURE SWITCH SETTING – PSI					
	20-40		30-50		40-60	
	Runtimes					
	1 Minute	2 Minute	1 Minute	2 Minute	1 Minute	2 Minute
5	PSP19T	PSP32	PSP19T	PSP35	PSP19T	PSP50
7.5	PSP32	PSP50	PSP32	PSP50	PSP32	PSP62
10	PSP32	PSP62	PSP35	PSP85	PSP50	PSP85
12.5	PSP35	PSP85	PSP50	PSP85	PSP50	PSP119
15	PSP50	PSP85	PSP50	PSP119	PSP62	PSP119
20	PSP62	PSP119	PSP85	PSP85 (2)	PSP85	PSP85 (2)
30	PSP85	PSP85 (2)	PSP119	PSP119 (2)	PSP119	PSP119 (2)
50	PSP62 + PSP85	PSP119 (2) + PSP62	PSP85 (2)	PSP119 (3)	PSP119 (2)	PSP119 (4)

Note: Drawdown will be affected by operating temperature of the system, accuracy of the pressure switch and gauge, the actual precharge pressure, and rate of fill.
Pumps installed with a Pro-Source® PLUS tank require a relief valve equal to the tank's maximum operating pressure. Relief valve must be capable of relieving entire flow of pump at relief pressure.

CHART B: DRAWDOWN VOLUME MULTIPLIER* (APPROX.)

Pump Off Pressure PSI	PUMP START PRESSURE – PSI							
	10	20	30	40	50	60	70	80
20	0.26							
30	0.41	0.22						
40		0.37	0.18					
50		0.46	0.31	0.15				
60			0.40	0.27	0.13			
70			0.47	0.35	0.24	0.12		
80				0.42	0.32	0.21	0.11	
90				0.48	0.38	0.29	0.19	0.10
100					0.44	0.35	0.26	0.17

*Utilize this chart if proper selection cannot be made using Chart A. Drawdown based on Boyle's Law.

PROCEDURE: 1. Identify drawdown multiplier relating to specific application.
2. Insert multiplier (X) into the following formula:

$$\frac{\text{Pump GPM} \times \text{Min Runtime}}{\text{Multiplier (X)}} = \text{Minimum Tank Capacity Required}$$

EXAMPLE: An example of a 20 GPM pump with a minimum runtime of 1 minute, installed on a 50-70 PSIG system pressure range:

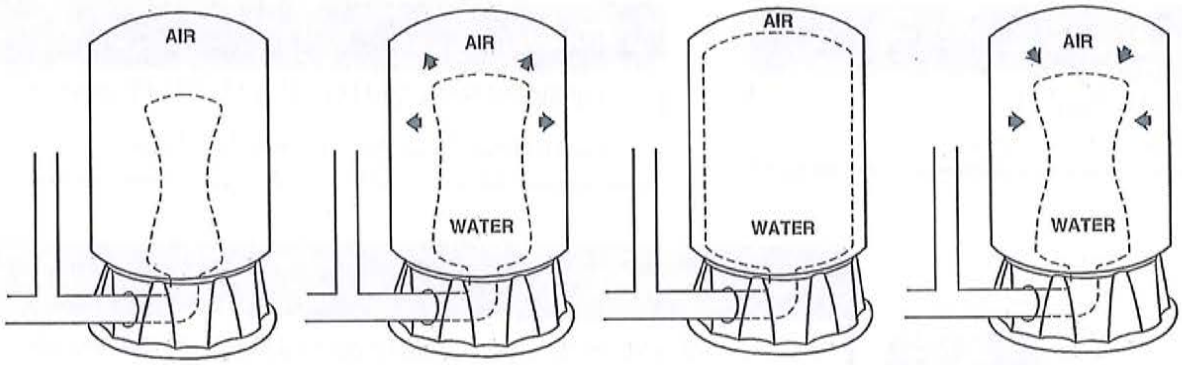
$$\frac{20 \text{ GPM} \times 1 \text{ minute}}{.24 \text{ (factor) from Chart B}} = 83.3 \text{ minimum U.S. gal. tank capacity required}$$

Referring to "Ordering Information" chart, the model PSP85-T52 has the closest U.S. gallon capacity that is greater or equal to the minimum volume requirement of 83.3 U.S. gallons.

PRO-SOURCE® PLUS Premium Steel Tanks

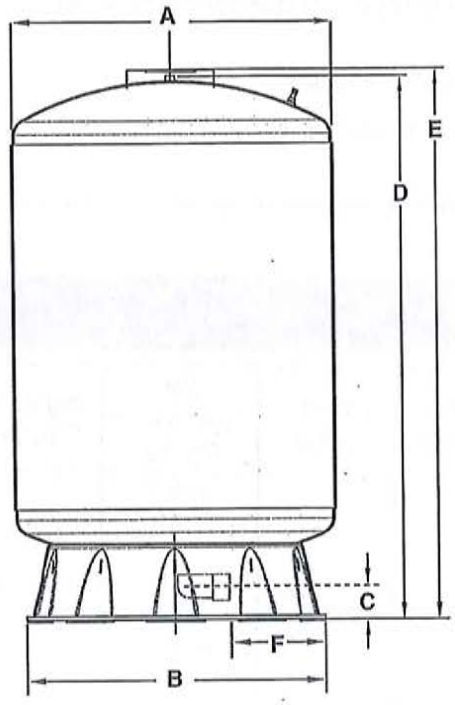
Heavy gauge steel

OPERATING CYCLE



1. **Separator is completely empty:** A new cycle is ready to begin. Simple, positive action produces maximum drawdown on every cycle.
2. **Water begins to enter the tank:** Air is compressed around the water separator as it fills with water.
3. **Pump-up cycle completed:** Air is now compressed to the cut-off setting of pressure switch.
4. **Water is being drawn from the tank:** Compressed air in the tank forces water out of the separator.

OUTLINE DIMENSIONS



Catalog Number	Discharge NPT	A	B	C	D	E	F
PSP19T-T02	1"	16.1	15.5	2.0	27.8	–	3.9
PSP19S-T02	1"	20.1	15.5	2.0	21.5	–	2.3
PSP32-T02	1"	16.1	15.5	2.0	43.0	–	2.3
PSP35-T05	1"	20.1	15.5	2.0	33.0	–	2.3
PSP50-T50	1-1/4"	24.1	22.7	2.5	33.2	–	5.5
PSP62-T51	1-1/4"	24.1	22.7	2.5	40.1	–	5.5
PSP85-T52	1-1/4"	24.1	22.7	2.5	51.5	–	5.5
PSP119-TR50	1-1/4"	24.1	22.7	2.5	68.6	–	5.5

Dimensions (in inches) are for estimating purposes only.

Aqua-Pure®

Spec #

Quantity

Models:

AP801 / AP801-C
AP801T-C / AP801-1.5-C

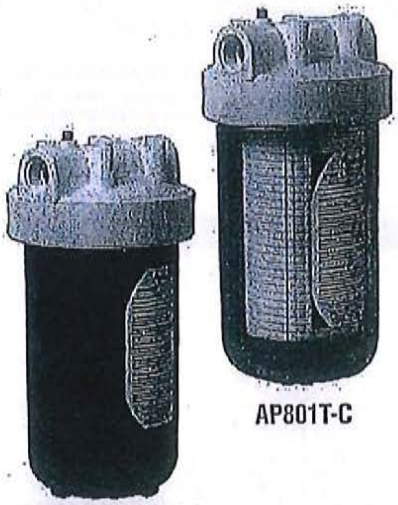
Whole House Water Filters

Applications:

- Sediment & Rust
- Chlorine Taste & Odor

At a Glance:

- Unrestricted flow designed with 1" and 1-1/2" NPT connections
- Ideal for larger homes and commercial applications



AP801T-C

AP801 / AP801-C / AP801-1.5-C

Product Benefits:

- 1" and 1-1/2" inlet and outlet connections for easy installation and high flow rates
- Designed with built-in pressure relief for convenient cartridge change-out
- Accepts long-life, rigid AP800 Series sediment cartridges for high filtration efficiency and sediment capacity
- Accepts long-life carbon fiber block AP800 Series cartridges for efficient chlorine taste and odor reduction
- Installation kit included for Complete Series for easy and convenient installation
- Aqua-Grip filter wrench included for fast and easy housing sump removal for changing cartridges
- Manufactured from FDA CFR-21 compliant materials
- 10 Year Limited Warranty to help provide long-term operation, superior factory support and service

Product Specifications:

Model No. (Part No.)	Inlet/ Outlet Size	Dimensions		Approx. Weight	Flow Rate	Temp. Range	Pressure Range	Std. Replacement Ctg. No.	Degree of Filtration
		Height	Diameter						
★ AP801 (55857-01)	1" NPT	13-15/16" (35.4 cm)	7-1/4" (18.4 cm)	5.5 lbs. (2.5 kg)	20 gpm (75.7 lpm)	40-100°F (4.4-37.8°C)	25-100 psi (172-689 kPa)	AP810 (not included)	5 micron nominal
AP801-C (55857-16)	1" NPT							AP810 (included)	
AP801T-C* (55857-26)	1" NPT								
AP801-1.5-C** (55857-17)	1-1/2" NPT				28 gpm (106.0 lpm)				

* "T" denotes transparent sump
** "C" denotes Complete Series, Includes housing, bracket, wrench and AP810 cartridge

3M

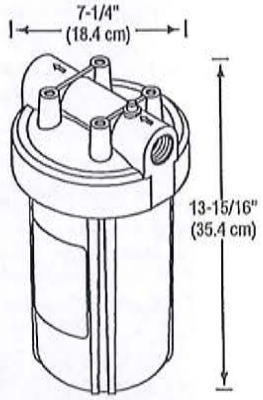
Aqua-Pure®

Spec #

Quantity

Model Number

Part Number



AP801 / AP801-C / AP801T-C / AP801-1.5-C

Physical Specifications:

- 1" and 1-1/2" NPT inlet and outlet ports
- System is a single vessel design
- System is manufactured from FDA CFR-21 compliant materials
- System has a maximum operating pressure of 100 psi (690 kPa) and operating temperature of 100°F (37.8°C)
- System comes with mounting bracket, wrench and AP810 cartridge
- System incorporates a pressure relief button

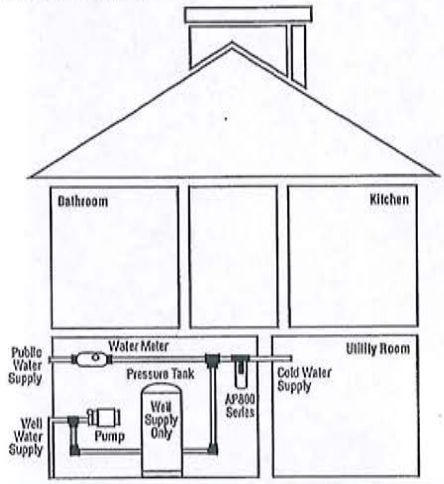
Replacement Cartridge Options						
Sediment Model	Load	Nominal Micron Rating	Application			Max. Flow Rate
			Sediment/ Rust	Chlorine Taste & Odor	Scale	
AP810	Normal	5	•			28 gpm (106 lpm)
AP811	Medium	25	•			28 gpm (106 lpm)
AP814	Heavy	50	•			28 gpm (106 lpm)
AP815		5		•		5 gpm (18 lpm)
AP817	Normal	5	•	•		10 gpm (38 lpm)

WARNING: Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

CUNO Incorporated recommends regularly scheduled maintenance and replacement of the filter cartridge(s) in order for the product to perform as advertised/sold. **Change the filter cartridge at least every 6 months. Improper installation and maintenance may result in property damage due to water leakage.**

Easy Installation:

CAUTION: Diagram shown is for reference purposes only. Read installation and operation manual prior to installing the unit.



Limited Warranty:

CUNO Incorporated warrants that this product is free from defects in materials and workmanship. This limited warranty, together with any and all warranties implied by law, shall be limited to a period of ten (10) years from the date of original purchase. This limited warranty does not apply to failures that result from abuse, misuse, alteration or damage not caused by CUNO or failure to properly comply with these installation or cartridge change-out instructions. This limited warranty is subject to exclusions and limitations. Please refer to the Warranty Card provided with the product for details.

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3M

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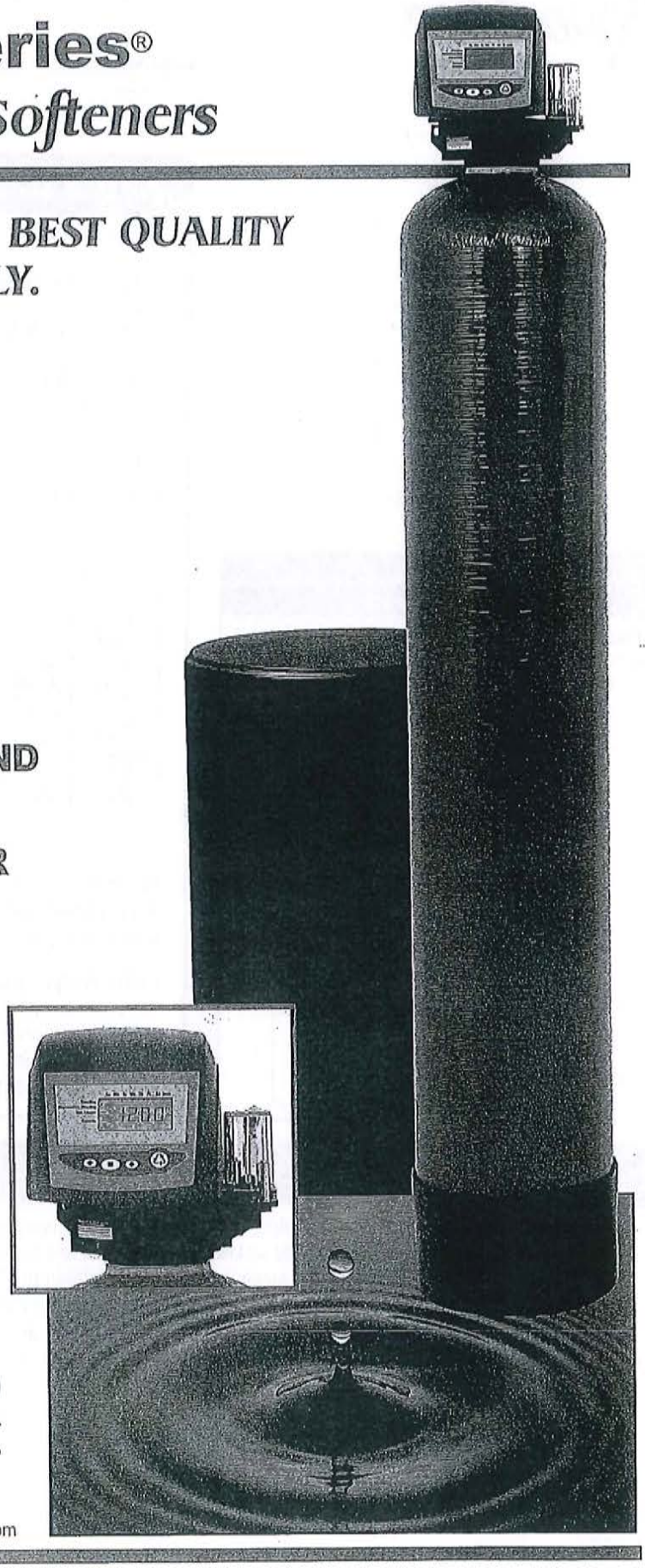
The MP-MBA Series®
Residential Water Softeners



BUILT TO GIVE YOU THE BEST QUALITY WATER FOR YOUR FAMILY.

- MONEY SAVING
- SALT SAVING
- EFFICIENT
- RELIABLE
- EASY TO USE
- SMART TECHNOLOGY
- 12 YEAR WARRANTY
- TURBULATOR TO EXTEND MINERAL LIFE
- FACTORY SUPPORT FOR THE LIFE OF THE UNIT

Quality That Lasts!

MASTER
Water Conditioning Corp.

224 Shoemaker Road • Pottstown, Pennsylvania 19464
Tel 610-323-8358 • Fax 610-323-5526 • www.masterwater.com

FEATURES

CALENDAR OF EVENTS
The controller actually learns the owner's water usage patterns in the 28-day variable reserve mode, virtually guaranteeing continuous soft water.

HISTORY
Easily program unit to tell you when service is required. Readily accessible historical performance and diagnostic data available at your fingertips.

TOUCH OF CONVENIENCE
The control valve is factory-programmed with complete salt tables and operational parameters. Simply set the timing schedule and hardness data...
IT'S THAT EASY!

ECONOMIC ELECTRONIC METER
Fully programmable cycle times and calendar override. High efficiency regeneration sequence. Salt settings in 1 pound increments for salt savings.

WARRANTY
One of the best in the business! 12 year warranty on mineral and brine tanks. 5 year warranty on valves.

MEMORY RETENTION
Battery-free time & date retention during loss of power failure.... Up To 8 Hours!

FACTORY SUPPORT
Factory technical service is available to your dealer or distributor for the life of the unit.

NOTE: The Models MP-MBA-30T, MP-MBA-45T-1 and MP-MBA-60T-1 conforms to NSF/ANSI 44 for the specific performance claims as verified and substantiated by test data as follows:

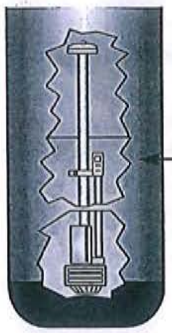
TEST DATA FOR MP-MBA-45T-1 UNIT:

Rated Efficiency:	4600 Grains per pound of salt
5 lbs Salt:	23.0 Kg Capacity
13.5 lbs salt:	46.7 Kg Capacity
22.5 lbs salt:	53.7 Kg Capacity
Rated Service Flow:	12.8 GPM @ 15 psi pressure drop

SOFTENER RESIN
The cation softening resin used in our softeners is designed to perform efficiently for years. It's one of the most efficient and rugged water softening resins available.

OPTIONAL: The 434 safety shutoff provides a positive air check and brine water level control.

The 464 shutoff is standard on all 1" control valves or with a 400 lb salt tank.



TURBULATOR
A plastic distributor system that uses a unique Water-Stream Compression device to shoot the softening resin granules to the top of the softener bed. This agitation extends the life, hardness, and iron removal capacities of the softening resin.

NSF/ANSI APPROVED UNITS

**Detailed warranty information accompanies each water conditioner.

SPECIFICATIONS

Model No.	Grains Capacity Per Regeneration	Service Flow GPM	Salt Storage LBS.	Salt Usage Per Regeneration LBS.	Backwash Flow GPM	Service Pipe Size	Drain Pipe Size	Floor Space		Height	Shipping Weight LBS.
								Width	Depth		
MP-MBA-30T	33,000	10.2	300	15.0	2.5	3/4"	1/2"	31"	19"	48"	95
MP-MBA-45T-1	46,700	12.8	400	13.5	2.5	1"	3/4"	31"	19"	62"	130
MP-MBA-60T-1	61,500	15.2	400	18.0	4.0	1"	3/4"	33"	19"	54"	180

Sterilight SPV-15 Ultraviolet (UV) NSF-Certified Water Purifier

Please Note: This model is no longer available. It has been replaced by the Sterilight SPV-950.

The Sterilight SPV-15 NSF-certified UV water purifier is recommeded for average-sized homes and commercial applications to kill bacteria (including coliform and e.coli), viruses, cryptosporidium, giardia, and a wide range of other microbiological contaminants where flow rates do not exceed 15.0 gallons per minute (56.8 LPM). It is loaded with features normally only found in expensive commercial systems including UV intensity monitor, flow restrictor, powered solenoid outputs, flow pacing, and multi-function digital display. It is an excellent choice for applications with a known bacteria or other microbiological contamination problem.

The Sterilight SPV-15 is based on the feature-laden Platinum™ ICE controller and Sterilight's Flow-Pace™ UV intensity monitor. This combination allows for 2-stage flow pacing where the lamps operate at half power when water is not flowing and full-power when the water is running. This allows the system to operate with minimal power requirements (excellent for applications powered by solar power systems!), at a lower operating cost, and with less heat build-up. The Platinum™ ICE controller provides constant output current and a universal power input (100-250V./50-60Hz.), as well as visually displaying % UV intensity, remaining lamp life, and total hours of operation. The system comes with a set of dry contacts allowing for the external hook-up of a remote device such as a solenoid valve (sold separately - see below), as well as a self-diagnostic check upon start-up, and an RJ-11 communications port. Using high-output, Sterilume™-HO coated low pressure germicidal UV lamps coupled with 304 stainless steel, axial flow sterilization chambers, the Platinum Series provides very high flow throughput capacity in a very compact system. The UV lamp provides a 4-log (99.99%) reduction of bacteria, viruses, and protozoan cysts (cryptosporidium and giardia) at the specified maximum flow rates. Lamp life is 9,000 hours (1 year).

The SPV-15 is NSF-certified (Class A, Standard 55).

Pre-treatment Requirements:

All UV sterilizers required sediment pre-filtration to reduce or eliminate the possibility that a targeted contaminant could "hide" behind a sediment particle in the "shadow" of the UV light and therefore not receive a full dose of UV light. Accordingly, the manufacturer strongly recommends sediment pre-filtration down to a level of 5 microns or smaller.

Water exceeding 120 ppm in hardness (7 grains per gallon) should be softened to reduce the risk that hard water mineral scale will build-up on the UV sleeve thereby reducing UV light distribution into the UV chamber. Similarly, iron levels exceeding 0.3 ppm or manganese levels exceeding 0.05 ppm should also be treated to prevent staining of the UV sleeve.

Elevated levels of certain other contaminants, such as tannins, can cause a reduction in UV transmittance (the ability of the water to transmit UV light). If the UV transmittance (UVT) of your water is less than 75% after the above-mentioned pre-treatment, activated carbon filtration may be desirable to improve UV transmittance. The majority of deep wells have a UVT of 85% or greater. If your UVT is unknown, select a model with a higher flow rate capacity then you feel you will really require (this will provide a higher UV dose at your desired flow rate), or add an activated carbon pre-filter to your system. We recommend the following pre-filter equipment:

Sterilight SPV-15 Specifications	
Applications	average house / commercial
Water Chamber Material	Electropolished 316 Stainless Steel
Chamber Diameter	3.5 inches / 8.9 cm
Lamp	Sterilume-HO Model S740RL-HO

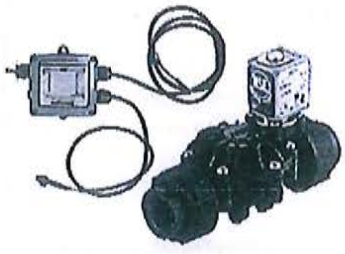
Electrical	100-240v, 50/60HZ
Lamp Power	80 watts
"Power-On" Indicator Light	✔
Lamp Replacement Reminder	✔
UV Intensity Monitor	✔
Flow Pacing	✔
Diagnostic Check	✔
NSF-Certification	✔

Please Note: This model is no longer available. It has been replaced by the Sterilight SPV-950.

*Note: Maximum recommended flow rates based on 95% UV transmittance. Actual dosage depends on flow rate, water quality, and maintenance (cleaning ov UV sleeve). UV dosage will be lower when the UV transmittance capacity of the water drops below 95% - if in doubt, select a model rated for a higher flow rate than you actually require. We recommend a UV dose of not less than 30,000 µWs/cm2.

Feed Water Quality Parameters	
Iron	0.3 ppm (0.3 mg/L)
Tannins	0.1 ppm (0.1 mg/L)
Hardness	< 120 ppm (7 grains / gallon)
Maximum Temperature:	104F (40C)

Options, Accessories and Replacement Parts



Viqua SOL-Plat-0.75 Solenoid Kit
MSRP: US$565.00
Our Price: US$299.00
You save: $266
ADD TO CART
- More Info -

Sterilight S740RL-HO Lamp
MSRP: US$165.00
Our Price: US$109.00
You save: $56
ADD TO CART
- More Info -

Sterilight QS-740 Sleeve
MSRP: US$86.00
Our Price: US$47.00
You save: $39
ADD TO CART
- More Info -

Sterilight SPV-950 Ultraviolet (UV) NSF-Certified Water Purifier


SPV-950

The Sterilight SPV-950 NSF-certified UV water purifier is recommeded for larger homes and commercial applications to kill bacteria (including coliform and e.coli), viruses, cryptosporidium, giardia, and a wide range of other microbiological contaminants where flow rates do not exceed 14.9 gallons per minute (56.6 LPM). It is loaded with features normally only found in expensive commercial systems including UV intensity monitor, flow restrictor, powered solenoid outputs, flow pacing, and multi-function digital display. It is an excellent choice for applications with a known bacteria or other microbiological contamination problem.

The Sterilight SPV-950 is based on the feature-laden Platinum™ ICE controller and Sterilight's Flow-Pace™ UV intensity monitor. This combination allows for 2-stage flow pacing where the lamps operate at half power when water is not flowing and full-power when the water is running. This allows the system to operate with minimal power requirements (excellent for applications powered by solar power systems!), at a lower operating cost, and with less heat build-up. The Platinum™ ICE controller provides constant output current and a universal power input (100-250V/50-60Hz), as well as visually displaying % UV intensity, remaining lamp life, and total hours of operation. The system comes with a set of dry contacts allowing for the external hook-up of a remote device such as a solenoid valve (sold separately - see below), as well as a self-diagnostic check upon start-up, and an RJ-11 communications port. Using high-output, Sterilume™-HO coated low pressure germicidal UV lamps coupled with 304 stainless steel, axial flow sterilization chambers, the Platinum Series provides very high flow throughput capacity in a very compact system. The UV lamp provides a 4-log (99.99%) reduction of bacteria, viruses, and protozoan cysts (cryptosporidium and giardia) at the specified maximum flow rates. Lamp life is 9,000 hours (1 year).

The SPV-950 is NSF-certified (Class A, Standard 55).

Sterilight SPV-950

MSRP: US$2450.00

Our Price: US$1739.00

You save: $711.00

FREE SHIPPING

ADD TO CART

(In Stock)

LOWEST PRICE GUARANTEE

Found a Lower Price?
Request a Price Beat

Bulk Quantity Discounts Available,
Please call 1-866-376-2690 for Quote

Pre-treatment Requirements:

All UV sterilizers required sediment pre-filtration to reduce or eliminate the possibility that a targeted contaminant could "hide" behind a sediment particle in the "shadow" of the UV light and therefore not receive a full dose of UV light. Accordingly, the manufacturer strongly recommends sediment pre-filtration down to a level of 5 microns or smaller.

Water exceeding 120 ppm in hardness (7 grains per gallon) should be softened to reduce the risk that hard water mineral scale will build-up on the UV sleeve thereby reducing UV light distribution into the UV chamber. Similarly, iron levels exceeding 0.3 ppm or manganese levels exceeding 0.05 ppm should also be treated to prevent staining of the UV sleeve.

Elevated levels of certain other contaminants, such as tannins, can cause a reduction in UV transmittance (the ability of the water to transmit UV light). If the UV transmittance (UVT) of your water is less than 75% after the above-mentioned pre-treatment, activated carbon filtration may be desirable to improve UV transmittance. The majority of deep wells have a UVT of 85% or greater. If your UVT is unknown, select a model with a higher flow rate capacity then you feel you will really require (this will provide a higher UV dose at your desired flow rate), or add an activated carbon pre-filter to your system.

Optional Emergency Solenoid Shut-Off Kit:

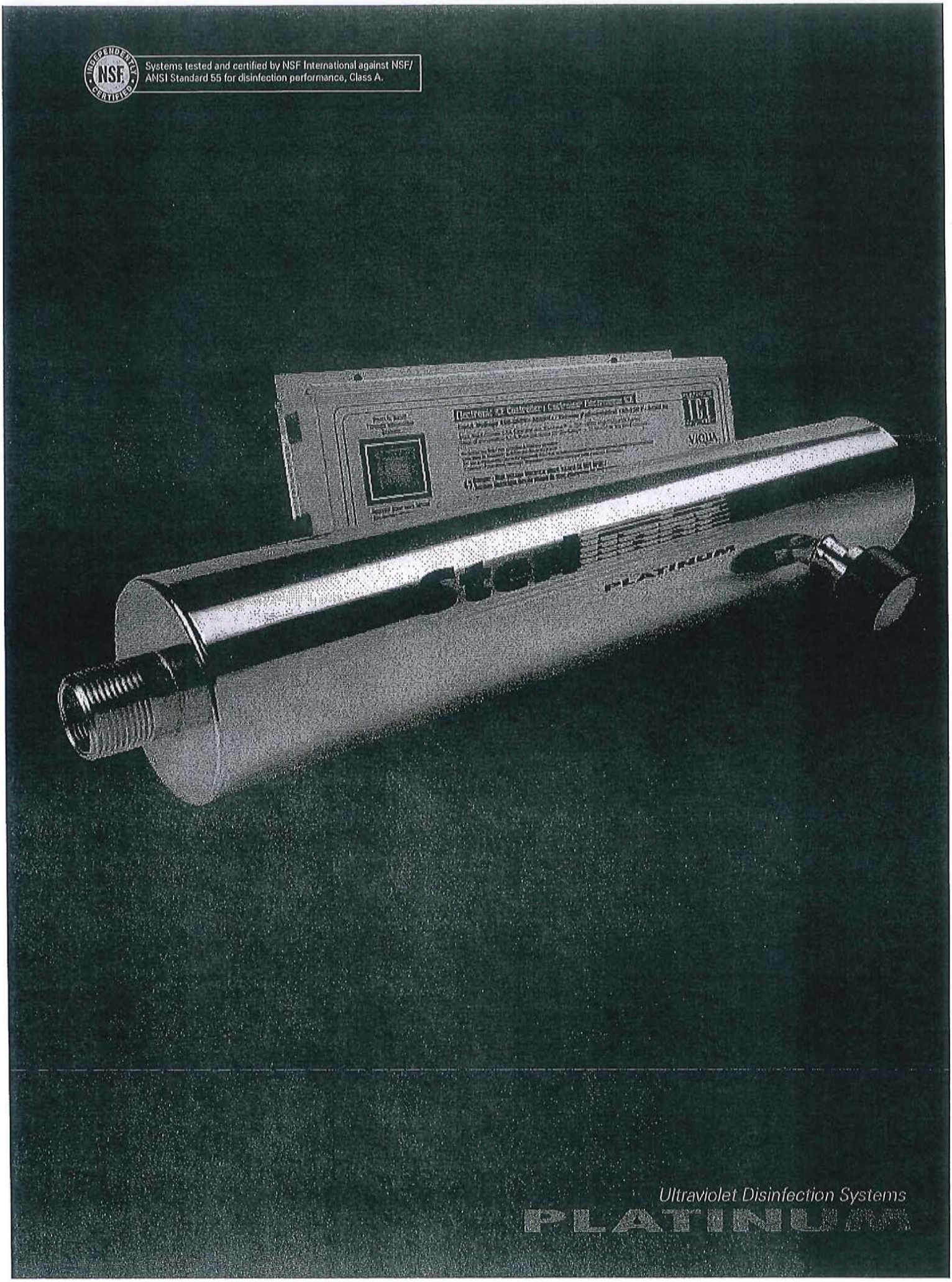
The Sterilight SPV-950 can be equipped with an emergency solenoid shut-off kit. In the event of a power failure or electrical outage to your home,

your UV lamp in your UV system will lose power. This could leave your home unprotected if someone turns on a water faucet. Some bacteria and other waterborne pathogens can also swim past an un-powered UV lamp and reach the downstream portion of your water system and therefore not receive a dose of UV light once the power is restored. The same situation could occur in the event of a UV bulb failure or in the event of a reduction in UV lamp output (drop in UV intensity below safe dosage level). The solenoid emergency shut-off valve is normally installed at the output of your UV system and will physically close a valve in the event of a bulb burn-out or power failure, thereby preventing any contaminant from passing through the system untreated. This feature will also turn off the water supply if there is a UV intensity loss (for models equipped with a UV intensity monitor). This kit is highly recommend for all homes with a known bacterial, virus, or cyst contamination problem, and for all homes with an electrical supply that is prone to frequent outages. Various valve sizes are available.

Sterilight SPV-950 Specifications	
Applications	large homes commercial
Water Chamber Material	Electropolished 316 Stainless Steel
Chamber Diameter	3.5 inches / 8.9 cm
Lamp	Sterilume-HO Model S950RL-HO
Electrical	100-240v, 50/60HZ
Lamp Power	100 watts
"Power-On" Indicator Light	✔
Lamp Replacement Reminder	✔
UV Intensity Monitor	✔
Flow Pacing	✔
Diagnostic Check	✔
NSF-Certification	✔

*Note: Maximum recommended flow rates based on 75% UV transmittance. Actual dosage depends on flow rate, water quality, and maintenance (cleaning of UV sleeve). UV dosage will be lower when the UV transmittance capacity of the water drops below 75% and a UV intensity alarm will be triggered. We recommend a UV dose of not less than 40 mJ/cm2.

Feed Water Quality Parameters	
Iron	0.3 ppm (0.3 mg/L)
Tannins	0.1 ppm (0.1 mg/L)
Hardness	< 120 ppm (7 grains / gallon)
Maximum Temperature:	104F (40C)


Systems tested and certified by NSF International against NSF/ANSI Standard 55 for disinfection performance, Class A.
PLATINUM
Ultraviolet Disinfection Systems
PLATINUM

WHO IS VIQUA - a Trojan Technologies Company

VIQUA is a leading water treatment technology company focused on providing our customers – residential and light commercial – confidence in their water. Offering a complete solution package including UV disinfection, water filtration, softeners and ozone products.

WHAT IS UV?

Ultraviolet (UV) light is at the invisible, violet end of the light spectrum. The water treatment industry uses a high-powered form of UV light called UV-C or "germicidal UV" to disinfect water.

HOW DOES UV LIGHT WORK?

UV-C rays penetrate microorganisms and destroy their ability to reproduce, effectively rendering them harmless.
It's a simple but effective process, destroying a minimum of 99.99% of harmful microorganisms, including *E. coli*, *Cryptosporidium*, and *Giardia*.

Not only is it safe and highly effective, UV does not change the taste, color, or odor of water. It simply removes the risk of illness caused by microbial contamination, making water safe.

WHY NOT USE CHLORINE?

Chlorine changes the taste and odor of water. Chlorination may also produce harmful by-products that are linked to the incidence of cancer.

WHO USES UV DISINFECTION SYSTEMS?

For more than 30 years, institutions, consumers and businesses have relied on VIQUA's environmentally friendly UV technology to disinfect their water supplies. Top candidates for UV disinfection systems include:

- Rural homes and cottages
- Nursing homes
- Hospitals
- Schools
- Hotels
- Restaurants
- Resorts and holiday camps
- Community water systems

Steri PLATINUM

Ensuring the safety of your water.

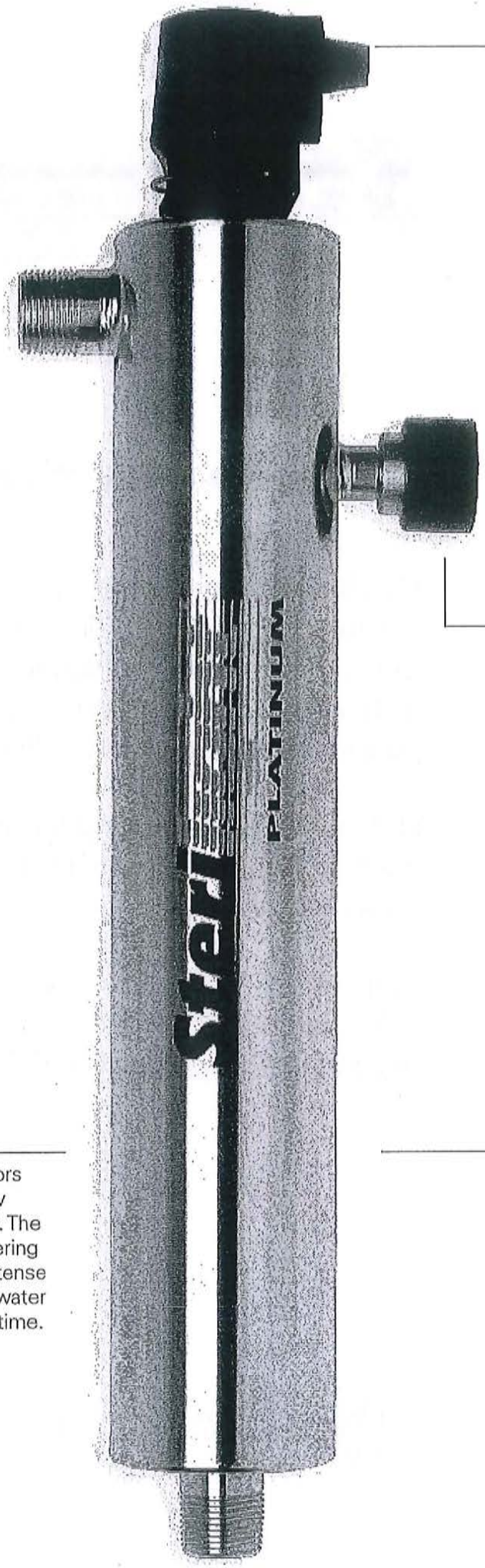
UV disinfection for drinking water is an acceptable alternative disinfectant under the drinking water regulations worldwide, as long as the equipment has proof of performance (third party validation).

NSF is a certified testing facility that conducts UV validations under the NSF 55 Class A protocol.

Sterilight SPV systems have undergone validation with NSF and hold certification to deliver an accepted dose of 40 mJ/cm^2.

INDEPENDENTLY NSF CERTIFIED

Systems tested and certified by NSF International against NSF/ANSI Standard 55 for disinfection performance, Class A.



Safety-Loc™ Lamp Connector

The interlock switch easily allows users simple, safe lamp removal without the use of special tools.

Combo Ports

For ease of installation [all point-of-entry systems].

Flow-Pace™ UV Sensor

This UV sensor promises system stability and long-life reliability with low power consumption, reduced operational costs and less heat transfer into the water.

Axial Flow

Sterilight® Platinum™ reactors include a patented axial flow system installed at the inlet. The axial flow directs water entering the chamber to the most intense area of UV light – ensuring water confidence each and every time.

Electropolished and Passivated Reactor Chamber

Manufactured from 316L stainless steel.

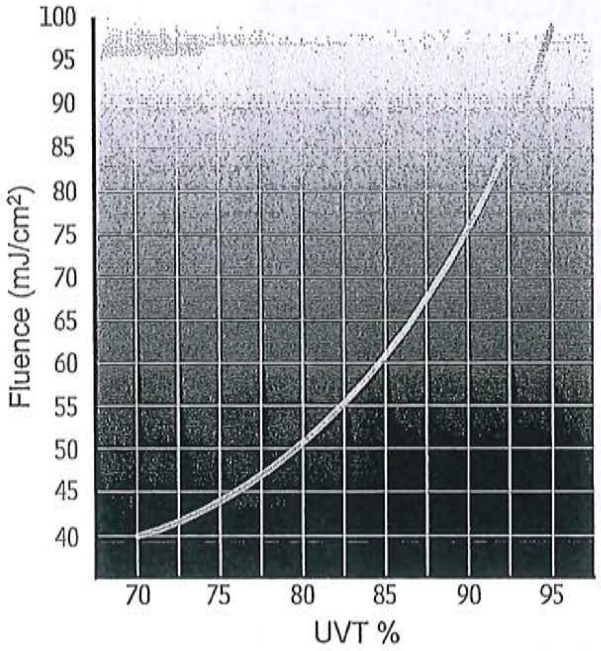
Steri PLATINUM

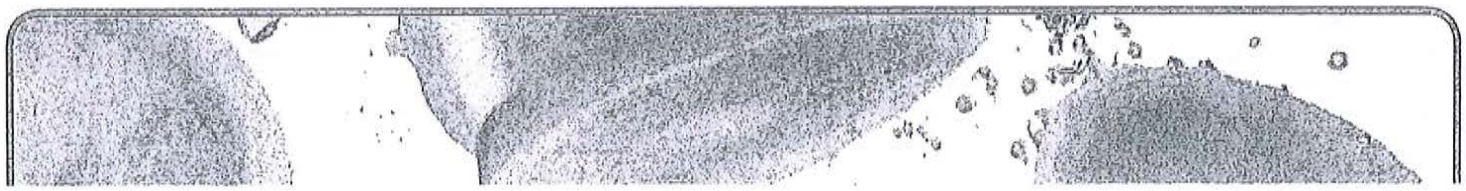
Platinum ICE Controller

- > graphic interface (Smart Switch™)
- > universal power (100-250V)
- > visual elapsed time meter (counts down remaining days between lamp changes and provides for total running time of controller)
- > visual UV intensity output in %
- > constant current output
- > full system diagnostic check on start-up
- > dry contacts (for solenoid etc.)
- > universal IEC power input connector

Sizing Your System

The UV dose delivered by a given reactor is dependent on many factors, including water quality and flow rate. NSF/ANSI Standard 55 requires that the UV system deliver a minimum UV fluence of 40 mJ/cm² at the alarm set-point. The accompanying graph shows how the delivered fluence will be affected at varying UV transmittance levels.





USED

General	
Chamber Material	316L SS
Electropolished & Passivated	Yes
UV Intensity Monitor	Yes
Flow Pacing – Sensor	Yes
Elapsed Time Meter	
Countdown	Yes
Total Hours	Yes
Controls	
Flow Restrictor	Yes
Dry Contacts	Yes
Lamp Replacement Reminder	Yes
Diagnostic Check	Yes
Operating Parameters	
Maximum Operating Pressure	8.62 bar (125 psi)
Minimum Operating Pressure	1 bar (14.5 psi)
Pressure Drop at Rated Flow	0.3 bar (4 psi) at 50% rated flow*
Ambient Water Temperature	2-40°C (36-104°F)
Maximum Ambient Temperature	50°C (122°F)
Installation	Horizontal or Vertical
NSF/ANSI Certification	Standard 55 Class A
Other Certifications	

* pressure drop due to flow restrictor

	SPV-200	SPV-410	SPV-600	SPV-740	SPV-950
[1]Rated flow at dose of 40 mJ/cm²	9.9 lpm (2.6 gpm) (0.5 m³/hr)	22.6 lpm (5.9 gpm) (1.3 m³/hr)	32.7 lpm (8.6 gpm) (1.9 m³/hr)	42.9 lpm (11.2 gpm) (2.5 m³/hr)	56.6 lpm (14.9 gpm) (3.4 m³/hr)
Electrical					
Voltage	100-250V/50-60 Hz				
Power Consumption	35 W	52 W	73 W	88 W	110 W
Lamp Watts	30 W	45 W	65 W	80 W	100 W
Dimensions					
Reactor	45 cm x 9 cm (18" x 3.5")	67 cm x 9 cm (26" x 3.5")	86 cm x 9 cm (34" x 3.5")	100 cm x 9 cm (39" x 3.5")	121 cm x 9 cm (48" x 3.5")
Controller	28 cm x 11 cm (11" x 4.5")	28 cm x 11 cm (11" x 4.5")	28 cm x 11 cm (11" x 4.5")	28 cm x 11 cm (11" x 4.5")	28 cm x 11 cm (11" x 4.5")
Shipping Weight	5.4 kg (12 lbs)	6.8 kg (15 lbs)	8.2 kg (18 lbs)	8.6 kg (19 lbs)	9.5 kg (21 lbs)
Inlet/Outlet Port Size	1/2" MNPT	Combo 3/4" FNPT/ 1" MNPT	Combo 3/4" FNPT/ 1" MNPT	Combo 3/4" FNPT/ 1" MNPT	Combo 3/4" FNPT/ 1" MNPT

[1] Flow rates stated as determined by NSF/ANSI Standard 55 testing.

Warranty

The Sterilight® Platinum™ Series systems come with a seven year warranty against manufacturer's defects on the stainless steel reactor chamber; a one year warranty on lamps, sleeves, and UV intensity monitors; and a five year pro-rated warranty on all other components.

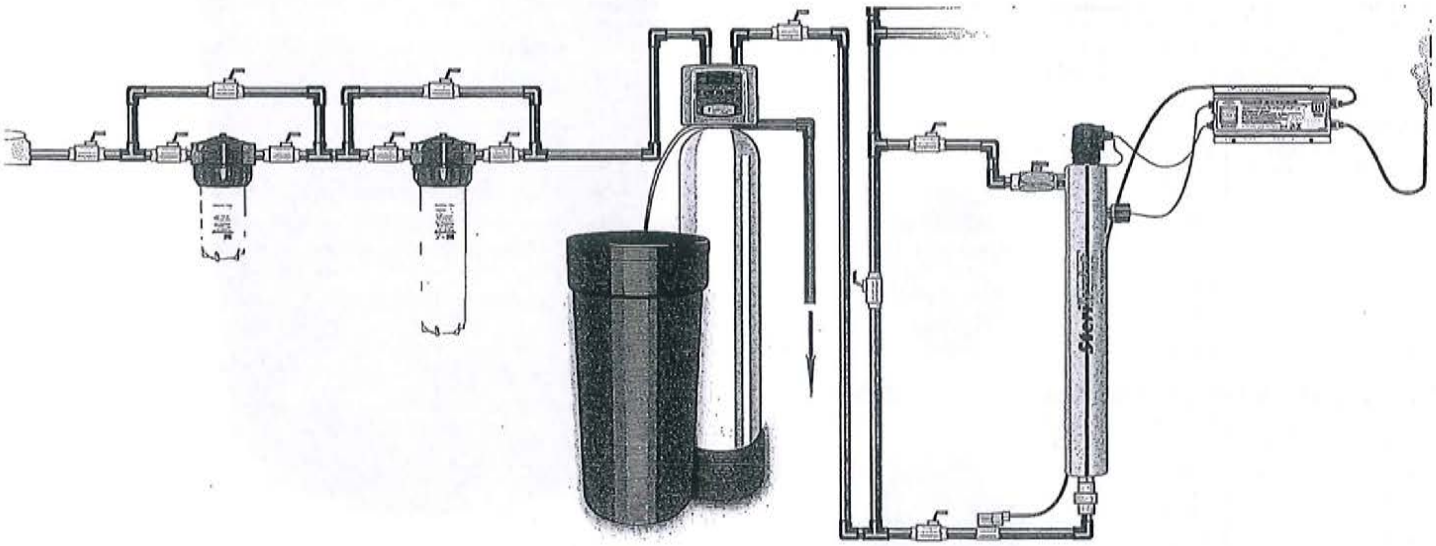
Systems tested and certified by NSF International against NSF/ANSI Standard 55 for disinfection performance, Class A.

VIQUA™

A TROJAN TECHNOLOGIES COMPANY

425 Clair Road West Guelph, ON Canada N1L 1R1 t. 519 763 1032 t.f. 800 265 7246 f. 519 763 5069 www.viqua.com

Sterilight PLATINUM



Typical Point-of-entry Illustration

Water Quality Guidelines

Iron: < 0.3 ppm (0.3 mg/L)	**Manganese:** < 0.05 ppm (0.05 mg/L)
Hardness: < 7 gpg (120 mg/L)	**Tannins:** <0.1 ppm (0.1 mg/L)
Turbidity: < 1 NTU	**UV Transmittance:** > 75%

Lamps

Sterilume HO lamps utilize low pressure high output technology in order to deliver superior performance. All SPV lamps include the following:

> Proprietary lamp coating

> Consistent UV output

> Superior cold water start conditions

> One year warranty

get **genuine**

VIQUA - a Trojan Technologies company offers a wide range of certifications, both electrical and microbiological, throughout the Sterilight product line. VIQUA cannot warranty any system or system components if non-genuine parts are used, specifically lamps. Getting genuine ensures maintenance of your system warranty, electrical certification and NSF 55 validation. Ensure the performance, safety and warranty of your Sterilight systems...get **genuine**.

Chem-Tainer® Tank Fittings & Accessories

Factory-installed fittings are professionally installed to provide a secure and reliable connection. Or, choose non-factory installed fittings to install yourself. Unless noted otherwise, fittings are constructed of PVC for general chemical compatibility.

Ordering info: When ordering factory-installed fittings, sketch where fittings are to be installed on the tank drawing we fax you, then fax back with date and signature. We cannot process your order without this drawing. Factory installed fitting prices include installation cost.

(A) Bolt-On Bulkhead Fitting

	W/ EPDM GASKET		VITON® GASKET UPGRADE (2 REQ)	
SIZE	STOCK #	EACH	STOCK #	EACH
½"	23050	$	23058	$
¾"	23051		23059	
1"	23052		23060	
1½"	23053		23061	
2"	23054		23062	
3"	23055		23063	
4"	23056		23064	
6"	23057		23065	

(B) Screw-On Bulkhead Fitting (w/EPDM Gaskets, Socket x FNPT)

	FACTORY INSTALLED		NON-FACTORY INSTALLED	
SIZE	STOCK #	EACH	STOCK #	EACH
½"	23066	$	45605	$
¾"	23067		45607	
1"	23068		45609	
1½"	23070		45613	
2"	23071		45615	
3"	23072		45617	
4"	23073		45619	

(C) Optional Viton® Gasket for Screw-On Bulkhead Fitting (B)

	FACTORY INSTALLED		NON-FACTORY INSTALLED	
SIZE	STOCK #	EACH	STOCK#	EACH
½"	23074	$	68282	$
¾"	23075		68283	
1"	23076		68284	
1½"	23078		68286	
2"	23079		68287	
3"	23080		68288	
4"	23081		68289	

(G) U-Vent with Screen

	FACTORY INSTALLED	
SIZE	STOCK #	EACH
2"	23134	$
3"	23135	
4"	23136	

(J) Ball Valve, Bolt On

	FACTORY INSTALLED	
SIZE	STOCK #	EACH
½"	23122	$
¾"	23123	
1"	23124	
1¼"	23125	
1½"	23126	
2"	23127	

Threaded Bulkhead Fitting Installation

operator notes

Fitting Size	Installation Hole Size	Min Flexible Tank ID	Max Wall Thickness
½"	1.38"	5.56"	1.08"
¾"	1.63"	7.75"	1.15"
1"	1.88"	8.94"	1.15"
1¼"	2.38"	12.19"	1.02"
1½"	2.38"	12.19"	1.02"
2"	3.25"	19.38"	1.09"
3"	4.5"	36.25"	1.14"
4"	5.75"	76.81"	1.69"

Green Water Storage Tanks

- **Green polyethylene resin limits algae growth**
- **Pre-installed fittings**
- **FDA compliant**

Use these tanks for potable water storage in residential, commercial and industrial applications. Their green polyethylene resin construction limits light penetration, reducing the growth of water-borne algae. All tanks comply with FDA specifications for safe storage of potable water.

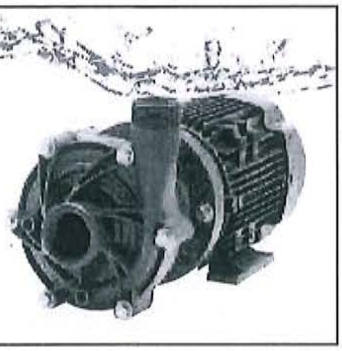
Includes: a standard 16" manway, 1-½" top fill fitting and 2" bottom drain fitting. Additional fittings are available. Contact USABlueBook for more information.

Note: Use for storing potable WATER ONLY. For chemical storage, see pages 1486-1488. **Not for underground use.**

Shipping: Ships motor freight.

CAPACITY (GALLONS)	DIA x H	STOCK #	EACH
305	46" x 50"	52600	$
500	48" x 73"	52601	
550	67" x 44"	52602	
1,000	64" x 80"	52603	
1,100	87" x 53"	52604	
1,550	87" x 67"	52605	
2,500	95" x 91"	52606	
3,000	95" x 109"	52607	
5,000	102" x 152"	52608	
10,000	141" x 160"	52609*	

*2" bottom fitting only; no top fitting.



See pages 1243-1253 for **Transfer Pumps.**

Mark Siemers

From: Wittbold, Alice A [HDS] <awittbold@usabluebook.com>
Sent: Thursday, June 25, 2015 5:05 PM
To: SIEMERSM@PIETRZAKPFAU.COM
Subject: USABLUEBOOK TANKS

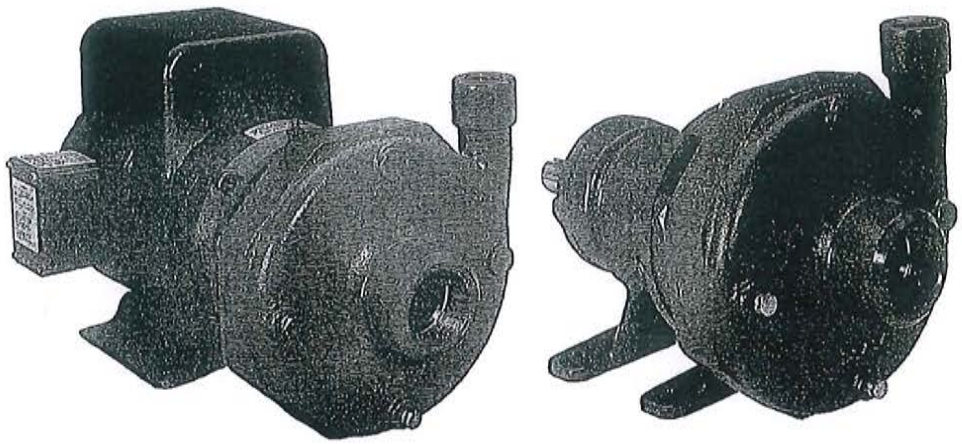
Item number 52600 -52609 the tanks are NFS61-pertains only to the material the tanks are made from although the tanks are FDA compliant.

Thank you

Alice Wittbold
Customer Care Representative
USABlueBook
A proud HD Supply Facilities Maintenance Company
Get the Best Treatment!

Office 800-548-1234 x 75117
Fax 847-689-3030
Cell N/A
awittbold@usabluebook.com
http://www.usabluebook.com

TECHNICAL BROCHURE
B363756S



3656/3756 S-Group

CAST IRON, BRONZE FITTED CENTRIFUGAL PUMPS

BOMBAS CENTRÍFUGAS EN HIERRO FUNDIDO CON ACCESORIOS DE BRONCE

GOULDS WATER TECHNOLOGY
a xylem brand

A FULL RANGE OF PRODUCT FEATURES

The 3656 and 3756 S-Group pumps from Goulds Water Technology have been designed with technical benefits to meet the needs of users in a variety of water supply, recirculation, and cooling applications.

- The model 3656 offers close coupled design for space saving and simplified maintenance.
- The model 3756 offers a bearing frame mounted design for flexibility of installation and drive arrangements.
- Back pull-out to reduce maintenance down time.
- Standard Type 21 mechanical seal for both reliability and availability. Carbon/ceramic/BUNA standard, with other faces and elastomers available.
- 3656/3756 available in all iron, bronze fitted or all bronze construction for application versatility.
- Replaceable wearing components include stainless steel shaft sleeve and casing and hub wear rings to maintain peak efficiency.
- Packed box sealing is also available as an option.
- Enclosed impeller design, dynamic balancing and renewable wear rings reduce losses affecting performance and pump life.
- Suction and discharge pipe connections are NPT threaded, except 3 x 4 – 7 which has 125 lb. ANSI flat faced flanges.
- Rigid cast iron motor adapter provides support and registered fits maintain positive unit alignment.
- Standard NEMA motor frame, JM or JP shaft extension, C-face mounting, single phase or three phase, 3500 or 1750 RPM. Open drip proof and totally enclosed fan cooled.
- Optional explosion proof or high efficiency motors available.
- Optional rigid carbon steel bedplate, sheet metal coupling guard and T. B. Woods spacer coupling for 3756 models.

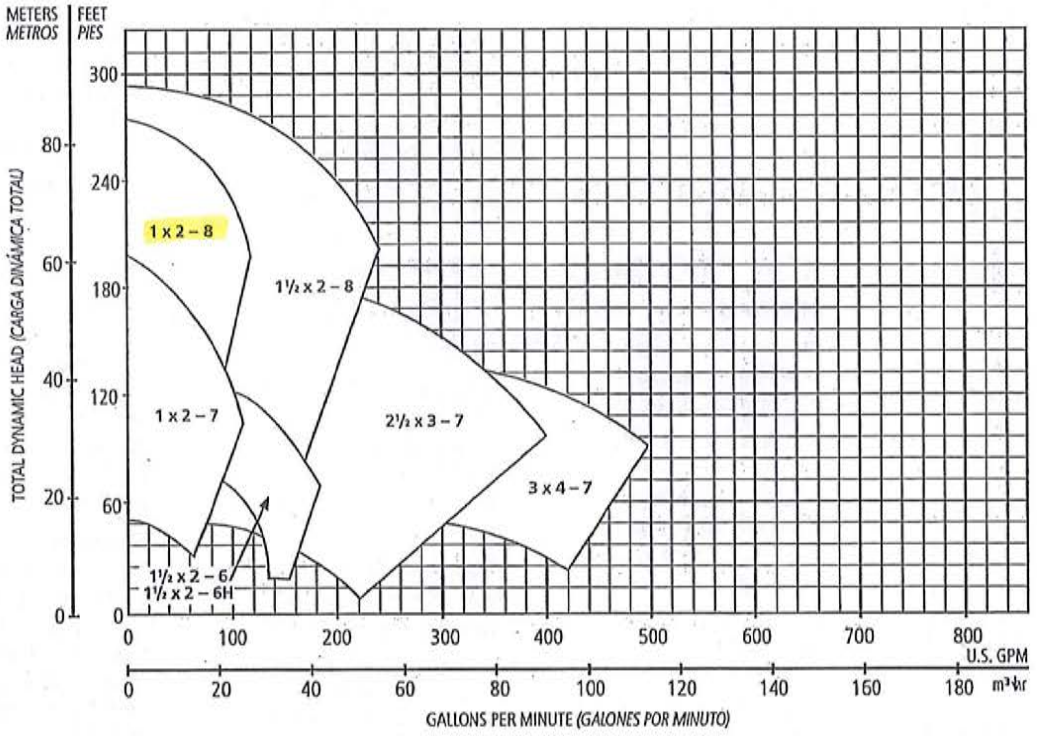
UNA AMPLIA GAMA DE VARIADAS CARACTERÍSTICAS

Las bombas 3656 y 3756 del Grupo S de Goulds Water Technology han sido diseñadas con beneficios técnicos para satisfacer las necesidades de los usuarios en variadas aplicaciones de suministro y recirculación de agua y aplicaciones de refrigeración.

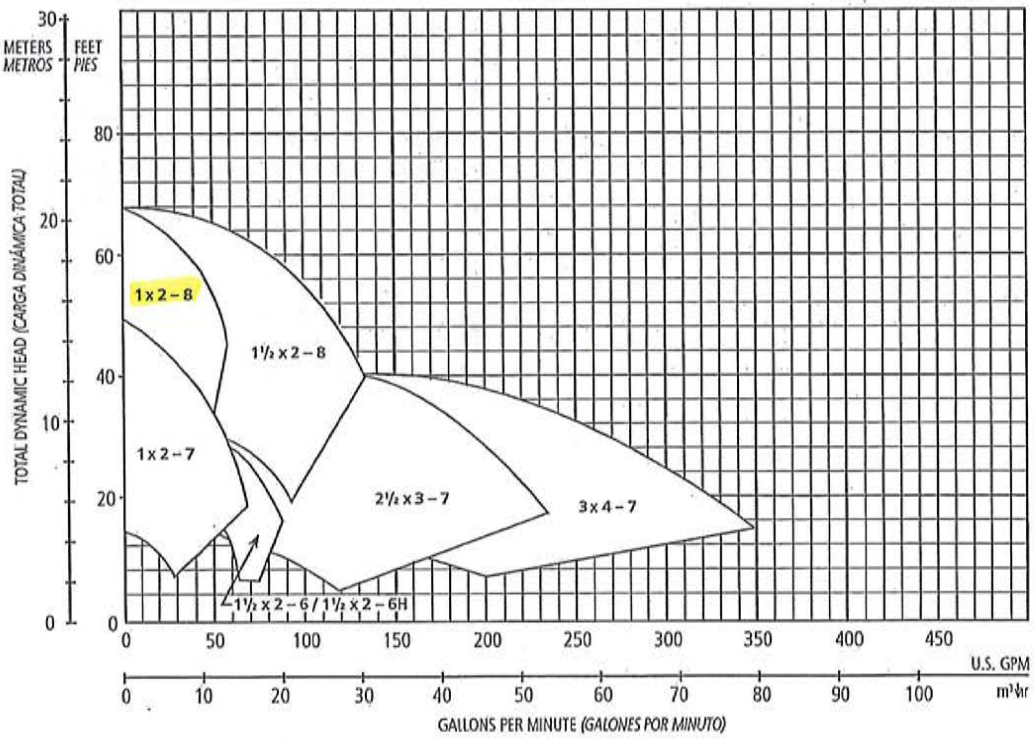
- *El modelo 3656 cuenta con diseño de acoplamiento corto para ahorrar espacio y simplificar el mantenimiento.*
- *El modelo 3756 cuenta con diseño de montaje sobre bastidor que ofrece gran flexibilidad en los arreglos de instalación y accionamiento.*
- *Desmontaje posterior que reduce el tiempo de inactividad por mantenimiento.*
- *Sello mecánico estándar Tipo 21, brinda gran confiabilidad y asegura la disponibilidad. Estándar de carbono/cerámica / BUNA, también se encuentran disponibles con otras caras y elastómeros.*
- *Los modelos 3656 y 3756 se fabrican en todo hierro, con accesorios de bronce o en todo bronce, para una mayor versatilidad de aplicación.*
- *Los componentes de desgaste reemplazables incluyen los anillos de desgaste de la carcasa y del rodete y la camisa del eje, de acero inoxidable, para mantener la eficiencia pico.*
- *El diseño de impulsor encerrado, balanceo dinámico y anillos de desgaste reemplazables reducen las pérdidas que afectan el desempeño y la vida de la bomba.*
- *Las conexiones de succión y descarga son roscadas NPT, con excepción de la bomba de 3 x 4 – 7, que cuenta con bridas de cara lisa ANSI de 125 lbs.*
- *El adaptador rígido del motor, de hierro fundido, ofrece soporte y los montajes registrados mantienen el alineamiento positivo de la unidad.*
- *Motor con bastidor NEMA estándar, extensión de eje JM, montaje en cara C, monofásico o trifásico, 3500 ó 1750 RPM. Abierto a prueba de filtraciones o totalmente encerrado enfriado por ventilador.*
- *Motores a prueba de explosiones y de alta eficiencia disponibles como opción.*
- *Placa de asiento rígida de acero al carbono, protector de acoplamiento de chapa metálica y acoplamiento espaciador T. B. Woods disponibles como opción en los modelos 3756.*

PERFORMANCE COVERAGE
CAMPO DE DESEMPEÑO

3500 Coverage Curve, *Curva de alcance 3500*



1750 Coverage Curve, *Curva de alcance 1750*



3656/3756 S-GROUP NUMBERING SYSTEM FOR ALL UNITS BUILT AFTER AUGUST 3, 1998

SISTEMA DE NUMERACIÓN DEL GRUPO S, MODELOS 3656/3756, PARA TODAS LAS UNIDADES FABRICADAS LUEGO DEL 3 DE AGOSTO DE 1998

The various versions of the 3656 and 3756 S-Group are identified by a product code number on the pump label. This number is also the catalog number for the pump. The meaning of each digit in the product code number is shown below.

Not all combinations of motor, impeller and seal options are available for every pump model. Please check with Goulds Water Technology on non-cataloged numbers.

Not recommended for operation beyond printed H-Q curve. For critical application conditions consult factory.

Las diferentes versiones de los modelos 3656 y 3756 del Grupo S se identifican con un número de código de producto en la etiqueta de la bomba. Este número es también el número de catálogo de la bomba. A continuación se ilustra el significado de cada dígito en el código del producto.

No todas las combinaciones de motor, impulsor y sellos están disponibles para cada modelo. Consulte a Goulds Water Technology sobre números que no aparecen en el catálogo.

No se recomienda la operación más allá de la curva impresa de H-Q (carga-capacidad). Para aplicaciones bajo condiciones críticas, consulte con la fábrica.

Example Product Code, *Ejemplo del código de producto*

9 BF 1 H 2 G 0 H

High Head Impeller (1½ x 2 – 6H Only), *Impulsor de carga alta (1½ x 2 – 6H únicamente)*

Mechanical Seal and O-ring, *Sello mecánico y anillo en O*

Type 21 Mechanical Seal, *Tipo 21 sello mecánico*					
Seal Code, *Código del Sello*	**Rotary, *Rotativo***	**Stationary, *Estacionario***	**Elastomers, *Elastómeros***	**Metal Parts, *Partes Metálicas***	**Part No., *Pieza Número***
0	Carbon, *Carbón*	Ceramic, *Cerámica*	BUNA-N	316 SS, *316 Acero inoxidable*	10K13
1		Sil-Carbide, *Carburo de silicona*	EPR		10K19
3			Viton		10K27
5	Sil-Carbide				10K64
9	Packed Box Design with BUNA O-Ring, *Diseño de prensaestopas empacado con anillo en O de BUNA*				15K16

Note: 10K27 replaces obsolete 10K25, ***Nota:** La 10K27 reemplace la obsoleta 10K25.*

Impeller Option Code, *Código de opción de impulsor*

Impeller Code, *Código del impulsor*	22BF	9BF	3BF		5BF	4BF	6BF
	1 x 2 – 7	1 x 2 – 8	1½ x 2 – 6	1½ x 2 – 6H	1½ x 2 – 8	2½ x 3 – 7	3 x 4 – 7
	Dia.	Dia.	Dia.	Dia.	Dia.	Dia.	Dia.
A	6¾"	8 1/16"	5 15/16"	5 15/16"	8 1/16"	7 1/16"	7 1/16"
B	6 7/16	7⅝	5⅝	5⅝	7⅝	6⅞	6⅜
C	6	7 5/16	5⅛		6¾	6 9/16	5½
D	5¾	7	4¾		5¾	6	4 11/16
E	5½	6½			7¾	5 11/16	5⅛
F	5 1/16	6 3/16			7	5 7/16	6
G	4 13/16	5⅜			6¼	5 3/16	
H	4 9/16	5⅛			6⅛	4¾	
J	4⅜					4½	
K	4 1/16					4 1/16	
L	3 13/16						

Driver, *Elemento motor*

1 = 1 PH, *fase*, ODP
2 = 3 PH, *fases*, ODP
3 = 3 PH, *fases*, 575 V, ODP
4 = 1PH, *fase*, TEFC
5 = 3 PH, *fases*, TEFC
6 = 3 PH, *fases*, 575 V, TEFC
7 = 3 PH, *fases*, XP
8 = 3 PH, *fases*, 575 V, XP
9 = 3 PH, *fases*, TEFC, PREFF
0 = 1 PH, *fase*, XP

1 PH, fase = Monofásico; 3 PH, fases = Trifásico

For frame mounted version, substitute the letters "FRM" in these positions.

Para las versiones de montaje en bastidor, reemplazar las letras en esta ubicación con "FRM".

HP Rating, *Potencia nominal, HP*

C = ½ HP
D = ¾ HP
E = 1 HP
F = 1½ HP
G = 2 HP
H = 3 HP
J = 5 HP
K = 7½ HP
L = 10 HP
M = 15 HP
N = 20 HP

Driver: Hertz/Pole/RPM, *Elemento motor: Hertz/Polos/RPM*

1 = 60 Hz, 2 pole, 3500 RPM
2 = 60 Hz, 4 pole, 1750 RPM
3 = 60 Hz, 6 pole, 1150 RPM
4 = 50 Hz, 2 pole, 2900 RPM
5 = 50 Hz, 4 pole, 1450 RPM

Material, *Material*

BF = Bronze fitted, *Accesorios de bronce*
AI = All iron, *Todo hierro*
AB = All bronze, *Todo bronce*

Pump Size, *Tamaño de bomba*

3 = 1½ x 2 – 6(H)
4 = 2½ x 3 – 7
5 = 1½ x 2 – 8
6 = 3 x 4 – 7*
9 = 1 x 2 – 8
22 = 1 x 2 – 7

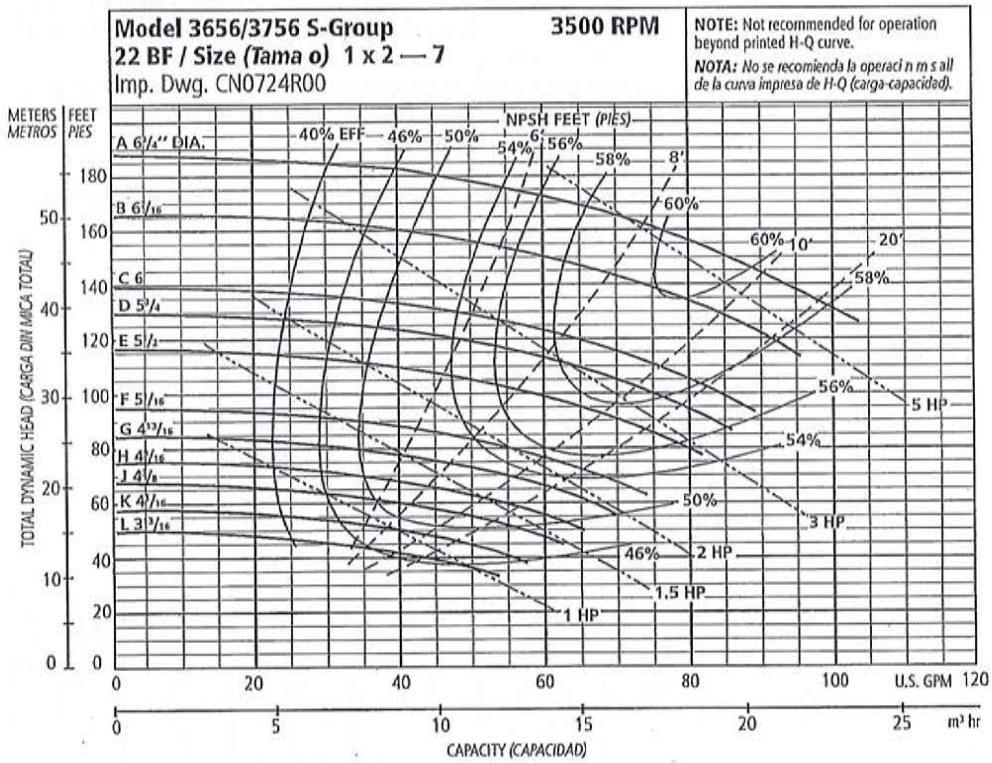
*Flanged design suction and discharge. *Succión y descarga brida del diseño.*

The 1 x 2 – 8 and 1 x 2 – 7 are only available in Bronze Fitted. *Los tamaños 1 x 2 – 8 y 1 x 2 – 7 están disponibles con accesorios de bronce únicamente.*

PERFORMANCE CURVES – 60 HZ, 3500 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 3500 RPM

These curves show the performance of the 3656 and 3756 at 3500 RPM and 1750 RPM, 60 Hz, and at 2900 RPM and 1450 RPM, 50 Hz. Standard impeller trims are shown.

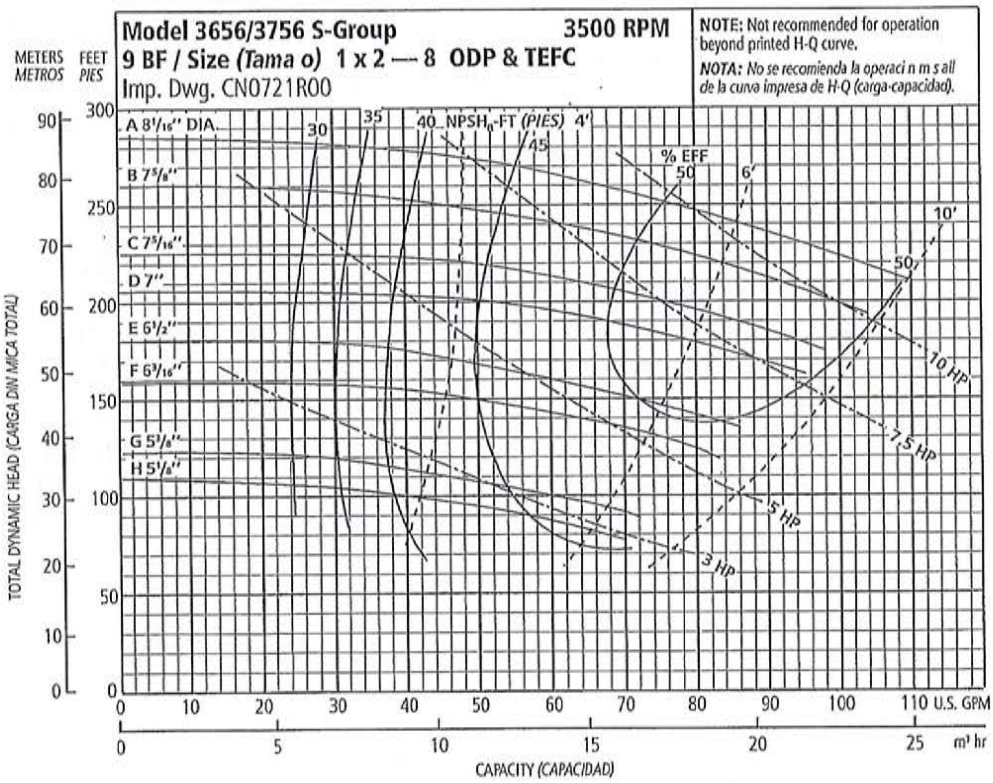
Estas curvas ilustran el desempeño de los modelos 3656 y 3756 operando a 3500 RPM y 1750 RPM en 60 Hz, y a 2900 RPM y 1450 RPM en 50 Hz. Se muestran los diámetros de impulsor estándar.



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	6¾"
B	6 7/16
C	6
D	5¾
E	5½
F	5 1/16
G	4 13/16
H	4 9/16
J	4⅜
K	4 1/16
L	3 13/16

NOTE: Pump will pass a sphere to 3/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 3/16 de pulgada de diámetro.

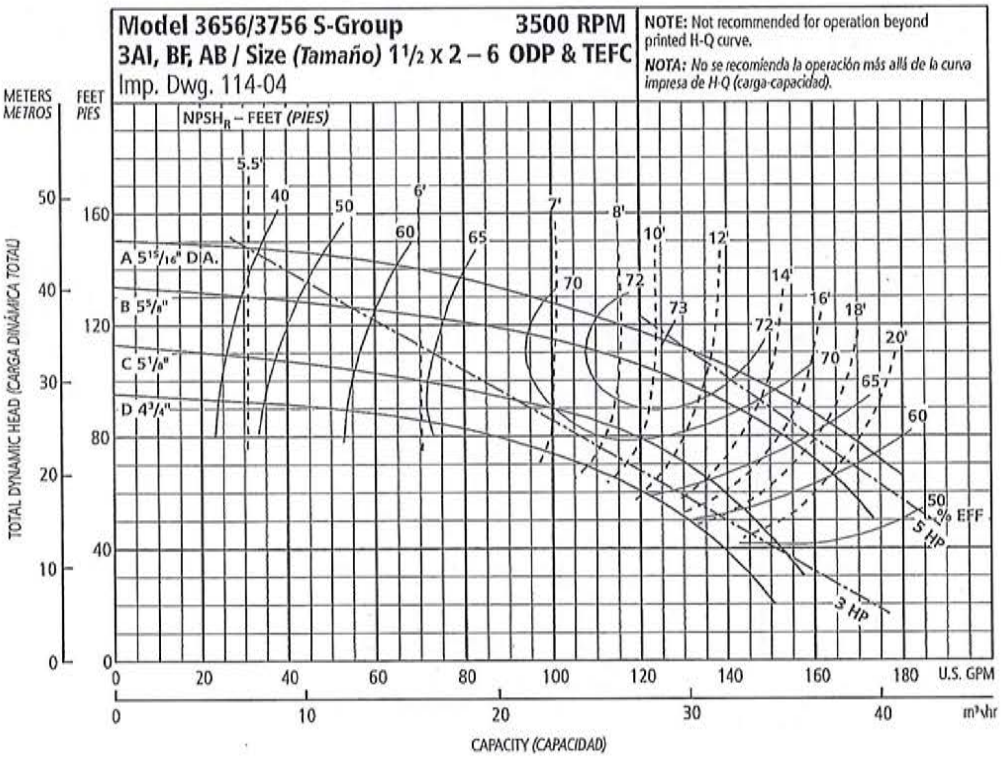


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	8 1/16"
B	7⅝"
C	7 5/16
D	7
E	6½
F	6 3/16
G	5⅜
H	5⅛

NOTE: Pump will pass a sphere to 3/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 3/16 de pulgada de diámetro.

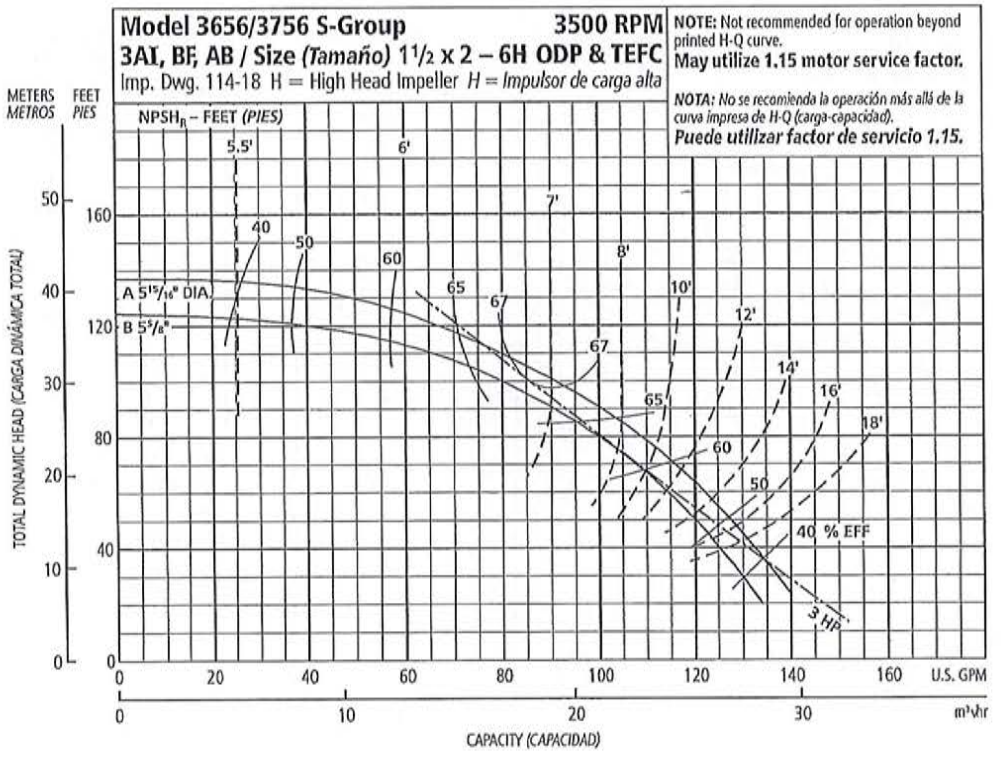
PERFORMANCE CURVES – 60 HZ, 3500 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 3500 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	5 15/16"
B	5 5/8"
C	5 1/8
D	4 3/4

NOTE: Pump will pass a sphere to 5/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 5/16 de pulgada de diámetro.

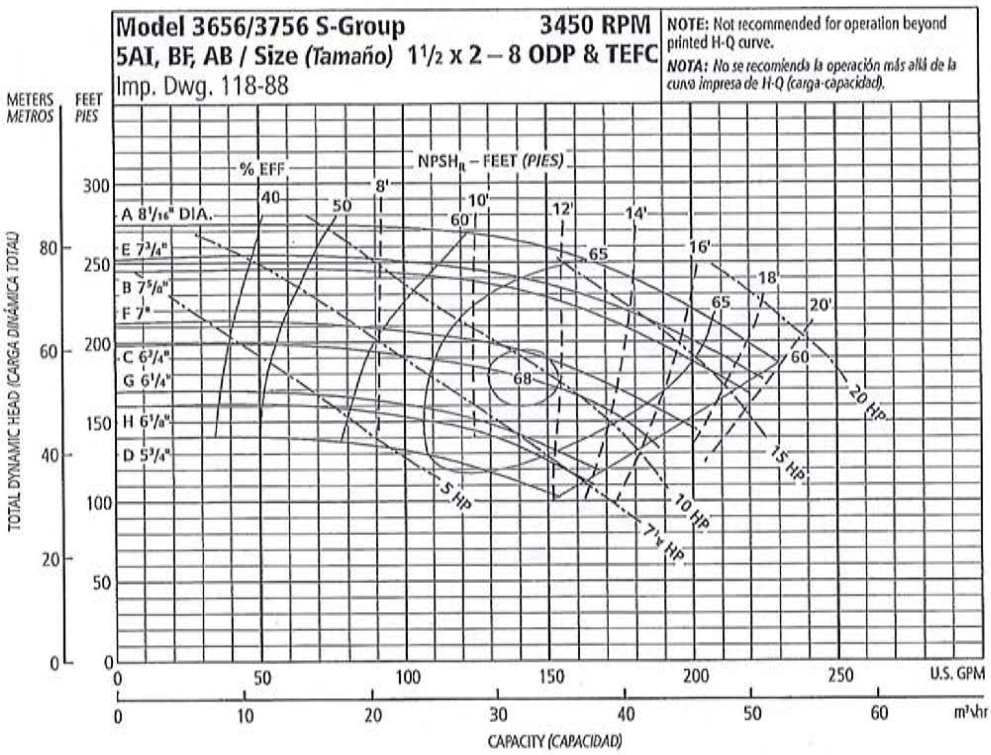


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	5 15/16"
B	5 5/8

NOTE: Pump will pass a sphere to 3/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 3/16 de pulgada de diámetro.

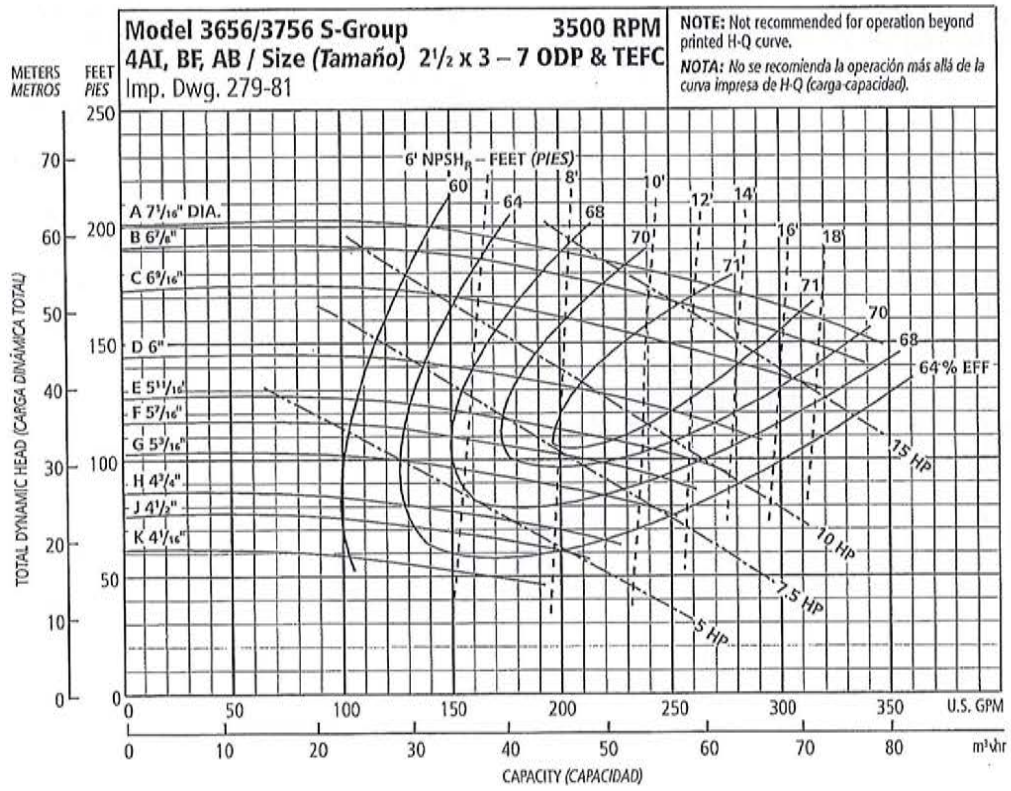
PERFORMANCE CURVES – 60 HZ, 3500 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 3500 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	8 1/16"
E	7 3/4"
B	7 5/8
F	7
C	6 3/4
G	6 1/4
H	6 1/8
D	5 3/4

NOTE: Pump will pass a sphere to 5/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 5/16 de pulgada de diámetro.

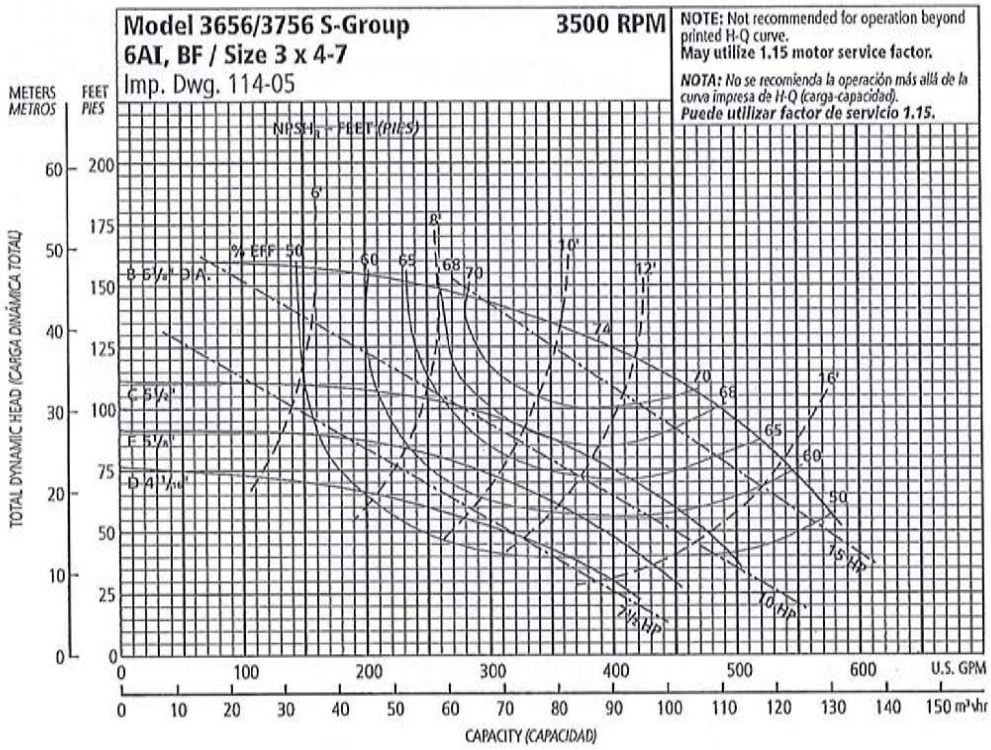


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	7 1/16"
B	6 7/8
C	6 9/16
D	6
E	5 11/16
F	5 7/16
G	5 3/16
H	4 3/4
J	4 1/2
K	4 1/16

NOTE: Pump will pass a sphere to 7/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 7/16 de pulgada de diámetro.

PERFORMANCE CURVES – 60 HZ, 3500 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 3500 RPM

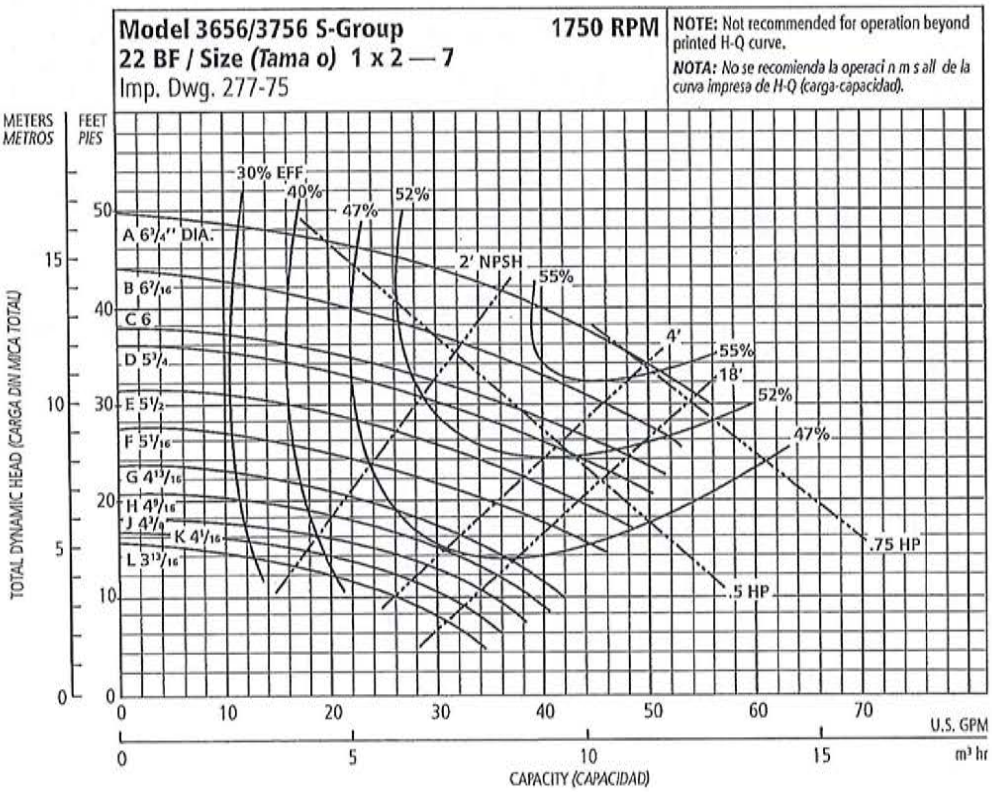


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
B	6⅜"
C	5½
D	4¹¹⁄₁₆
E	5⅛

NOTE: Pump will pass a sphere to ½" diameter.

NOTA: La bomba dejará pasar una esfera de hasta ½ de pulgada de diámetro.

PERFORMANCE CURVES – 60 HZ, 1750 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 1750 RPM

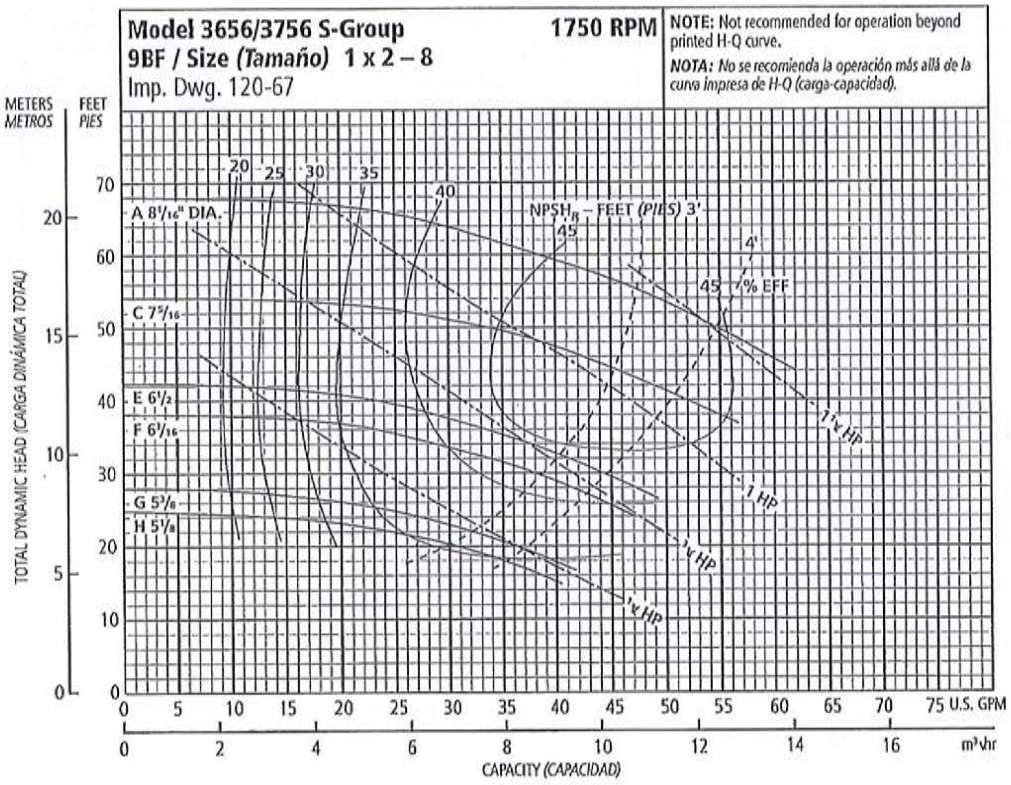


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	6¾"
B	6⁷⁄₁₆
C	6
D	5¾
E	5½
F	5¹⁄₁₆
G	4¹³⁄₁₆
H	4⁹⁄₁₆
J	4⅜
K	4¹⁄₁₆
L	3¹³⁄₁₆

NOTE: Pump will pass a sphere to ³⁄₁₆" diameter.

NOTA: La bomba dejará pasar una esfera de hasta ³⁄₁₆ de pulgada de diámetro.

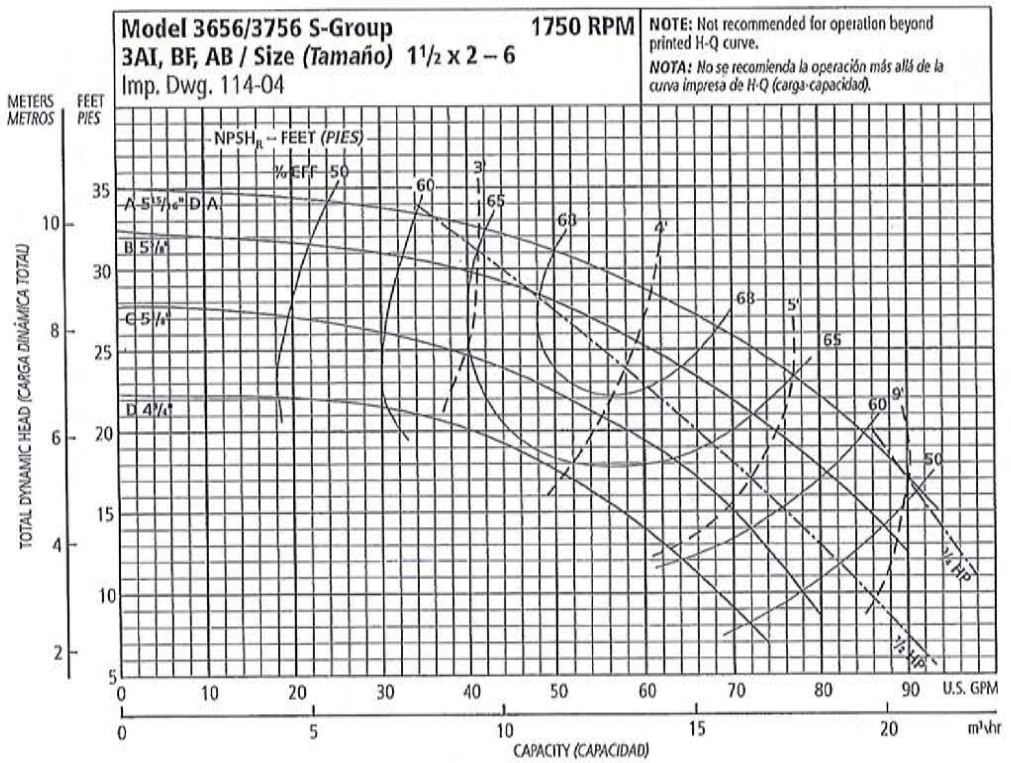
PERFORMANCE CURVES – 60 HZ, 1750 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 1750 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	8 1/16"
C	7 5/16
E	6 1/2
F	6 3/16
G	5 3/8
H	5 1/8

NOTE: Pump will pass a sphere to 3/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 3/16 de pulgada de diámetro.

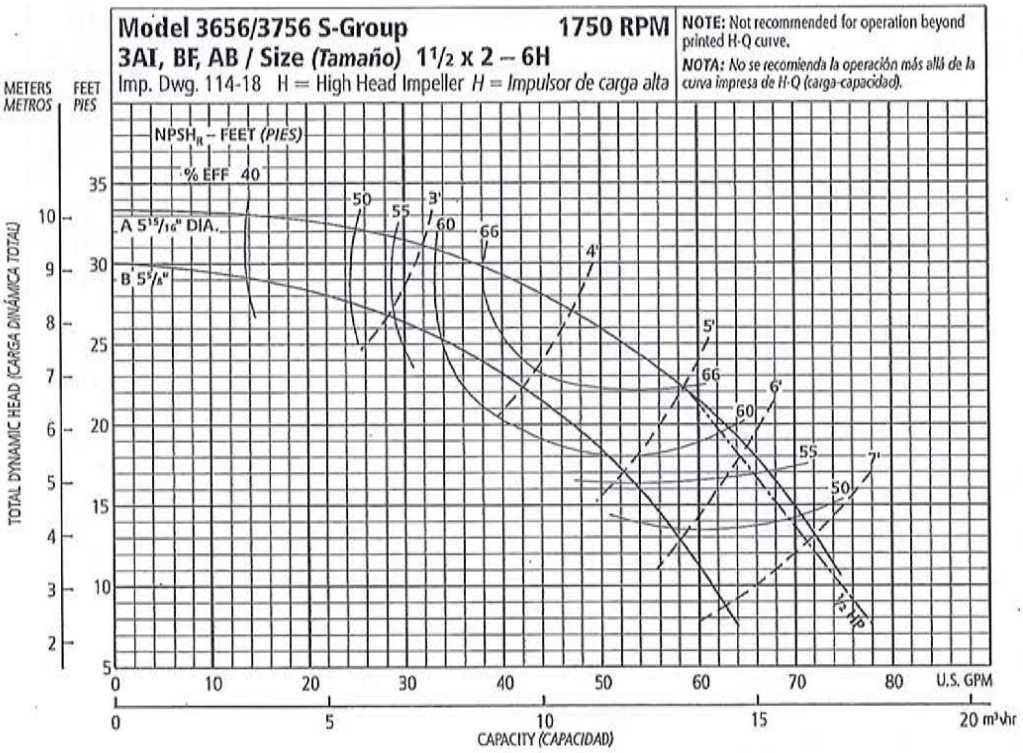


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	5 15/16"
B	5 3/8
C	5 1/8
D	4 3/4

NOTE: Pump will pass a sphere to 5/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 5/16 de pulgada de diámetro.

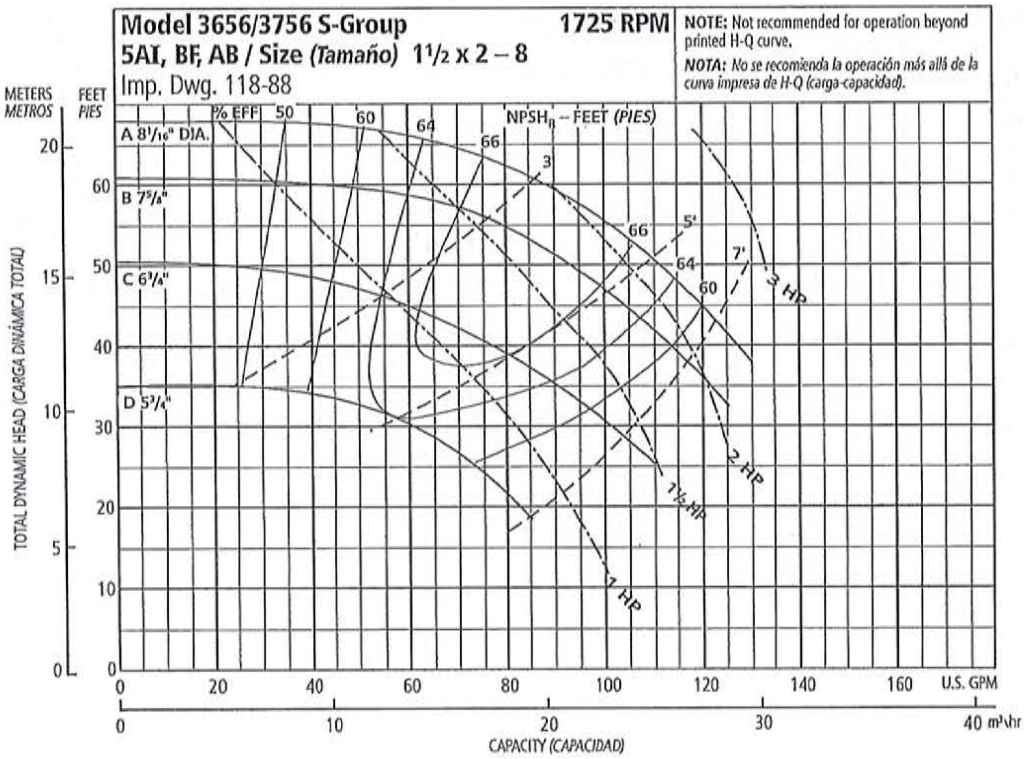
PERFORMANCE CURVES – 60 HZ, 1750 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 1750 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	5 15/16"
B	5 5/8

NOTE: Pump will pass a sphere to 3/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 3/16 de pulgada de diámetro.

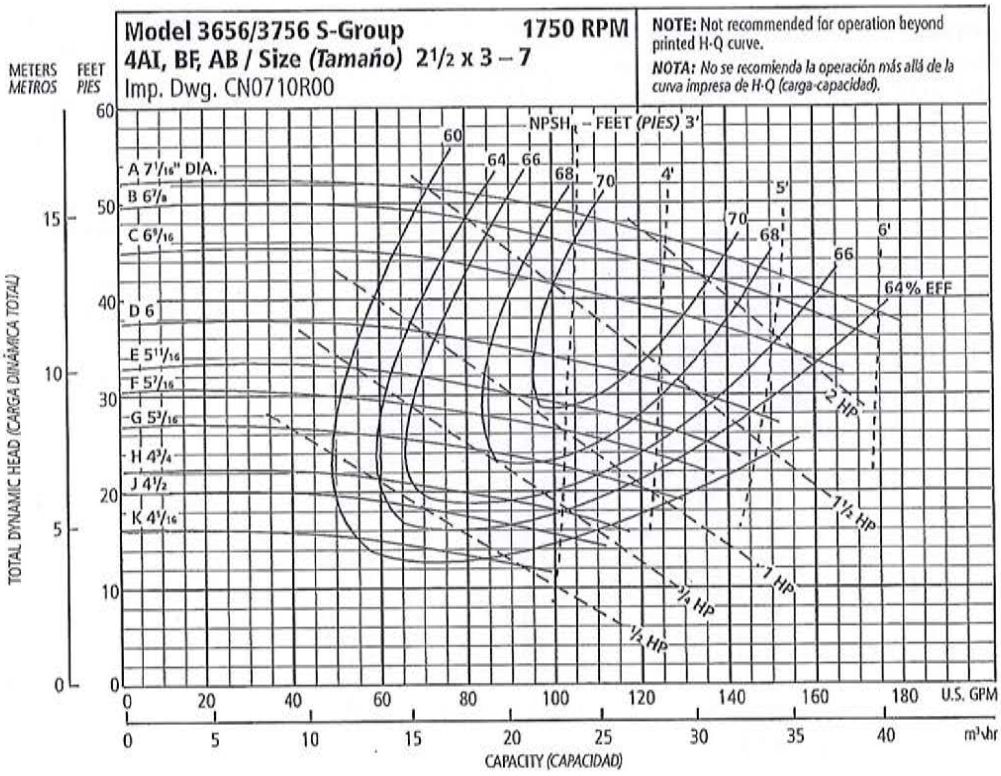


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	8 1/16"
B	7 5/8
C	6 3/4
D	5 3/4

NOTE: Pump will pass a sphere to 5/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 5/16 de pulgada de diámetro.

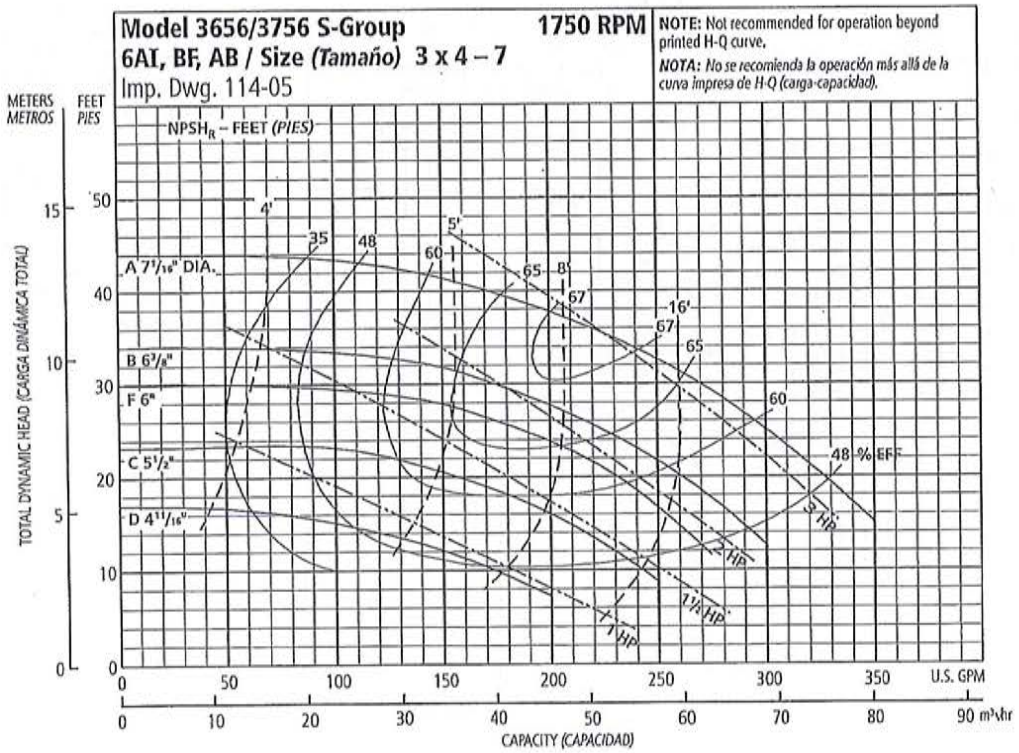
PERFORMANCE CURVES – 60 HZ, 1750 RPM
CURVAS DE DESEMPEÑO – 60 HZ, 1750 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	7 1/16"
B	6 7/8
C	6 9/16
D	6
E	5 11/16
F	5 7/16
G	5 3/16
H	4 3/4
J	4 1/2
K	4 1/16

NOTE: Pump will pass a sphere to 7/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 7/16 de pulgada de diámetro.

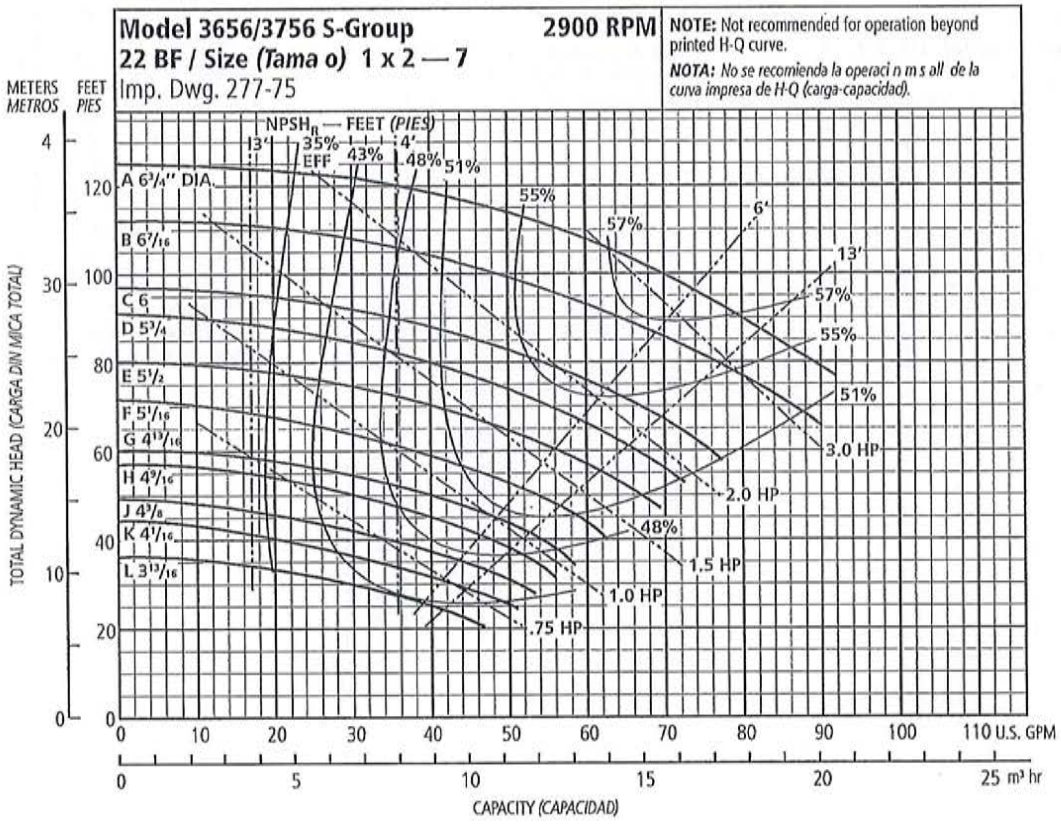


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	7 1/16"
B	6 3/8
C	5 1/2
D	4 11/16
F	6

NOTE: Pump will pass a sphere to ½" diameter.

NOTA: La bomba dejará pasar una esfera de hasta ½ de pulgada de diámetro.

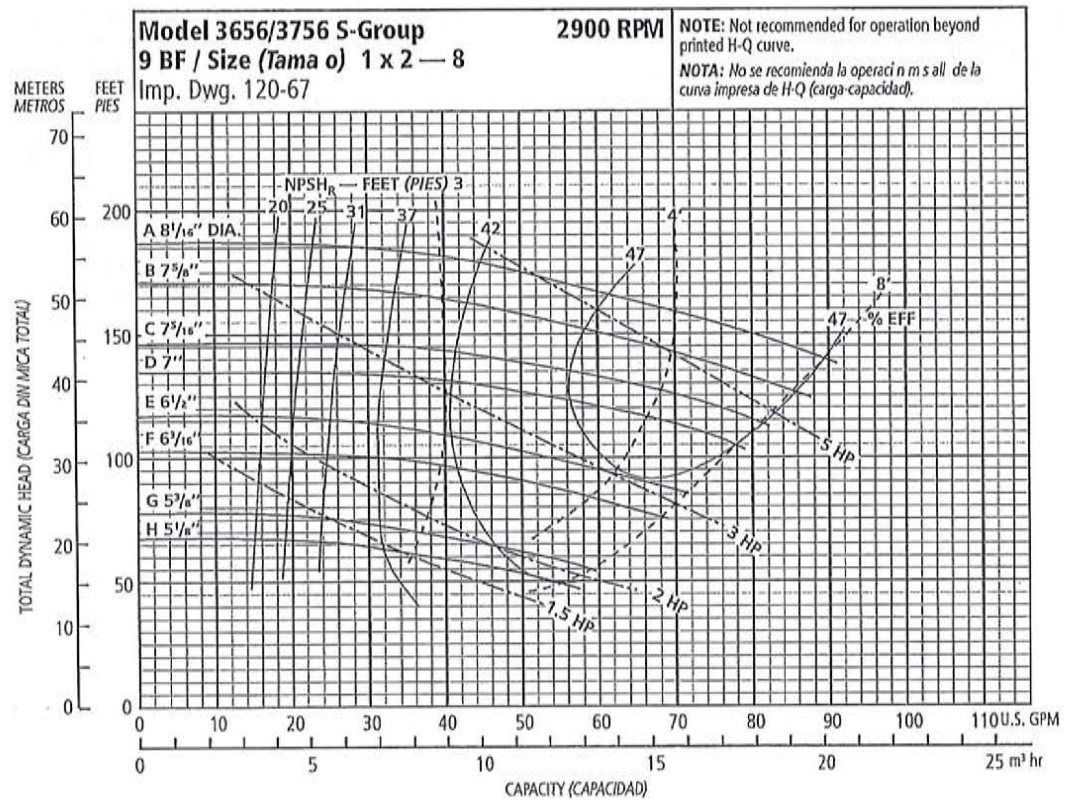
PERFORMANCE CURVES – 50 HZ, 2900 RPM
CURVAS DE DESEMPEÑO – 50 HZ, 2900 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	6¾"
B	6⁷/16
C	6
D	5¾
E	5½
F	5⁵/16
G	4¹³/16
H	4⁹/16
J	4⅜
K	4¹/16
L	3¹³/16

NOTE: Pump will pass a sphere to 3/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 3/16 de pulgada de diámetro.

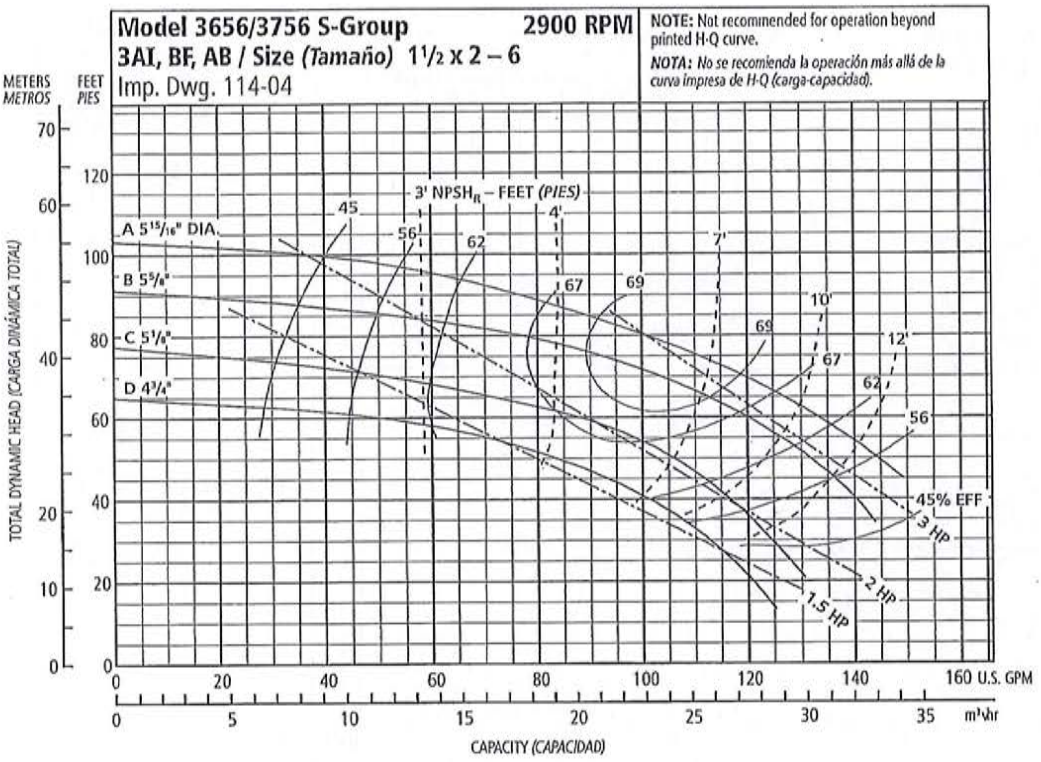


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	8¹/16"
B	7⅝
C	7⁵/16
D	7
E	6½
F	6³/16
G	5⅜
H	5⅛

NOTE: Pump will pass a sphere to 5/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 5/16 de pulgada de diámetro.

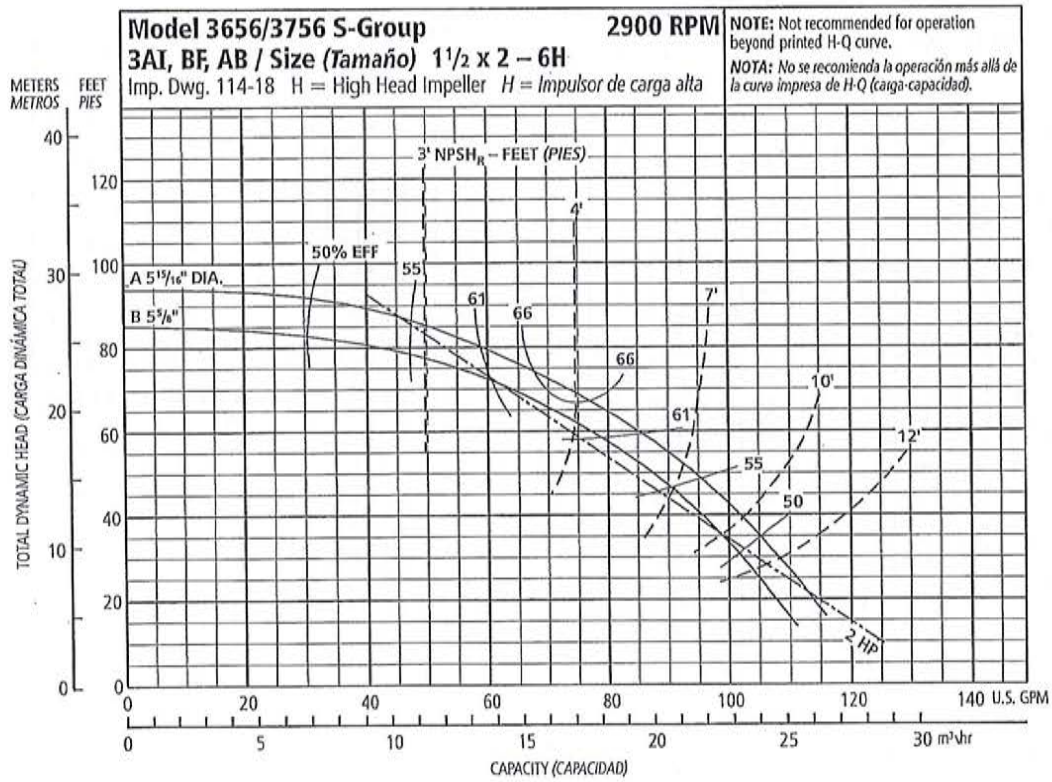
PERFORMANCE CURVES – 50 HZ, 2900 RPM
CURVAS DE DESEMPEÑO – 50 HZ, 2900 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	5¹⁵/₁₆"
B	5⅝"
C	5⅛
D	4¾

NOTE: Pump will pass a sphere to 7/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 7/16 de pulgada de diámetro.

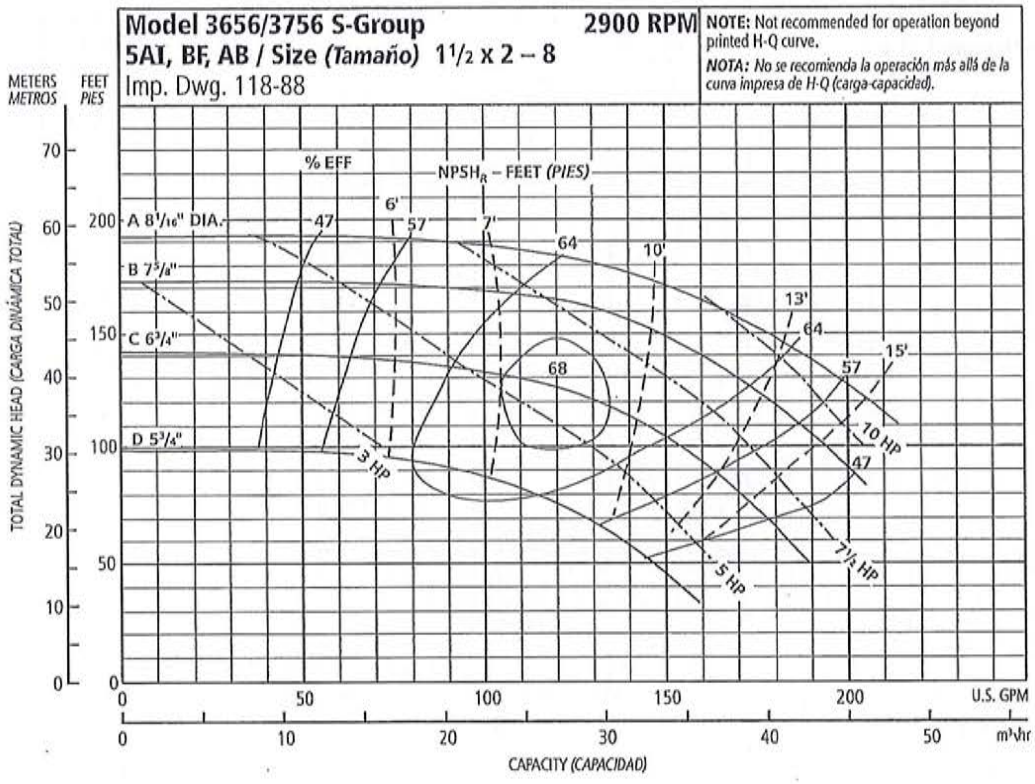


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	5¹⁵/₁₆"
B	5⅝"

NOTE: Pump will pass a sphere to ½" diameter.

NOTA: La bomba dejará pasar una esfera de hasta ½ de pulgada de diámetro.

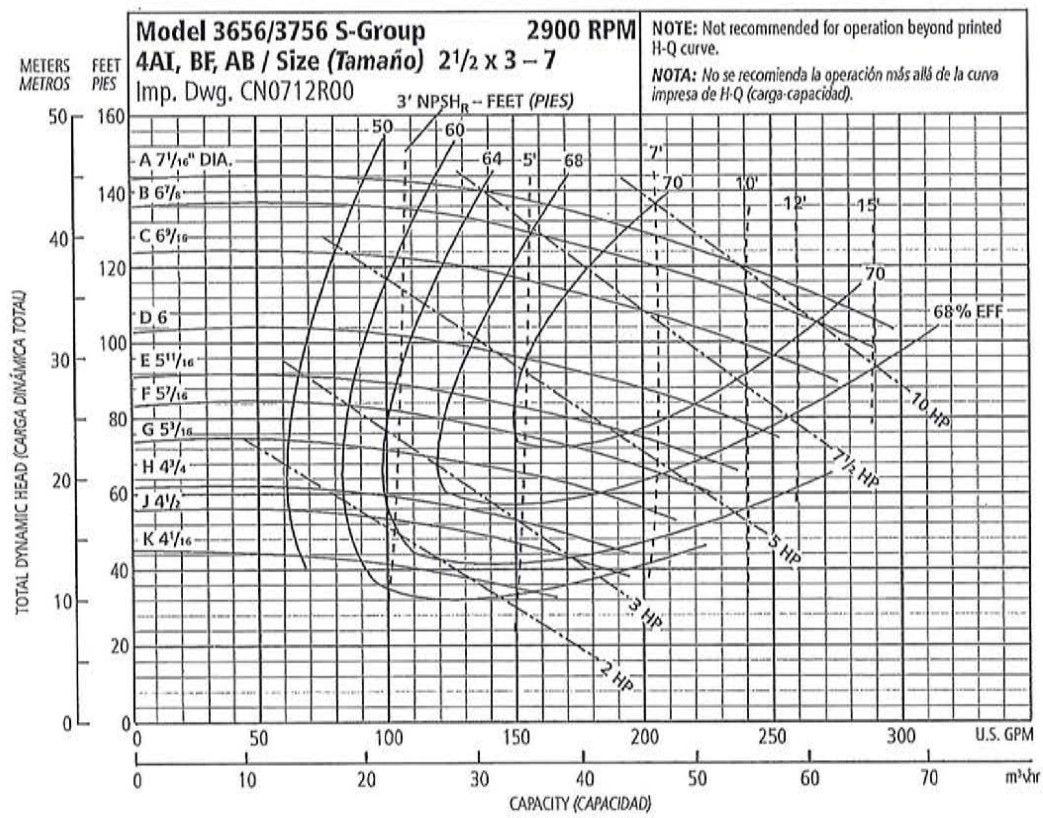
PERFORMANCE CURVES – 50 HZ, 2900 RPM
CURVAS DE DESEMPEÑO – 50 HZ, 2900 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	8 1/16"
B	7 5/8
C	6 3/4
D	5 3/4

NOTE: Pump will pass a sphere to 3/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 3/16 de pulgada de diámetro.

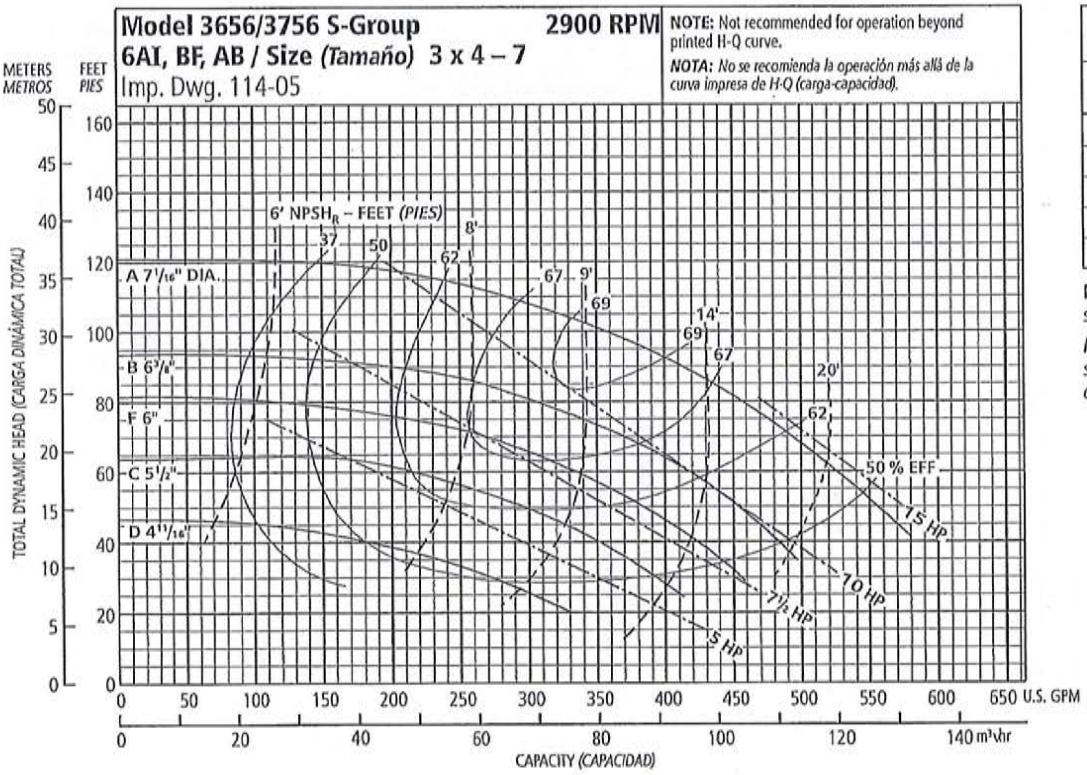


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	7 1/16"
B	6 7/8
C	6 9/16
D	6
E	5 11/16
F	5 7/16
G	5 3/16
H	4 3/4
J	4 1/2
K	4 1/16

NOTE: Pump will pass a sphere to 5/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 5/16 de pulgada de diámetro.

PERFORMANCE CURVES – 50 HZ, 2900 RPM
CURVAS DE DESEMPEÑO – 50 HZ, 2900 RPM

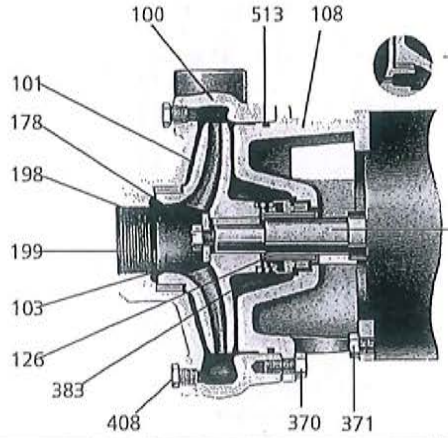


Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	7 1/16"
B	6 3/8
C	5 1/2
D	4 11/16
F	6

NOTE: Pump will pass a sphere to 7/16" diameter.

NOTA: La bomba dejará pasar una esfera de hasta 7/16 de pulgada de diámetro.

3656 S-GROUP MATERIALS OF CONSTRUCTION
MATERIALES DE CONSTRUCCIÓN - GRUPO S, MODELO 3756



Back wearing ring on S-Group (2½ x 3 – 7) only
Anillo de desgaste posterior en el Grupo S (2½ x 3 – 7) únicamente.

AISI 1045 steel motor shaft extension (typical)
Extensión del eje del motor de acero AISI 1045 (típico)

Item No. / No. Ítem	Description / Descripción	Materials, Materiales: All Iron / Todo hierro	Bronze Fitted / Accesorios de bronce	All Bronze / Todo bronce
100	Casing, *Carcasa*	1001	1001	1101
101	Impeller, *Impulsor*		1101	
103	Casing wear ring, *Anillo de desgaste de la carcasa*		1618	1618
108	Adapter, *Adaptador*		1001	1001
184	Seal housing, *Cubierta del sello* ①	One piece with adapter, *Una pieza con adaptador*		1101
126	Shaft sleeve, *Camisa del eje*	AISI Type 300 series stainless steel / *Acero inoxidable serie AISI tipo 300*		
198	Impeller bolt, *Perno del impulsor*			
199	Impeller washer, *Arandela del impulsor*			
178	Impeller key, *Chaveta del impulsor*	Carbon Steel, *Acero al carbono*		
370	Hex head cap screw (adapter to case), *Tornillo de cabeza hexagonal (del adaptador a la cubierta)*	Steel SAE 1200 Grade 5 / *Acero SAE 1200 grado 5*		
371	Hex head cap screw (adapter to motor), *Tornillo de cabeza hexagonal (del adaptador al motor)*			
383	Mechanical seal, *Sello mecánico*	See seal chart, *Ver tabla del sello*		
408	Pipe plug ¼" or ⅜", *Tapón de tubos de ¼ de pulgada ó ⅜ de pulgada*	Steel, *Acero*	Bronze, *Bronce*	
513	O-ring, *Anillo en O*	BUNA-N, *BUNA-N*		

Material Code, *Código de material*	Engineering Standard, *Norma de ingeniería*
1101	Cast Iron ASTM A48 CL20, *Hierro fundido ASTM A48 CL20*
1101	Silicon bronze ASTM B584, C87500, *Siliciuro de bronce ASTM B584, C87500*
1618	Bizmuth brass, *Latón al bismuto*

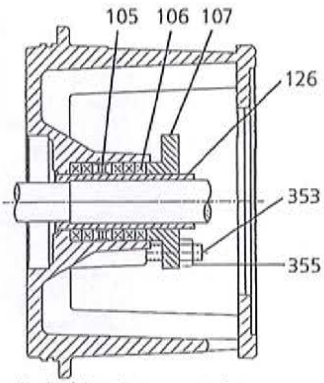
Packed Box Arrangement, *Caja prensaestopas*

Item No., *No. Ítem*	Description, *Descripción*	Materials, *Materiales*
105	Lantern ring, *Aro de linterna*	Teflon™
106	Packing, 5 rings; *Empaquetadura, 5 aros*	Teflon Impregnated, *Impregnado de Teflon*
107	Gland, *Casquillo*	AISI 316SS
126	Shaft sleeve, *Camisa del eje*	AISI Type 300 Series Stainless Steel / *Acero inoxidable serie AISI tipo 300*
353	Gland stud, *Perno del casquillo*	
355	Gland nut, *Tuerca del casquillo*	

Type 21 Mechanical Seal, *Tipo 21 sello mecánico*

Seal Code, *Código del Sello*	Rotary, *Rotativo*	Stationary, *Estacionario*	Elastomers, *Elastómeros*	Metal Parts, *Partes Metálicas*	Part No., *Pieza Número*
0	Carbon, *Carbón*	Ceramic, *Cerámica*	BUNA-N	316 SS, *316 Acero inoxidable*	10K13
1		Sil-Carbide, *Carburo de silicona*	EPR		10K19
3			Viton		10K27
5	Sil-Carbide				10K64
9	Packed Box Design with BUNA O-Ring, *Diseño de prensaestopas empacado con anillo en O de BUNA*				15K16

Note: 10K27 replaces obsolete 10K25, ***Nota:*** *La 10K27 reemplace la obsoleta 10K25.*



Packed Box Arrangement
Caja prensaestopas

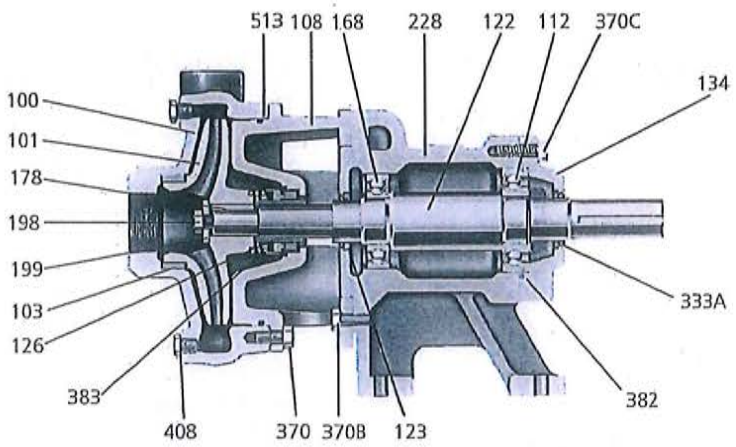
① For separate seal housing and adapter construction, all bronze material only, see repair parts page.

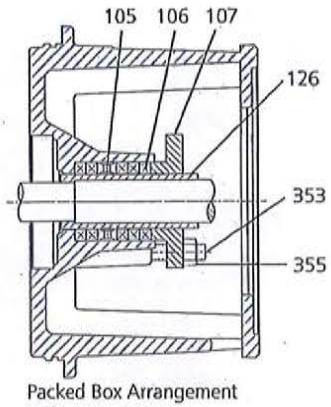
Para la construcción separada del compartimiento del sello y el adaptador, materiales de bronce únicamente, consulte la página de piezas de repuesto.

NOTE:
Pumps will be shipped with top-vertical discharge position as standard. For other orientations, remove casing bolts – rotate discharge to desired position – replace and tighten bolts to 25 ft./lbs. Note that discharge may extend below motor mounting surface in bottom-horizontal position; adequate clearance must be provided.

NOTA:
Las bombas salen de la fábrica con la descarga orientada en posición vertical superior de manera estándar. Para modificar la orientación, retirar los pernos de la carcasa, hacer girar la descarga hasta la posición deseada y volver a colocar los pernos, ajustándolos a una torsión de 25 pies/libras. Se ha de notar que la descarga se puede extender por debajo de la superficie de montaje del motor en la posición horizontal inferior; por lo tanto, debe proveerse suficiente espacio.

3756 S-GROUP MATERIALS OF CONSTRUCTION
MATERIALES DE CONSTRUCCIÓN - GRUPO S, MODELO 3756





Packed Box Arrangement
Caja prensaestopas

Item No. / *No. Ítem*	Description / *Descripción*	Materials, Materiales: All Iron / *Todo hierro*	Bronze Fitted / *Accesorios de bronce*	All Bronze / *Todo bronce*
100	Casing, *Carcasa*	1001	1001	1101
101	Impeller, *Impulsor*		1101	
103	Casing wear ring, *Anillo de desgaste de la carcasa*		1618	1618
108	Adapter, *Adaptador*		1001	1001
184	Seal housing, *Cubierta del sello*	One piece with adapter, *Una pieza con adaptador*		1101
112	Ball bearing (outboard), *Cojinete de bolas (exterior)*	Steel, *Acero*		
122	Shaft, *Eje*	Carbon steel, *Acero al carbono*		
123	V-ring (Deflector), *Anillo en V (Deflector)*	BUNA-N		
126	Shaft sleeve, *Camisa del eje*	AISI Type 303 SS, *Acero inoxidable AISI tipo 303*		
134	Bearing cover, *Cubierta del cojinete*	1001		
168	Ball bearing (inboard), *Cojinete de bolas (interior)*	Steel, *Acero*		
178	Impeller key, *Chaveta del impulsor*	Carbon steel, *Acero al carbono*		
198	Impeller screw, *Tornillo del impulsor*	AISI Type 303 Series SS *Acero inoxidable serie AISI tipo 300*		
199	Impeller washer, *Arandela del impulsor*			
228	Bearing frame, *Marco de cojinete*	1001		
333A	Lip seal, *Sello con reborde*			
370	Hex head cap screw (adapter to case), *Tornillo de cabeza hexagonal (del adaptador a la cubierta)*	Steel SAE 1200 Grade 5 *Acero SAE 1200 grado 5*		
370B	Hex head cap screw (adapter to bearing frame), *Tornillo de cabeza hexagonal (del adaptador al marco de cojinetes)*			
370C	Hex head cap screw (bearing cover to frame), *Tornillo de cabeza hexagonal (de la cubierta de cojinetes al marco)*			
382	Retaining ring, *Anillo de retención*			
383	Mechanical seal, *Sello mecánico*	See seal chart, *Ver tabla del sello*		
408	Pipe plug ¼" or ⅜", *Tapón de tubos de ¼ de pulgada ó ⅜ de pulgada*	Steel, *Acero*		Bronze, *Bronce*
513	O-ring, *Anillo en O*	BUNA-N, *BUNA-N*		

Material Code, *Código de material*	Engineering Standard, *Norma de ingeniería*
1101	Cast iron ASTM A48 CL20, *Hierro fundido ASTM A48 CL20*
1101	Silicon bronze ASTM B584, C87500, *Siliciuro de bronce ASTM B584, C87500*
1618	Bizmuth brass, *Latón al bismuto*

Packed Box Arrangement, *Caja prensaestopas*

Item No., *No. Ítem*	Description, *Descripción*	Materials, *Materiales*
105	Lantern ring, *Aro de linterna*	Teflon™
106	Packing, 5 rings; *Empaquetadura, 5 aros*	Teflon Impregnated, *Impregnado de Teflon*
107	Gland, *Casquillo*	AISI 316SS
126	Shaft sleeve, *Camisa del eje*	AISI Type 300 Series Stainless Steel, *Acero inoxidable serie AISI tipo 300*
353	Gland stud, *Perno del casquillo*	
355	Gland nut, *Tuerca del casquillo*	

NOTE:
Above shows typical AI or BF construction. For separate seal housing adapter, all bronze construction, see repair parts.

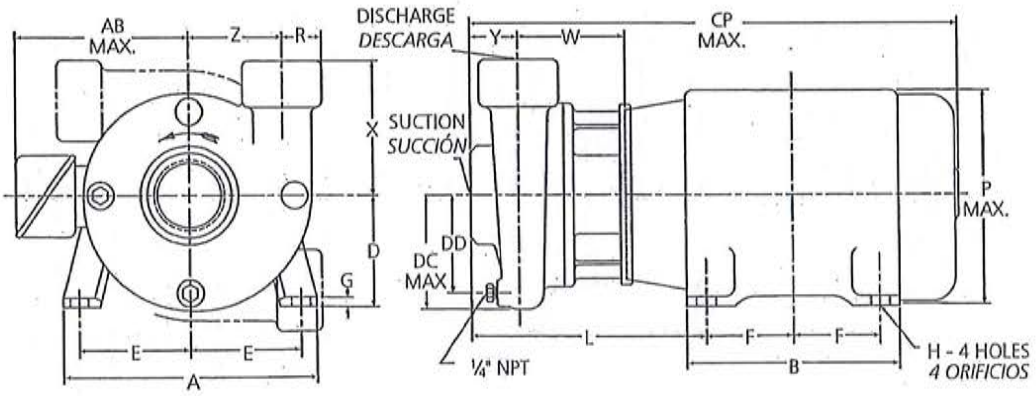
Pumps will be shipped with top-vertical discharge position as standard. For other orientations, remove casing bolts – rotate discharge to desired position – replace and tighten bolts to 25 ft./lbs. Note that discharge may extend below motor mounting surface in bottom-horizontal position; adequate clearance must be provided.

NOTA:
Esta información corresponde a las construcciones típicas AI y BF. Para el adaptador separado del compartimiento de sellos y construcción en todo bronce, consulte las partes de repuesto.

Las bombas salen de la fábrica con la descarga orientada en posición vertical superior de manera estándar. Para modificar la orientación, retirar los pernos de la carcasa, hacer girar la descarga hasta la posición deseada y volver a colocar los pernos, ajustándolos a una torsión de 25 pies/libras. Se ha de notar que la descarga se puede extender por debajo de la superficie de montaje del motor en la posición horizontal inferior; por lo tanto, debe proveerse suficiente espacio.

3656 S-GROUP DIMENSIONS AND WEIGHTS
GRUPO S, MODELO 3656 - PESO Y DIMENSIONES

MECHANICAL SEAL
SELLO MECÁNICO



Pump Dimensions and Weights (Dimension "L" determined by Pump and Motor)
Peso y dimensiones de la bomba *(la dimensión "L" está determinada por la bomba y el motor)*

Pump *Bomba*	Suction *Succión*	Discharge *Descarga*	CP Max.	DC Max.	DD	R	W	X	Y	Z	Wt. (lbs.) *Pesos (libras)*	Motor Frame Size, *Bastidor*			
												140	180	210	250
												L			
1 x 2 – 7	2	1	27	4¼	3½	1 1/16	4⅛	5½	3	4	52	10	10¾	—	—
★ 1 x 2 – 8					4		3 15/16	5¾	3 3/16	4¼	52			—	—
1½ x 2 – 6		1½	23¾		3½	1¼	4¼	4½	2⅝	3½	34	9¾	10½	—	—
1½ x 2 – 8			27⅛	5⅜	4⅝			5		4¼	54			11⅛	11⅝
2½ x 3 – 7	3	2½	25⅝	5⅛	4½	1 13/16		6	3	4	49	10⅛	10¾	11¾	—
3 x 4 – 7	4*	3*	25¼	5¾	5⅛	3¾	4⅜		2½	4½	82	9¾	10⅜	11⅜	—

*For use with ANSI class 150 mating flange. All others are NPT connections.
* *Para uso con brida de contacto ANSI clase 150. Todas las demás son conexiones NTP.*

Motor Dimensions and Weights (may vary with manufacturer)*
Peso y dimensiones del motor *(pueden variar de acuerdo al fabricante) **

Frame Size JM *Tamaño del bastidor JM*	A	AB (Max.)	B	D	E	F	G	H	P (Max.)	Weight (lbs.) *Pesos (libras)*
143	6½	5¼	6	3½	2¾	2	1/8	11/32	6⅝	41
145						2½				57
182	8½	5⅞	6½	4½	3¾	2¼	3/16	13/32	7⅞	77
184						2¾				97
213	9½	7⅞	8	5¼	4¼	2¾	7/32	13/32	9⅝	122
215						3½				155
254 TCZ	11¼	9	9½	6¼	5	4⅛	¼	17/32	11½	265
256 TCZ			11¾			5				320

NOTE:
All pumps shipped in vertical discharge position. May be rotated in 90° increments. Tighten casing bolts to 25 ft./lbs. torque.

NOTA:
Todas las bombas se embarcan con la descarga en posición vertical. Esta posición puede rotarse en incrementos de 90°. Ajustar los pernos de la carcasa a una torsión de 25 pies/libras.

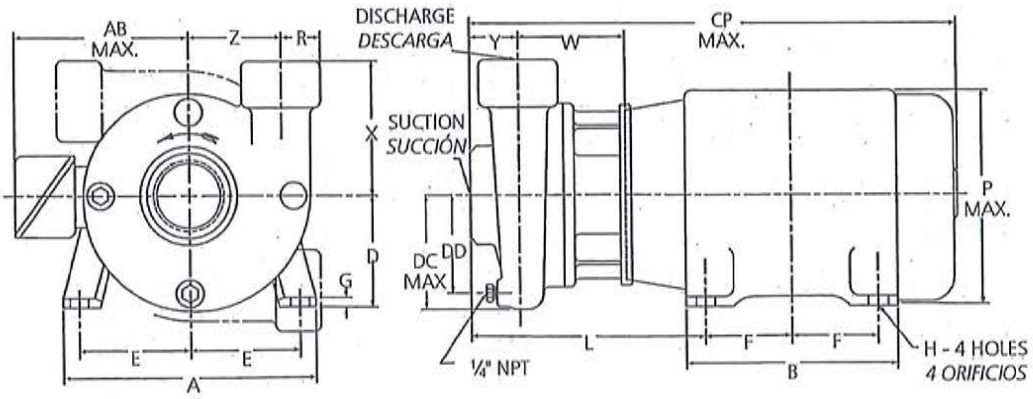
Motor Frames and Horsepower
Bastidores del motor y potencia en HP

Motor Frame *Bastidor del motor*	3500 RPM				1750 RPM			
	1 Phase		3 Phase		1 Phase		3 Phase	
	ODP	TEFC	ODP	TEFC	ODP	TEFC	ODP	TEFC
143	—	¾, 1, 1½	¾, 1, 1½	¾, 1, 1½	—	½, ¾	½, ¾, 1	½, ¾, 1
145	—	2	2, 3	2, 3	—	1, 1½	1½, 2	1½, 2
182	3	3	5	3	3	2, 3	3	3
184	5	3, 5	7½	5	—	—	5	5
213	7½	—	10	7½	5	—	7½	7½
215	10	—	15	10, 15	—	—	—	—
254TCZ	—	—	20	—	—	—	—	—
256TCZ	—	—	25	20, 25	—	—	—	—

All dimensions in inches and weights in lbs. Do not use for construction purposes.
Todas las dimensiones están en pulgadas, el peso en libras. No utilizar para fines de construcción.

3656 S-GROUP DIMENSIONS AND WEIGHTS
GRUPO S, MODELO 3656 - PESO Y DIMENSIONES

PACKED BOX
CAJA PRENSAETOPAS



Pump Dimensions and Weights (Dimension "L" determined by Pump and Motor)
Peso y dimensiones de la bomba *(la dimensión "L" está determinada por la bomba y el motor)*

Pump *Bomba*	Suction *Succión*	Discharge *Descarga*	CP Max.	DC Max.	DD	R	W	X	Y	Z	Wt. (lbs.) *Pesos (libras)*	Motor Frame Size, *Bastidor* L			
												140	180	210	250
1 x 2 – 7	2	1	30	4¼	3½	1 1/16	7 3/16	5½	3	4	52	13 1/16	13 13/16	—	—
1 x 2 – 8					4		7	5¾	3 3/16	4¼	52			—	—
1½ x 2 – 6		1½	26¼		3½	1¼	7 5/16	4½	2⅝	3½	34	12 13/16	13⅜	—	—
1½ x 2 – 8			30⅛	5⅜	4⅝			5		4¼	54			14 7/16	11⅝
2½ x 3 – 7	3	2½	28⅝	5⅛	4½	1 13/16		6	3	4	49	13 3/16	13 13/16	14 13/16	—
3 x 4 – 7	4*	3*	28¼	5¾	5⅛	3¾	7 1/16		2½	4½	82	12 13/16	13⅞	14 7/16	—

*For use with ANSI class 150 mating flange. All others are NPT connections.
* *Para uso con brida de contacto ANSI clase 150. Todas las demás son conexiones NTP.*

Motor Dimensions and Weights (may vary with manufacturer)*
Peso y dimensiones del motor *(pueden variar de acuerdo al fabricante) **

Frame Size JP *Tamaño del bastidor JP*	A	AB (Max.)	B	D	E	F	G	H	P (Max.)	Weight (lbs.) *Pesos (libras)*
143	6½	5¼	6	3½	2¾	2	1/8	11/32	6⅝	41
145						2½				57
182	8½	5⅞	6½	4½	3¾	2¼	3/16	13/32	7⅞	77
184						2¾				88
213 TCZ	9½	7⅜	8	5¼	4¼	2¾	7/32	13/32	9⅝	122
215 TCZ						3½				155
254 TCZ	11¼	9	9½	6¼	5	2¾	¼	17/32	11½	265
256 TCZ			11¾			3½				320

TCZ indicates west coast fit.

NOTE:
All pumps shipped in vertical discharge position. May be rotated in 90° increments. Tighten casing bolts to 25 ft./lbs. torque.

NOTA:
Todas las bombas se embarcan con la descarga en posición vertical. Esta posición puede rotarse en incrementos de 90°. Ajustar los pernos de la carcasa a una torsión de 25 pies/libras.

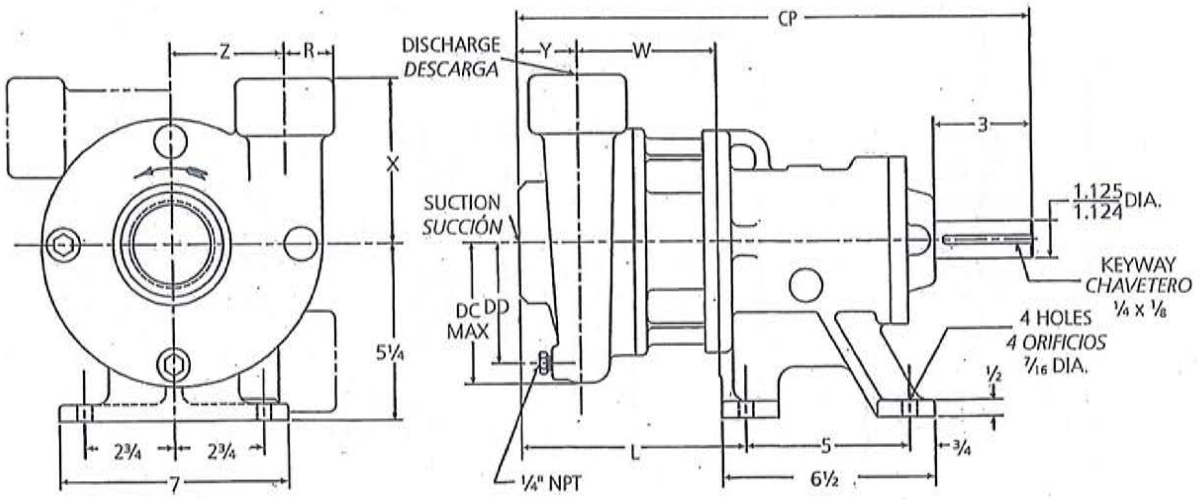
Motor Frames and Horsepower
Bastidores del motor y potencia en HP

Motor Frame *Bastidor del motor*	3500 RPM				1750 RPM			
	1 Phase		3 Phase		1 Phase		3 Phase	
	ODP	TEFC	ODP	TEFC	ODP	TEFC	ODP	TEFC
143 JP	—	—	—	—	—	—	1	—
145 JP	—	—	3	2, 3	—	—	1½, 2	1½, 2
182 JP	3	—	5	—	3	—	3	3
184 JP	5	—	7½	5	—	—	5	5
213 TCZ	7½	—	10	7½	5	—	—	—
215 TCZ	10	—	15	10, 15	—	—	—	—
254 TCZ	—	—	20	—	—	—	—	—
256 TCZ	—	—	25	—	—	—	—	—

All dimensions in inches and weights in lbs. Do not use for construction purposes.
Todas las dimensiones están en pulgadas, el peso en libras. No utilizar para fines de construcción.
TCZ indicates west coast fit.

3756 S-GROUP DIMENSIONS AND WEIGHTS
GRUPO S, MODELO 3756 - PESO Y DIMENSIONES

MECHANICAL SEAL
SELLO MECÁNICO



Pump Dimensions and Weights (Dimension "L" determined by Pump and Motor)
Peso y dimensiones de la bomba *(la dimensión "L" está determinada por la bomba y el motor)*

Pump *Bomba*	Suction *Succión*	Discharge *Descarga*	CP	DC Max.	DD	L	R	W	X	Y	Z	Wt.(lbs.) *Pesos (libras)*
1 x 2 – 7	2	1	16¾	4¼	3½	8	1 1/16	4⅛	5½	3	4	84
1 x 2 – 8					4			3 15/16	5¾	3 3/16	4¼	84
1½ x 2 – 6		1½	16½		3½	7¾	1¼	4¼	4½	2⅝	3½	66
1½ x 2 – 8				5⅛	4⅝				5		4¼	86
2½ x 3 – 7	3	2½	16⅞	5⅛	4½	8⅛	1 13/16		6	3	4	81
3 x 4 – 7	4*	3*	16½	5¾	5⅛	7¾	3¾	4⅜		2½	4½	114

*For use with ANSI class 150 mating flange. All others are NPT connections.
* *Para uso con brida de contacto ANSI clase 150. Todas las demás son conexiones NTP.*

NOTE:
All pumps shipped in vertical discharge position. May be rotated in 90° increments. Tighten casing bolts to 25 ft./lbs. torque.

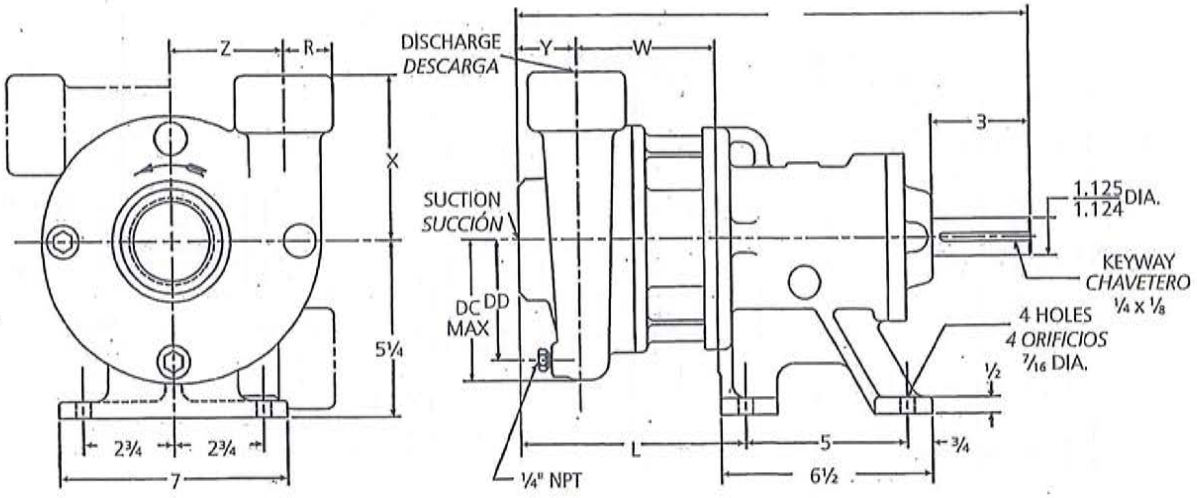
Dimensions in inches, weights in lbs. Do not use for construction purposes.

NOTA:
Todas las bombas se embarcan con la descarga en posición vertical. Esta posición puede rotarse en incrementos de 90°. Ajustar los pernos de la carcasa a una torsión de 25 pies/libras.

Dimensiones en pulgadas, peso en libras. No utilizar para fines de construcción.

3756 S-GROUP DIMENSIONS AND WEIGHTS
GRUPO S, MODELO 3756 - PESO Y DIMENSIONES

PACKED BOX
CAJA PRENSAETOPAS



Pump Dimensions and Weights (Dimension "L" determined by Pump and Motor)
Peso y dimensiones de la bomba *(la dimensión "L" está determinada por la bomba y el motor)*

Pump *Bomba*	Suction *Succión*	Discharge *Descarga*	CP	DC Max.	DD	L	R	W	X	Y	Z	Wt.(lbs.) *Pesos (libras)*
1 x 2 –7	2	1	19 7/16	4¼	3½	11 1/16	1 1/16	7 3/16	5½	3	4	84
★ 1 x 2 – 8					4			7	5¾	3 3/16	4¼	84
1½ x 2 – 6		1½	19 9/16		3½	10 13/16	1¼	7 5/16	4½	2⅝	3½	66
1½ x 2 – 8				5⅜	4⅝				5		4¼	86
2½ x 3 – 7	3	2½	19 15/16	5⅛	4½	11 3/16	11 3/16		6	3	4	81
3 x 4 – 7	4*	3*	19 9/16	5¾	5⅛	10 13/16	3¾	7 7/16		2½	4½	114

*For use with ANSI class 150 mating flange. All others are NPT connections.
* *Para uso con brida de contacto ANSI clase 150. Todas las demás son conexiones NTP.*

NOTE:
All pumps shipped in vertical discharge position. May be rotated in 90° increments. Tighten casing bolts to 25 ft./lbs. torque.

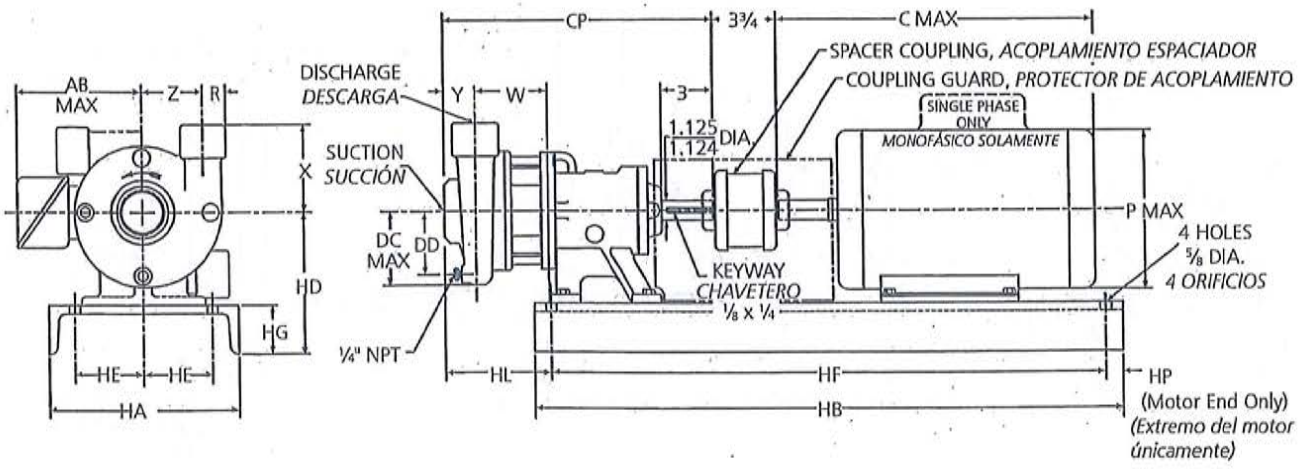
Dimensions in inches, weights in lbs. Do not use for construction purposes.

NOTA:
Todas las bombas se embarcan con la descarga en posición vertical. Esta posición puede rotarse en incrementos de 90°. Ajustar los pernos de la carcasa a una torsión de 25 pies/libras.

Dimensiones en pulgadas, peso en libras. No utilizar para fines de construcción.

3756 S-GROUP DIMENSIONS AND WEIGHTS
GRUPO S, MODELO 3756 - PESO Y DIMENSIONES

MECHANICAL SEAL
SELLO MECÁNICO



Pump Dimensions and Weights (Dimension "HL" determined by Pump and Motor)
Peso y dimensiones de la bomba *(la dimensión "HL" está determinada por la bomba y el motor)*

Pump *Bomba*	Suction *Succión*	Discharge *Descarga*	CP Max.	DC Max.	DD	R	W	X	Y	Z	Wt.(lbs.) *Pesos (libras)*	Motor Frame Size, *Tamaño del bastidor*		
												140 / 180	210	250 / 280
												HL		
1 x 2 – 7	2	1	16⅜	4¼	3½	1 1/16	4⅛	5½	3	4	84	9¼	—	—
1 x 2 – 8					4		3 15/16	5¾	3 3/16	4¼	84		7¾	—
1½ x 2 – 6		1½	16½		3½	1¼	4¼	4½	2⅝	3½	66			—
1½ x 2 – 8					5⅜			5		4¼	86			—
2½ x 3 – 7	3	2½	16⅞	5⅛	4½	1 13/16		6	3	4	81	9⅝	8⅛	4⅜
3 x 4 – 7	4*	3*	16½	5¾	5⅛	3¾	4⅜		2½	4½	114	9¼	7¾	7

*For use with ANSI class 150 mating flange. All others are NPT connections.
* *Para uso con brida de contacto ANSI clase 150. Todas las demás son conexiones NTP.*

Motor Dimensions and Weights, ***Peso y dimensiones del motor***

Motor Frame *Bastidor del motor*	3500 RPM				1750 RPM				AB Max.	C Max.	P Max.	Wt. (lbs.) *Pesos (libras)*
	1 Phase		3 Phase		1 Phase		3 Phase					
	ODP	TEFC	ODP	TEFC	ODP	TEFC	ODP	TEFC				
143 T	½,1,1½	¾,1,1½	¾,1,1½	¾,1,1½	½,¾	½,¾	½,¾,1	½,¾,1	5¼	13⅜	5¼	45
145 T	2	2	2,3	2,3	1,1½	1,1½	1½,2	1½,2		14¼		53
182 T	3	3	5	3	2	2,3	3	3	5⅞	16⅝	5⅞	74
184 T	5	3,5	7½	5	3	—	5	5		18⅛		95
213 T	7½	—	10	7½	5	—	7½	7½	7⅜	18	7⅜	116
215 T	10	—	15	10,15	—	—	—	—		19⅛		136
254 T	—	—	20	—	—	—	—	—	10⅛	21⅝	10⅛	266
256 T	—	—	25	20,25	—	—	—	—		23⅜		264
284 TS/T	—	—	30	25	—	—	—	—	12⅝	24⅞	15	392

Bedplate Dimensions and Weights, ***Pesos y dimensiones de la place de asiento***

Motor Frame *Bastidor del motor*	HA	HB	HD	HE	HF	HG	HP*	Motor *Shim Cuña*	Bearing Frame *Shim Cuña del marco de cojinetes*	Weight (lbs.) *Pesos (libras)*
143 T	10	28	8	3¼	24	2¾	¾	1¾	—	48
145 T										
182 T								¾	—	
184 T										
213 T	12	31	8¼	4¼	29	3	1	—	—	65
215 T										
254 T	13	42	9¼	5¼	38½	4	1¼	—	1	110
256 T										
284 TS/T	15	44	10½	5¼	40½	3½		—	1¾	124

* "HP" Dimension at Motor end only. * *Dimensión "HP" al extremo del motor únicamente.*

NOTE:

1. All pumps shipped in vertical discharge position. May be rotated in 90° increments. Tighten casing bolts to 25 ft./lbs. torque.
2. Dimensions in inches, weights in lbs. Do not use for construction purposes.
3. Motor dimensions and weights very with manufacturer.

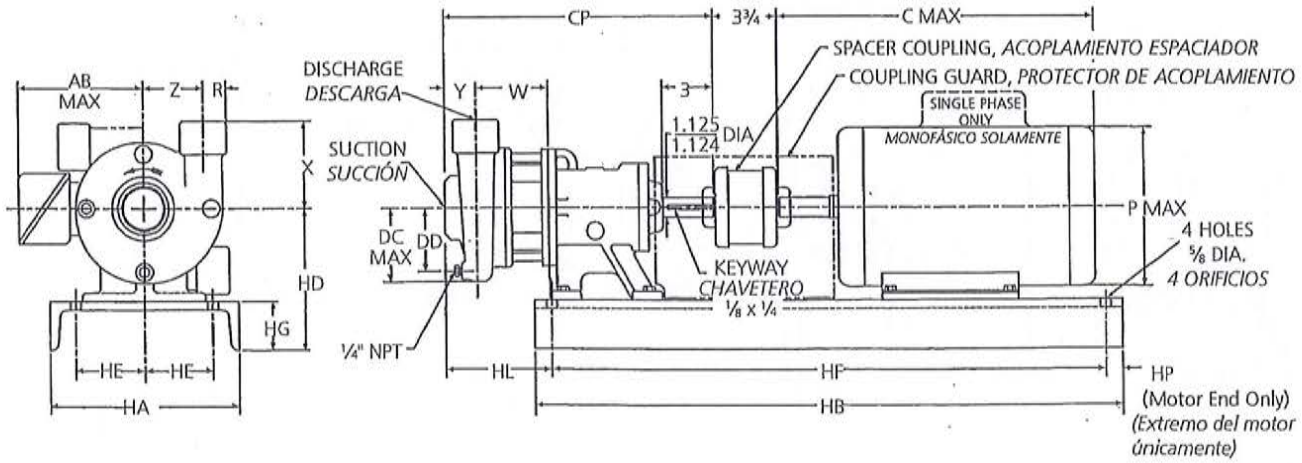
NOTA:

1. Todas las bombas se embarcan con la descarga en posición vertical. Esta posición puede rotarse en incrementos de 90°. Ajustar los pernos de la carcasa a una torsión de 25 pies/libras.

2. Dimensiones en pulgadas, peso en libras. No utilizar para fines de construcción.

3. Las dimensiones y el peso de los motores varían de acuerdo al fabricante.

3756 S-GROUP DIMENSIONS AND WEIGHTS — PACKED BOX
GRUPO S, MODELO 3756 - PESO Y DIMENSIONES — *CAJA PRENSAETOPAS*



Pump Dimensions and Weights (Dimension "HL" determined by Pump and Motor)
Peso y dimensiones de la bomba *(la dimensión "HL" está determinada por la bomba y el motor)*

Pump *Bomba*	Suction *Succión*	Discharge *Descarga*	CP Max.	DC Max.	DD	R	W	X	Y	Z	Wt.(lbs.) *Pesos (libras)*	Motor Frame Size, *Tamaño del bastidor*		
												140 / 180	210	250 / 280
												HL		
1 x 2 – 7	2	1	19 7/16	4¼	3½	1 1/16	7 3/16	5½	3	4	84	12 5/16	—	—
1 x 2 – 8					4		7	5¾	3 3/16	4¼	84		10 13/16	—
1½ x 2 – 6		1½	19 9/16		3½	1¼	7 5/16	4½	2⅝	3½	66			—
1½ x 2 – 8					5⅜			5		4¼	86			—
2½ x 3 – 7	3	2½	19 15/16	5⅛	4½	1 13/16		6	3	4	81	12 11/16	11 3/16	7 7/16
3 x 4 – 7	4*	3*	19 9/16	5¾	5⅛	3¾	7 7/16		2½	4½	114	12 5/16	10 13/16	10 1/16

*For use with ANSI class 150 mating flange. All others are NPT connections.
* *Para uso con brida de contacto ANSI clase 150. Todas las demás son conexiones NTP.*

Motor Dimensions and Weights, ***Peso y dimensiones del motor***

Motor Frame *Bastidor del motor*	3500 RPM				1750 RPM				AB Max.	C Max.	P Max.	Wt. (lbs.) *Pesos (libras)*
	1 Phase		3 Phase		1 Phase		3 Phase					
	ODP	TEFC	ODP	TEFC	ODP	TEFC	ODP	TEFC				
143 T	½,1,1½	¾,1,1½	¾,1,1½	¾,1,1½	½,¾	½,¾	½,¾,1	½,¾,1	5¼	13⅜	5¼	45
145 T	2	2	2,3	2,3	1,1½	1,1½	1½,2	1½,2		14¼		53
182 T	3	3	5	3	2	2,3	3	3	5⅞	16⅝	5⅞	74
184 T	5	3,5	7½	5	3	—	5	5		18⅛		95
213 T	7½	—	10	7½	5	—	7½	7½	7⅞	18	7⅞	116
215 T	10	—	15	10,15	—	—	—	—		19⅛		136
254 T	—	—	20	—	—	—	—	—	10⅛	21⅝	10⅛	266
256 T	—	—	25	20,25	—	—	—	—		23⅜		264
284 TS/T	—	—	30	25	—	—	—	—	12⅝	24⅞	15	392

Bedplate Dimensions and Weights, ***Pesos y dimensiones de la place de asiento***

Motor Frame *Bastidor del motor*	HA	HB	HD	HE	HF	HG	HP*	Motor *Shim Cuña*	Bearing Frame *Shim Cuña del marco de cojinetes*	Weight (lbs.) *Pesos (libras)*
143 T	10	28	8	3¾	24	2¾	¾	1¾	—	48
145 T										
182 T								¾	—	
184 T										
213 T	12	31	8¼	4¼	29	3	1	—	—	65
215 T										
254 T	13	42	9¼	5¼	38½	4	1¾	—	1	110
256 T										
284 TS/T	15	44	10½	5¾	40½	3½		—	1¾	124

* "HP" Dimension at Motor end only. * *Dimensión "HP" al extremo del motor únicamente.*

NOTE:

1. All pumps shipped in vertical discharge position. May be rotated in 90° increments. Tighten casing bolts to 25 ft./lbs. torque.
2. Dimensions in inches, weights in lbs. Do not use for construction purposes.
3. Motor dimensions and weights very with manufacturer.

NOTA:

1. Todas las bombas se embarcan con la descarga en posición vertical. Esta posición puede rotarse en incrementos de 90°. Ajustar los pernos de la carcasa a una torsión de 25 pies/libras.

2. Dimensiones en pulgadas, peso en libras. No utilizar para fines de construcción.

3. Las dimensiones y el peso de los motores varían de acuerdo al fabricante.

SPECIFICATIONS

Capacities to:
550 GPM (125 m³/hr) at 3500 RPM
350 GPM (79 m³/hr) at 1750 RPM

Heads to:
280 feet TDH (85 m) at 3500 RPM
67 feet TDH (20 m) at 1750 RPM

Working pressure to:
175 PSIG (12 bars)

Suction pressure to:
100 PSIG (7 bars)

Maximum temperature to:
212°F (100°C) with standard seal or 250°F (121°C) with optional seal.

Motor:
NEMA standard JM frame or JP frame for 3656 or T-frame for 3756. Open drip-proof, totally enclosed fan cooled and explosion proof enclosures available. Single phase (115/208 – 230 V), ½ to 3 HP (208 – 230 V) 5 HP and (230V only) on 7½, 10 HP. Three phase (208 – 230/460 V) standard note that 20 and 25 HP are (230/460 V).

Direction of Rotation:
Clockwise viewed from motor end.

ESPECIFICACIONES

Capacidad hasta:
550 GPM (125 m³/hr) a 3500 RPM
350 GPM (79 m³/hr) a 1750 RPM

Cargas hasta:
280 pies (85 m) carga dinámica total a 3500 RPM
67 pies (20 m) carga dinámica total a 1750 RPM

Presión de operación hasta:
175 PSIG (12 bars)

Presión de succión hasta:
100 PSIG (7 bars)

Temperatura máxima:
212 °F (100 °C) con sello estándar o
250 °F (121 °C) con sello optativo.

Motor:
Bastidor NEMA JM estándar en el modelo 3656 y bastidor NEMA T estándar en el modelo 3756. Las cubiertas disponibles son: abierta a prueba de filtración, totalmente encerrada con enfriamiento por ventilador y a prueba de explosiones. Monofásico (115/208 – 230 V), ½ a 3 HP; (208 – 230 V) 5 HP y (230 V solamente) 7½ a 10 HP. Trifásico (208 – 230/460 V) estándar. Los motores de 20 a 25 HP son de 230/460 V.

Dirección de rotación:
Dextrorsa (sentido de las agujas del reloj) cuando se mira desde el extremo del motor.

TYPICAL APPLICATIONS

- Booster service
- Spraying systems
- Irrigation
- Water circulation
- Liquid transfer
- General purpose pumping

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- *Servicio de refuerzo*
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- *Circulación de agua*
- *Transferencia de líquidos*
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FLEX-LITE FL40 COMPOSITE WELL PRESSURE TANK 119 GALLON

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SHIPS VIA FREIGHT · NSF CERTIFIED · BPA FREE · MADE IN USA

Part Number: FL40

Typically ships within 2 business days.

Price: $799.00 Qty: 1

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- WellMate Tank Fittings Package TFP2-1.25-RV - 30/50 psi Pressure Switch, $92.02
- WellMate Tank Fittings Package TFP2-1.25-RV - 40/60 psi Pressure Switch, $92.02

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DETAILS SPECS REVIEWS RELATED

Flex-Lite FL40 Composite Well Pressure Tank Features:

The Flex-Lite FL40 is a corrosion-proof well pressure tank that is made with a composite of continuous strand fiberglass filament that is coated with epoxy. The Flex-Lite FL series features the improved CAD-2 (Controlled Action Diaphragm) design which is stronger and doesn't crease and wear out like older bag designs. The 100% butyl diaphragm is chlorine resistant and combined with the precision molded copolymer polypropylene lower water chamber provides superior air and water separation.

- CAD-2 diaphragm technology allows the water chamber to be sized for optimum drawdown
- Corrosion-proof composite construction
- Won't rust in corrosive environments, particularly important in coastal regions
- Little or no maintenance
- Longer life, greater flexibility
- Light weight
- Drawdown at 30/50 Setting: 40.5 gallons
- 5 year warranty

ACCESSORIES

WellMate Tank Fittings Package TFP2-1.25-RV

TFP2-1.25-RV
$92.02
Qty:

Amtrol 146-832 Guardian CP Constant Pressure Digital Control

- NSF Standard 61 listed
- Made in the USA

Flex-Lite FL40 is compatible with the following tanks:

- WellMate WM35
- Sta-Rite SR119, PSP-FW119-35
- Flex2Pro H2PL120

146-832
$163.00
Qty:

Diversitech HEF-T-PAD Plastic Equipment Pad

$39.93
Qty:

Sani System - 0.25 oz Packet

SANISYSTEM
$2.75
Qty:

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3M Water Purification

FLEX-LITE FL40 COMPOSITE WELL PRESSURE TANK 119 GALLON

Mouse over to view larger image.

SHIPS VIA FREIGHT
NSF CERTIFIED
BPA FREE
MADE IN USA

Part Number: FL40

Typically ships within 2 business days.

Price: $799.00 Qty: 1

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You might like:

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- Well Tank Accessories

You may also need:

- ☐ WellMate Tank Fittings Package TFP2-1.25-RV - 20/40 psi Pressure Switch, $92.02
- ☐ WellMate Tank Fittings Package TFP2-1.25-RV - 30/50 psi Pressure Switch, $92.02
- ☐ WellMate Tank Fittings Package TFP2-1.25-RV - 40/60 psi Pressure Switch, $92.02

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DETAILS SPECS REVIEWS RELATED

Tank Specifications

Application(s)	Pressure Pump Tank
Total Volume	119 Gallons
Tank Pre-charge	38 psi
Inlet/Outlet Size	1-1/4" MNPT PVC
Inlet/Outlet Location	Bottom
Air Valve Stem Location	Top
Drawdown at 20/40 Setting	47.9 Gallons
Drawdown at 30/50 Setting	40.5 Gallons
Drawdown at 40/60 Setting	35 Gallons

Dimensions

Height w/ Stand	72.1 "
Diameter	24.2 "
Weight	99.5 lbs

Operating Conditions

Max Temperature	140 °F

ACCESSORIES

WellMate Tank Fittings Package TFP2-1.25-RV

TFP2-1.25-RV
$92.02
Qty:

Amtrol 146-832 Guardian CP Constant Pressure Digital Control

Max Working Pressure	125 psi
Tank Materials	Polypropylene tank reinforced with fiberglass, sealed with epoxy resin
Diaphragm Materials	Butyl Rubber
Origin	USA

Certifications

Certifications	NSF Certified to Standard 61

Warranty

Warranty	5 years

Mouse over for more information.

146-832
$163.00
Qty:

Diversitech HEF-T-PAD Plastic Equipment Pad

$39.93
Qty:

Sani System - 0.25 oz Packet

SANISYSTEM
$2.75
Qty:

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APPENDIX E

Remedial Investigation Report

NEW YORK STATE OF OPPORTUNITY. Department of Health

KATHY HOCHUL
Governor

MARY T. BASSETT, M.D., M.P.H.
Acting Commissioner

KRISTIN M. PROUD
Acting Executive Deputy Commissioner

January 20, 2022

Salvatore Priore
Division of Environmental Remediation
NYS Department of Environmental Conservation
625 Broadway
Albany, NY 12233

RE: Soil Vapor Intrusion Work Plan
Former Star Anchors and Fasteners Site
#336008
Mountainville, Orange County

Dear Salvatore Priore:

I reviewed the *Soil Vapor Intrusion Work Plan* (Work Plan) dated January 14, 2022 for the above referenced site. I understand that seven sub-slab and seven concurrent indoor air soil vapor samples will be collected along with one outdoor ambient air sample and one duplicate air sample, all in accordance with the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006 and revisions).* I offer the following comments:

1. Clarify whether there is a previously installed (2008) Sub-Slab Depressurization System (SSDS) running in the warehouse.

2. If there is a SSDS running, it must be turned off for at least 4 weeks prior to collecting the soil vapor samples, to determine if there is a rebound effect under the slab. If present, this system must be turned back on after the samples are collected.

If an active SSDS is present, shutdown of the system may proceed while the work plan is revised to address the above comments, in order to be able to conduct the sampling this heating season. If no SSDS is present, I find the work plan acceptable. If you have any questions, please contact me at (518) 402-0443.

Sincerely,

Steven G. Berninger
Bureau of Environmental Exposure Investigation
Center for Environmental Health

ec:

M. Schuck / W. Kuehner / e-File
M. Vaccaro – NYSDOH MARO
S. Gagnon, P.E. / T. Gaeta - OCDOH
J. Brown / K. Carpenter – NYSDEC Central Office
D. Bendell – NYSDEC Region 3

10 Maxwell Dr., Suite 200
Clifton Park, NY 12065

T 518.348.1190
TRCcompanies.com

June 13, 2022

Salvatore Priore, P.E.
Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, New York 12233

Re: Soil Vapor Intrusion Assessment Letter Report – 2021-2022 Heating Season
Areas of Concern No. 7 & 8
Former Star Anchors and Fasteners (NYSDEC Site No. 336008)
20 Industry Drive
Mountainville, Orange County, New York 10953

Dear Mr. Priore:

TRC Engineers, Inc. (TRC), on behalf of Cornwall Properties, LLC (Cornwall), has prepared this letter report to discuss recent soil vapor intrusion (SVI) sampling activities completed in association with the former Star Anchors and Fasteners facility located at 20 Industry Drive, Mountainville, New York (the Site). All activities were completed in accordance with the New York State Department of Environmental Conservation (NYSDEC) approved *January 2022 Revised Soil Vapor Point Intrusion Workplan* (Workplan).

An additional SVI assessment within the former Star Anchors and Fasteners facility was recommended in TRC's 2020 Remedial Investigation Report during the next heating season. For this most recent heating season, TRC completed the SVI assessment activities on February 9 and 10, 2022.

A summary of the completed field activities, air sample analytical results, and recommendations are detailed below. A photographic log of TRC's field activities is provided in **Attachment 1**.

2022 Soil Vapor Intrusion Field Activities

Permanent Sub-Slab Vapor Point Installation

On February 9, 2022, TRC installed eight permanent sub-slab vapor points (SSVP-101 through SSVP-108) at the Site. Seven sub-slab vapor points (SSVP-101 through SSVP-106 and SSVP-108) were installed in the Area of Concern (AOC) No. 7 warehouse building in the vicinity of the March 2017 temporary locations, where it was practical, and one sub-slab vapor point (SSVP-107) was installed in the basement of the AOC No. 8 residential structure. Permanent sub-slab vapor point locations can be found on **Figure 1**.

Each permanent sub-slab vapor point was installed through the respective building's concrete slab via a 5/8-inch hole, drilled utilizing a hammer drill. The slab thickness was measured and a Vapor Pin® device was installed to the concrete slab's lower depth. Volatile organic compound (VOC)-free silicone sleeves, installed on the barbed ends of the Vapor Pin® device, were used to seal each sub-slab point in place. Following installation, each permanent sub-slab point was completed at the surface with a tamper resistant flush mount cover.

Building Inspection and Chemical Inventory

The AOC No. 7 warehouse building is currently utilized by Pyramid Sound, Inc. of Mountainville, New York as a warehouse for distribution of furniture and consumer electronics. Bay doors, located on the northwest and southeast sides of the building, open and close throughout business hours to unload or load transport trucks. The main office and breakroom are located in the central portion of the building. At the time of sampling, chemical storage included cleaning products, such as hand soap and bleach, and were located in the breakroom.

The AOC No. 8 residential structure is located directly east of the warehouse building and consists of a two-story, single-family home. The house remains closed with minimal airflow other than when entering or leaving through the front door. The basement consists of a poured concrete slab floor and contains a water tank, heating oil tank, and a washing and drying machine. At the time of sampling, chemical storage included laundry detergents, cleaning products, paint, petroleum (heating oil).

Prior to SVI sampling and in accordance with NYSDEC/New York State Department of Health (NYSDOH) guidance, all air sampling locations and their adjacent vicinities were inspected/screened for the presence of volatile organic vapor with a photo-ionization detector (PID), capable of reading in the parts per billion (ppb) range. The NYSDEC form entitled *Structure Sampling Questionnaire and Building Inventory* was completed before and during vapor sampling (further discussed below) and is provided in **Attachment 2**.

Soil Vapor Intrusion Sample Collection

On February 9, 2022, all eight sub-slab vapor points were helium leak tested in accordance with NYSDOH methods to ensure that each location was capturing sub-slab vapors, rather than short circuiting ambient indoor air from the surface. On February 10, 2022, eight sub-slab vapor samples (SSVP-101 through SSVP-108), eight co-located indoor air samples (IA-101 through IA-108), and one outdoor ambient air sample (AA-101) was collected for laboratory analysis. For quality control/quality assurance (QA/QC) purposes, a single duplicate sample (IA-DUP) was collected adjacent to IA-102. A map showing the approximate air sampling locations is provided on **Figure 1**. Record of Vapor Sampling forms, detailing the helium leak test results, vapor sample PID readings, and sample times, can be found in **Attachment 3**.

All 18 air samples were collected utilizing batch certified 6-liter Summa® canisters equipped with 8-hour flow controllers, and submitted to Alpha Analytical of Mansfield, Massachusetts (Alpha) for analysis of VOCs by United States Protection Agency (USEPA) Method TO-15. Laboratory deliverables are in accordance with NYSDEC Analytical Services Protocol (ASP) Category B and were subjected to data validation by Alpha Geoscience of Clifton Park, New York.

2022 Soil Vapor Intrusion Results

Building Inspection and Chemical Inventory

During the pre-sampling inspection of the AOC No. 7 warehouse building and AOC No. 8 residential structure, minor to no PID readings were recorded. Within the AOC No. 7 warehouse building, PID readings ranging from 0 ppb to 95 ppb were noted in the indoor air space and were believed to be primarily due to the presence of stored/used cleaning products. Active use of the overhead garage bay doors occurred throughout the time of SVI sampling. Within the AOC No. 8 residential structure, no PID readings were recorded. No interfering conditions were noted within either the AOC No. 7 warehouse building or AOC No. 8 residential structure at the time of SVI sampling.

The integrity of the floor slabs within both the AOC No. 7 warehouse building and AOC No. 8 residential structure were assessed in the vicinity of each SVI sample location. This was completed by inspecting the slabs for cracks, penetrations, and other preferential pathways, by way of building utilities, for potential SVI. No apparent cracks/gaps were observed in the slabs of either building.

Soil Vapor Intrusion Analytical Results

SVI analytical results within the AOC No. 7 warehouse building and AOC No. 8 residential structure indicated the presence of Site contaminants of concern (COCs) tetrachloroethene (PCE), trichloroethene (TCE), and/or cis-1,2-dichloroethene (c12-DCE) in the sub-slab vapor points. The concentration ranges for these chlorinated VOCs (cVOCs) in the sub-slab points were detected at the following ranges:

- PCE – 7.26 micrograms per cubic meter (µg/m^3) (SSVP-103) to 211,000 µg/m^3 (SSVP-106).
- TCE – 6.23 µg/m^3 (SSVP-104) to 16,600 µg/m^3 (SSVP-106). TCE was not detected above the laboratory reporting limit (RL) in the sample collected from SSVP-107.
- c12-DCE – 387 µg/m^3 (SSVP-108). c12-DCE was not detected above the laboratory RL in samples collected from SSVP-101 through SSVP-107.

The concentration ranges for each of the above compounds for the co-located indoor air samples included the following:

- PCE – 0.312 µg/m^3 (IA-102) to 3.30 µg/m^3 (IA-106).
- TCE – 0.322 µg/m^3 (IA-107) to 12.8 µg/m^3 (IA-106).

- c12-DCE – 0.079 µg/m^3 (IA-102) to 0.567 µg/m^3 (IA-106). c12-DCE was not detected above laboratory RLs in samples collected from IA-101 and IA-107.

A comparison of the sub-slab cVOC detections to their respective co-located indoor air sample analytical results and the *October 2006 NYSDOH SVI Guidance* (amended May 2017) indicates the actions below:

- Vinyl Chloride – No further action in all co-located sub-slab and indoor air samples.
- 1,1-Dichloroethene - No further action in all co-located sub-slab and indoor air samples.
- Methylene Chloride - No further action in all co-located sub-slab and indoor air samples.
- c12-DCE - No further action in SSVP/IA-101 through SSVP/IA-107. Mitigation required in SSVP/IA-108.
- 1,1,1-Trichloroethane – No further action in all co-located sub-slab and indoor air samples.
- Carbon Tetrachloride – No further action in all co-located sub-slab and indoor air samples.
- TCE – No further action in SSVP/IA-107. Monitoring required in SSVP/IA-101 and SSVP/IA-102. Mitigation required in SSVP/IA-103 through SSVP/IA-106 and SSVP/IA-108.
- PCE – No further action in SSVP/IA-101 through SSVP/IA-105, SSVP/IA-107, and SSVP/IA-108. Mitigation required in SSVP/IA-106.

A summary of the SVI analytical results can be found in **Table 1**. Analytes that either require monitoring or mitigation per their respective NYSDOH matrix are shown on **Figure 2**. The summary laboratory analytical report and associated data usability summary report (DUSR) can be found in **Attachments 4** and **5**, respectively.

Conclusions and Recommendations

Analytical results from the seven co-located sub-slab and indoor air vapor points within the AOC No. 7 warehouse building show concentrations of PCE, TCE, and c12-DCE warranting either “monitoring” or “mitigation” per the NYSDOH Guidance. When compared to March 2017 sub-slab analytical results, concentrations of Site COCs have generally decreased at all locations. The exception to this is PCE at SSVP-106 only, which increased from a March 2017 concentration of 110,000 µg/m^3 to 211,000 µg/m^3. Analytical results from the sub-slab vapor point within AOC No. 8 residential structure (SSVP/IA-107) indicate “no further action” per the NYSDOH Guidance. This result is consistent with historical sub-slab/indoor air sampling competed on January 11, 2006 and documented in a TRC letter report dated January 31, 2006.

Based on the above SVI analytical results and stated in the *September 2020 Remedial Investigation Report*, TRC recommends that a Focused Feasibility Study (FSS) be completed in order to develop potential remedial action alternatives to address sub-slab soil vapor in the AOC No. 7 warehouse building. Prior to development of the FSS however, TRC requests that the NYSDEC formally approves the *September 2020 Remedial Investigation Report*.

With regard to the AOC No. 8 residential structure, sub-slab/indoor air samples indicate that detected concentrations of Site cVOCs are not impacting this structure to a degree which warrants action. As a result, the February 2022 SVI sampling has confirmed the conclusion of the historical January 2006 results and TRC respectfully requests that no further action be required for AOC No. 8.

If you have any comments, questions, or concerns regarding this letter, please do not hesitate to contact me at (518) 688-3109.

Sincerely,

Justin King
Project Manager

Jeffrey LaRock, P.G. (NY)
Office Practice Leader

CC: Steven Berninger, NYSDOH

Attachments

Table 1 Summary of SVI Analytical Results – February 2022

Figure 1 Site Layout Map
Figure 2 Select Soil Vapor Intrusion Air Sample Results (February 2022)

Attachment 1 Photographic Log
Attachment 2 NYSDEC *Structure Sampling Questionnaire and Building Inventory* Form
Attachment 3 Record of Vapor Sampling Forms
Attachment 4 Summary Laboratory Analytical Report
Attachment 5 DUSR

Remedial Investigation Report

Former Star Anchors and Fasteners (a.k.a., Star Expansion) Site

20 Industry Drive
Mountainville, Orange County, New York 10953
NYSDEC Site No. 336008

September 16, 2020

TRC Project No. 336744.0000.0000

Prepared For:
Cornwall Properties, LLC
1600 63rd Street
Brooklyn, New York 11204

Submitted To:
New York State Department of Environmental Conservation
Division of Environmental Remediation
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Acronyms and Abbreviations

µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
11-DCE	1,1-dichloroethene
Alpha	Alpha Analytical of Westborough, Massachusetts
AMSL	above mean sea level
Anacker	Susan M. Anacker Professional Land Surveyor, PLLC of Deerfield, New York
AOCs	Areas of Concern
APWA	American Public Works Association
ASP	Analytical Services Protocol
Aztech	Aztech Technologies, Inc. of Ballston Spa, New York
BEEI	Bureau of Environmental Exposure Investigation
bgs	below ground surface
c12-DCE	cis-1,2-dichloroethene
CAMP	Community Air Monitoring Plan
Cascade	Cascade Technical Services of Schenectady, New York
CEH	Center for Environmental Health
Class GA Values	Class GA Groundwater Standards and Guidance Values
COCs	contaminants of concern
Consent Order	Order on Consent and Administrative Settlement
Con-Test	Con-Test Laboratories of East Long Meadow, Massachusetts
Cornwall	Cornwall Properties, LLC
CSM	Conceptual Site Model
CUSCOs	Commercial Use Soil Cleanup Objectives
cVOC	chlorinated volatile organic compounds
DER	Division of Environmental Remediation
DER-10	NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation
DO	dissolved oxygen
DPT	direct push technology
DUSRs	Data Usability Summary Reports
ECs	emerging contaminants
EDDs	electronic data deliverables
Eder	Eder Associates
ELAP	Environmental Laboratory Approval Program
FER	Final Engineering Report
GWQS	groundwater quality standards
HASP	Health and Safety Plan
Hopkins	Hopkins Environmental Management, Inc.
HSAs	hollow stem augers
I-87	New York State Thruway
ID	inner diameter

Acronyms and Abbreviations (cont.)

IDW	Investigation derived waste
IHWDS	Inactive Hazardous Waste Disposal Site
IRMs	Interim Remedial Measures
IRT	Innovative Recycling Technologies, Inc.
mg/kg	milligrams per kilogram
MS/MSDs	Matrix spike/matrix spike duplicates
NAPL	Non-aqueous phase liquid
NAVD 88	North American Vertical Datum of 1988
NTUs	nephelometric turbidity units
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ORP	oxidation-reduction potential
PAHs	polycyclic aromatic hydrocarbons
PCE	tetrachloroethene
PDBs	passive diffusion bags
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	Photoionization detector
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RFA-SV	RCRA Facility Assessment Sampling Visit Report
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RI/FS Work Plan	Remedial Investigation/Feasibility Study Work Plan
RQD	rock quality designation
RSCO	recommended soil cleanup objective
SCGs	standards, criteria, and guidance
SI	Site Investigation
SIM	selective ion monitoring
Site	Former Star Anchors and Fasteners (a.k.a., Star Expansion) Site
SIWP	Site Investigation Work Plan
SOPs	Standard operating procedures
SOW	scope of work
SPDES	State Pollutant Discharge Elimination System

Acronyms and Abbreviations (cont.)

SSDS	sub-slab depressurization system
SSEC	Sergio Smiriglio Environmental Consultants, Inc.
SSSCO	site-specific soil cleanup objective
Star	Star Expansion Company
SVI	soil vapor intrusion
SVOCs	semi-volatile organic compounds
SWMUs	Solid Waste Management Units
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TCL	Target Compound List
TOGS	Technical and Operational Guidance Series
TOR	Top of riser
TPH	total petroleum hydrocarbon
TRC	TRC Engineers, Inc.
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UUSCOs	Unrestricted Use Soil Cleanup Objectives
VC	vinyl chloride
VOCs	volatile organic compounds
WWTP	waste water treatment plant

1.0 Introduction

This report presents the results of the Remedial Investigation (RI) for the Former Star Anchors and Fasteners (a.k.a., Star Expansion) Site located at 20 Industry Drive, Mountainville, New York (the Site). The RI was completed in accordance with the Order on Consent and Administrative Settlement (Index No. CO 3-20150226-27; Site No. 336008) [Consent Order] executed between Cornwall Properties, LLC (Cornwall) and the New York State Department of Environmental Conservation (NYSDEC) on October 21, 2015. The RI was completed pursuant to the TRC Engineers, Inc. (TRC) NYSDEC-approved *Remedial Investigation/Feasibility Study Work Plan* (RI/FS Work Plan), dated October 19, 2016 and NYSDEC Division of Environmental Remediation (DER)-10, Technical Guidance for Site Investigation and Remediation.

The Site is a Class 2 Inactive Hazardous Waste Disposal Site (IHWDS) and has been assigned NYSDEC Site No. 336008. The approximately 37-acre Site is a former manufacturing facility for a range of fasteners used by the residential, commercial, and building industries. Since the start of environmental investigation activities in 1994, eight Areas of Concern (AOCs), including three as Solid Waste Management Units (SWMUs), have been identified across the Site in association with their former land use. Each AOC/SWMU is further outlined below in **Section 2.6**.

Initial Site investigations have indicated that volatile organic compounds (VOCs) were the contaminants of concern (COCs), primarily in groundwater. Later investigations determined that metals and semi-volatile organic compounds (SVOCs) were additional COCs in specific AOCs. In November 2016, the NYSDEC approved the *October 2016 RI/FS Work Plan* to further assess sub-slab vapor, soil, and groundwater at Site. The RI field investigation activities were implemented between March 2017 and March 2020.

2.0 Site Description and History

2.1 Site Location and Setting

The Site encompasses approximately 37-acres and is improved with a slab on grade, single-story, approximately 200,000-square foot warehouse building, built in 1974. Additionally, there is a small occupied residential structure, of which the construction date could not be determined with available information. The Site is located in Mountainville, Orange County, New York and is bounded to the west by the New York State Thruway (I-87) followed by undeveloped land, to the east by Woodbury Creek followed by private residences, to the north by Creamery Hill Road followed by private residences and public sporting recreational fields, and to the south by a single-story commercial warehouse followed by undeveloped land. A United States Geological Survey (USGS) 7.5-minute topographic map showing the Site location and surrounding land features is provided on **Figure 1**. A figure showing the Site layout is provided on **Figure 2**.

2.2 Site Geology

The Site is located near the northeastern boundary of the geologic provenance known as Hudson Highlands. The area geology consists of glacial and fluvial deposits overlying Ordovician age dolomite bedrock. Studies prepared by others have shown the unconsolidated glacial-fluvial sediments to be heterogeneous, varying from relatively impermeable lacustrine clays to permeable outwash sands and gravels. The unconsolidated deposits generally thicken to the north, reflecting the bedrock surface that dips in that direction. Prior studies have also shown that the thickest of unconsolidated deposits appears to be confined within a bedrock trough that begins east of the onsite warehouse building and extends northward offsite. The bedrock occurs just beneath ground surface near AOC No. 2: Former Waste Pile Area (SWMU-2)] and outcrops to the east of the Site in Woodbury Creek.

According to geological cross sections prepared by others, the bedrock surface slopes downward to the north.

2.3 Site Hydrogeology

The two principal Site aquifers are an unconsolidated aquifer in glacial overburden deposits, and a bedrock aquifer in the underlying, dolomite bedrock. According to a hydrogeology evaluation prepared by others, there is no extensive confining unit between the overburden deposits and bedrock aquifer. Depth to groundwater in the overburden deposits ranges from 4 to 18 feet below ground surface (bgs) across the Site, and groundwater flow is predominately to the east, toward Woodbury Creek, with a southeast flow component in the southern part of the Site. The reported flow velocity in the overburden aquifer based upon slug tests performed by others is approximately 0.07 feet per day.

2.4 Site Features and Use

The Site is currently utilized to store various dry goods manufactured elsewhere. The following summary of the historic Site use is based on a review of the Eder Associates *January 1995 Comprehensive Resource Conservation and Recovery Act (RCRA) Facility Investigation Work Plan* and available information on the NYSDEC IHWDS database.

2.5 Historic Site Use

The former occupant and owner, the Star Expansion Company (Star), began operations in 1954 and manufactured a broad line of fasteners for residential, commercial and building industries. In 1997, Star filed for bankruptcy and abandoned the Site. Star NewCo purchased the Site out of bankruptcy in 1997 and entered into a Consent Order (D3-0001-96-12) with the NYSDEC to perform specific remedial work. In 1997, Star NewCo also filed for bankruptcy. The Site was then resold in 2004, again out of bankruptcy, to the current owner, Cornwall.

Past manufacturing activities performed at the Site included metal cold forming, die casting, plastic injection molding, heat-treating, zinc plating, assembly, and packaging. Offsite supply wells provided water for drinking and manufacturing. An onsite waste water treatment plant (WWTP) discharged treated industrial waste water directly to the Woodbury Creek pursuant to a NYSDEC State Pollutant Discharge Elimination System (SPDES) permit.

As a result of the previous Site use, numerous environmental studies have been conducted (see **Section 3.0** for discussion of previous studies and remediation efforts). These studies have identified elevated levels of VOCs in Site soil, soil vapor, and groundwater, and the NYSDEC has indicated that VOCs are the primary COCs. Historically, metals have also been detected in soil and groundwater in limited areas.

2.6 Site Areas of Concern

As described in **Section 3.0** below, previous reports describe eight Site AOCs. As described in the *October 2016 RI/FS Work Plan*, the Site AOCs are summarized in the table below and are shown on **Figure 2**.

AOC No.	Nature of Concern	Current Status
AOC No. 1: Former Landfill (SWMU-1)	Elevated metals and VOCs in soil; elevated VOCs in groundwater.	Soil remediation (excavation and offsite disposal) was previously performed by others.
AOC No. 2: Former Waste Pile Area (SWMU-2)	Elevated VOCs in groundwater.	Soil remediation (grading and capping) was previously performed by others in this AOC.

AOC No.	Nature of Concern	Current Status
AOC No. 3: Former Wastewater Treatment Area (SWMU-3)	Elevated VOCs and total petroleum hydrocarbons (TPH) in soil; elevated VOCs in groundwater. Potential VOCs and SVOCs in soil and groundwater.	Soil remediation (tank decommissioning and excavation and offsite disposal) was previously performed by others in this AOC.
AOC No. 4: Former Scrap Metal/Waste Oil Storage Area	Potential elevated VOCs and metals in soil.	Prior to this RI, extent of VOC contamination, if any, was unknown.
AOC No. 5: Former Wastewater Treatment Area – East	Elevated TPH in soil. Potential VOCs and SVOCs in soil and groundwater.	Soil remediation was previously performed by others in this AOC.
AOC No. 6: Former Solvent Recovery Still/Oil Water Separator Area	Elevated VOCs in groundwater.	At the time of this RI, extent of VOC impacted groundwater unknown.
AOC No. 7: Onsite Main Warehouse Building	Elevated VOCs in sub-slab vapor and indoor air.	First phase of SSDS design completed. NYSDEC comments regarding the December 2008 preliminary design have not been received to date.
AOC No. 8: Onsite Residential Structure	VOCs in sub-slab vapor.	Additional sampling of this structure has been requested by the NYSDEC and NYSDOH during this RI.

3.0 Previous Investigations

Presented below are summaries of prior Site investigations and remediation results performed by others, in addition to TRC Site investigation results from 2005 and 2008. With respect to investigations performed by others, information other than what is provided below, is not available and was not subject to verification.

3.1 Summary of Prior Reports

3.1.1 Resource Conservation and Recovery Act Facility Assessment Sampling Visit Report (September 1994)

Eder Associates (Eder) prepared a RCRA Facility Assessment Sampling Visit Report (RFA-SV) concerning AOC No. 4: Former Scrap Metal/Waste Oil Storage Area. Sergio Smiriglio Environmental Consultants, Inc. (SSEC) reportedly performed the sampling in accordance with a NYSDEC-approved work plan (SSEC, January 1994). Soil samples were collected at approximately one-foot bgs for laboratory analysis.

Soil sampling laboratory analytical data showed VOCs were found in soil located immediately beneath a concrete storage pad identified in AOC No. 4: Former Scrap Metal/Waste Oil Storage Area. 1,1,1-Trichloroethane (TCA) was detected in a soil sample collected beneath the concrete storage pad (1.5 parts per million (ppm)) above the NYSDEC recommended soil cleanup objective (RSCO) of 0.7 ppm. There were no VOCs in soil samples collected beneath the asphalt adjacent to the concrete storage pad, indicating that the extent of VOC related impacts to soil were limited in this area. Except for zinc, concentrations of metals detected in the soil samples were below the RSCOs. Zinc was detected at less than 100 ppm, and its presence in soil was attributed to native background concentrations.

3.1.2 Comprehensive Resource Conservation and Recovery Act Facility Investigation Work Plan (January 1995)

Eder prepared a RCRA Facility Investigation (RFI) Work Plan that presented a scope of work to characterize and define the extent of contamination associated with the three SWMUs. The SWMUs targeted in Eder's RFI Work Plan were:

- AOC No. 1: Former Landfill (SWMU-1): This area had reportedly received metal and plastic off-specification products, ash from an onsite incinerator that burned non-hazardous rubbish, and floor sweepings, and encompassed approximately a 10,600 square foot area in the northeast portion of the Site;
- AOC No. 2: Former Waste Pile Area (SWMU-2): This area is near the eastern property boundary and reportedly received non-hazardous hydroxide wastewater sludge, which was excavated and disposed at an offsite facility prior to Eder's RFI; and
- AOC No. 3: Former Wastewater Treatment Area (SWMU-3): This area is in the southeastern portion of the Site where reportedly industrial wastewater from the facility was treated in accordance with a NYSDEC SPDES permit (Permit No. NY0007889).

Significant findings of previous historic investigations, as reported by Eder in the RFI Work Plan, are summarized below.

- AOC No. 1: Former Landfill (SWMU-1): Groundwater sample results revealed elevated VOCs only, with the highest levels of total VOCs found in two downgradient wells. Of the VOCs, trichloroethene (TCE), trans-1,2-dichloroethene (a degradation byproduct of TCE), 1,1-dichloroethane, and chloroethane were detected at the highest concentrations in the collected groundwater samples. Detected concentrations of metals and SVOCs in groundwater were generally below Class GA Groundwater Standards and Guidance Values (Class GA Values);
- AOC No. 2: Former Waste Pile Area (SWMU-2): Groundwater sampling results indicated elevated VOC concentrations only. Of the VOCs, TCA and 1,1-dichloroethane, were detected at the highest concentrations in the collected groundwater samples. The concentrations of metals detected in groundwater were generally below Class GA Values; and
- AOC No. 3: Former Wastewater Treatment Area (SWMU-3): Groundwater sampling results revealed elevated concentrations of VOCs only. Of the VOCs, TCE and trans-1,2-dichloroethene, were detected at the highest concentrations in the collected groundwater samples. Elevated levels of tetrachloroethene (PCE) were also detected. Concentrations of detected metals in groundwater were generally below Class GA Values.

The Eder RFI Work Plan proposed additional soil and/or groundwater sampling at each of these previously described SWMUs. However, there is no known final report by Eder or reference in subsequent reports by others indicating that Eder implemented the RFI Work Plan. Due to the absence of confirmatory sampling results in connection with the above referenced AOCs, additional soil sampling was completed as part of this RI.

3.1.3 Site Investigation and Remedial Action Plan (February 1997)

Innovative Recycling Technologies, Inc. (IRT) presented the results of a site investigation as part of a Remedial Action Plan (RAP) for the Site. The RAP established a site-specific soil cleanup objective (SSSCO) of 200 parts per billion (ppb) for total VOCs. The overall objective of IRT's site investigation was to establish the vertical and horizontal limits of soil contamination in AOC No. 1: Former Landfill (SWMU-1) and AOC No. 3: Former Wastewater Treatment Area (SWMU-3). No soil sampling was performed in AOC No. 2: Former Waste Pile Area (SWMU-2). Significant findings of IRT's site investigation are summarized below.

- AOC No. 1: Former Landfill (SWMU-1): Total concentrations of VOCs in collected soil samples exceeded the SSSCO of 200 ppb in only one soil sample, collected at a depth between 9 to 11 feet bgs. Groundwater sample analytical results from two temporary wells revealed no detectable concentrations of VOCs and TPHs;
- AOC No. 3: Former Wastewater Treatment Area (SWMU-3): Total concentrations of VOCs in soil samples collected from three borings exceeded the SSSCO of 200 ppb. Soil samples collected from other borings exhibited elevated concentrations of TPH; and

- Offsite: No detectable VOC concentrations were found in two offsite groundwater monitoring wells installed by IRT.

The stated goals of IRT's RAP were to remove contaminated soils acting as a source of groundwater contamination, remediate contaminated groundwater with a pump and treat system, and cap AOC No. 2: Former Waste Pile Area (SWMU-2). The scope of remediation proposed by IRT included the following:

- Removal and offsite disposal of underground equalization tanks and filter beds associated with the former wastewater treatment plant;
- Excavation and offsite disposal of the soils comprising the waste lagoons associated with the former wastewater treatment plant;
- Excavation and offsite disposal of soils and debris in the AOC No. 1: Former Landfill (SWMU-1) area until the SSSCO is met;
- Capping the AOC No. 2: Former Waste Pile Area (SWMU-2) area; and
- Installation of new monitoring wells following remediation (one monitoring well southeast of the AOC No. 1: Former Landfill (SWMU-1), six monitoring wells in the AOC No. 3: Former Wastewater Treatment Area (SWMU-3), and three offsite monitoring wells).

3.1.4 Hopkins Environmental Management, Inc./IRT Monthly Progress Reports (February – August 1997)

Hopkins Environmental Management, Inc. (Hopkins) and IRT prepared monthly progress reports documenting the completed remediation activities pursuant to NYSDEC Consent Order D3-0001-96-12. A summary of the remediation activities performed in each AOC, as reported in the monthly progress reports, is presented below.

- AOC No. 1: Former Landfill (SWMU-1): Contaminated soil and waste materials comprising the landfill were excavated and disposed offsite;
- AOC No. 2: Former Waste Pile Area (SWMU-2): The waste pile area was graded and capped with a silty clay loam;
- AOC No. 3: Former Wastewater Treatment Area (SWMU-3): The equalization tanks were emptied, cleaned, removed, and disposed offsite as hazardous waste. The filter beds and surrounding soils were excavated and also disposed offsite as hazardous waste. In the lagoon areas, contaminated soils were excavated to a depth below the water table (7 to 8 feet bgs) at most locations. Excavated soils from the lagoon areas were disposed offsite; and
- AOC No. 5: Former Wastewater Treatment Area – East: Soil from the area was excavated and disposed offsite. Post-remediation soil sampling results indicated elevated levels of TPH. Concentrations of total VOCs in these post-remediation soil samples exceeded SSSCOs in only 1 sample collected at a depth between 4 to 8 feet bgs.

Based on available information, a Final Engineering Report (FER) documenting the completed remediation activities was not submitted to the NYSDEC.

3.1.5 NYSDEC Letter to Mr. Samuel Kaufmen (July 2002)

According to a July 2002 NYSDEC letter addressed to Mr. Kaufman, Mr. Kaufman was owner of the adjacent property and evaluating the possibility of purchasing the Site. Mr. Kaufman was informed by the NYSDEC that as a result of Site use to actively manage hazardous waste and later receipt of a RCRA permit, the Site was subject to New York State Hazardous Waste Management regulations and policies.

The NYSDEC letter also included a summary of the remaining environmental requirements based on the available data received to date. The remaining environmental requirements listed were:

- Rehabilitation and restart of the existing groundwater recovery systems along with possible expansion to control wider areas;
- Operation of the groundwater recovery systems until data demonstrated that the groundwater met NYSDEC groundwater quality standards (GWQS);
- Follow-up groundwater monitoring, which would include rehabilitation of the monitoring system wells, several rounds of sampling to demonstrate the effectiveness of the 1997 source removal activities, and the effectiveness of the groundwater recovery systems;
- Long term monitoring of several Site areas, to continue to demonstrate the effectiveness of remedial actions and to determine when the groundwater meets NYSDEC GWQS;
- Investigation and remediation of remaining contaminated soils and source areas in AOC No. 3: Former Wastewater Treatment Area (SWMU-3), AOC No. 4: Former Scrap Metal/Waste Oil Storage Area, and AOC No. 5: Former Wastewater Treatment Area – East;
- Evaluation of source(s) and extent of VOC contamination in the vicinity of an onsite monitoring well (MW-3) and remediation, as needed;
- Evaluation of the former sump area (located within AOC No. 7: Onsite Main Warehouse Building) for releases and remediation, as needed;
- Evaluation and remediation of source areas contributing to observed impacts in the underlying bedrock aquifer; and
- Investigation of the impact extent to the underlying bedrock aquifer. Remediation of the bedrock aquifer, as needed.
- Additional reconnaissance level evaluation of unstudied portions of the Site, to verify that there are no other release areas where past releases may have occurred but were not reported.

3.1.6 Site Investigation Work Plan (September 2005)

In a June 30, 2005 letter addressed to Mr. Kaufman, the NYSDEC expressed concern that VOCs in soil and groundwater may pose a potential health risk to building occupants considering recent re-occupation. The NYSDEC letter required submittal of a work plan to perform environmental sampling to address the concern. Specifically, the NYSDEC identified three potential source areas (container storage area, former solvent recovery still, and oil/water separator) all within AOC No. 7: Onsite Main Warehouse Building. TRC

submitted a Site Investigation Work Plan (SIWP) to the NYSDEC in September 2005 to address these concerns, and an NYSDEC approval was issued on September 12, 2005. The *September 2005 SIWP* consisted of:

- Collection and analysis of sub-slab vapor, indoor air, soil, and groundwater samples from several locations within AOC No. 7: Onsite Main Warehouse Building;
- Collection and analysis of sub-slab vapor and indoor air samples from one location in AOC No. 8: Onsite Residential Structure; and
- Repair and redevelopment or (if repair is not practical) replacement of existing monitoring well MW-3 and collection/analysis of one groundwater sample at this location.

The goal of the investigation activities was to collect data in accordance with the approved SIWP to evaluate, to the satisfaction of the NYSDEC and New York State Department of Health (NYSDOH), whether VOCs in sub-slab soil vapor, indoor air, soil and/or groundwater posed a risk to building occupants.

3.1.7 Site Investigation Report (January 2006)

In accordance with the NYSDEC-approved SIWP, TRC conducted a Site Investigation (SI) in November 2005. The SI included field activities in AOC No. 7: Onsite Main Warehouse Building, AOC No. 8: Onsite Residential Structure, and in the vicinity of existing monitoring well MW-3. The following field activities were completed as part of the SI:

- Installation of 4 sub-slab vapor sampling points (3 within AOC No. 7: Onsite Main Warehouse Building and 1 inside AOC No. 8: Onsite Residential Structure);
- Collection and analysis of 10 air samples for VOCs by United States Environmental Protection Agency (USEPA) Method TO-15 (4 sub-slab vapor samples, 5 indoor air samples, and 1 ambient air sample);
- Installation of 4 soil borings [2 locations within AOC No. 7: Onsite Main Warehouse Building (MW-101 and MW-102) and 2 locations outside of AOC No. 7: Onsite Main Warehouse Building (MW-3R and MW-3)];
- Collection and analysis of 4 soil samples for Target Compound List (TCL) VOCs by USEPA Method 8260C from 4 soil borings;
- Construction of permanent two-inch diameter monitoring wells in each of the four soil borings; and
- Collection and analysis of 4 groundwater samples for TCL VOCs by USEPA Method 8260C.

<u>Sub-slab Vapor, Indoor Air, and Outdoor Air Analytical Results</u>

The air sample laboratory analytical results were compared to the NYSDOH soil vapor intrusion (SVI) guidance matrices.

- TCE, PCE, and TCA were detected above the NYSDOH vapor intrusion “mitigation criteria” in AOC No. 7: Onsite Main Warehouse Building; and

- VOCs were not detected above the NYSDOH vapor intrusion "mitigation criteria" in AOC No. 8: Onsite Residential Structure.

Based on the sub-slab/indoor air analytical results collected from AOC No. 7: Onsite Main Warehouse Building, it was determined that mitigation was required.

Based on the sub-slab/indoor air analytical results collected from AOC No. 8: Onsite Residential Structure, it was determined that no further action was required. However, at the request of the NYSDEC, additional sub-slab and indoor air samples were proposed to be collected from the AOC Nos. 7 and 8 as part of this RI.

Soil Analytical Results

Soil sampling laboratory analytical data showed no exceedances above NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 RSCOs.

Groundwater Analytical Results

Analytical data showed VOC exceedances above Class GA Values for vinyl chloride and cis-1,2-dichloroethene in the groundwater sample collected from monitoring well MW-101 (located in the eastern-central portion of AOC No. 7: Onsite Main Warehouse Building). Additionally, the VOCs chloroform, cis-1,2-dichloroethene, 1,1-dichloroethane, 1,1-dichloroethene, methylene chloride, PCE, toluene, TCA, 1,1,2-trichloroethane, TCE, and vinyl chloride were detected above Class GA Values in the groundwater sample collected from monitoring well MW-102 (located in the north-eastern portion of AOC No. 7: Onsite Main Warehouse Building).

Additionally, groundwater sampling data showed no exceedances of Class GA Values in groundwater samples collected from monitoring wells MW-3 and MW-3R. Monitoring well MW-3 is located northeast of monitoring well MW-102 and outside of AOC No. 7 (MW-3 was not located during the December 9, 2015 TRC Site inspection). Monitoring well MW-3R is located south of monitoring well MW-101 and outside of AOC No.7.

The SI Report prepared by TRC recommended the following:

- Based on the sub-slab vapor and indoor air sampling results, additional monitoring within AOC No. 8 was recommended. Phased implementation of a sub-slab depressurization system (SSDS) was recommended for AOC No. 7 to mitigate vapor intrusion from below the concrete floor slab. Additional recommendations included the repair of accessible major floor slab cracks and installation of monitoring points in the Main Warehouse Building floor slab to evaluate the effectiveness of an SSDS.
- No VOCs were detected above the RSCOs in the collected soil samples analyzed. Therefore, no further action was recommended with respect to soil sampling performed as part of the SI.

Based on the groundwater sampling results, additional groundwater investigation was recommended to delineate the lateral and vertical extent of the groundwater contamination found in one of the newly installed monitoring wells located inside the Main Warehouse Building.

3.1.8 Additional Sub-slab Vapor and Indoor Air Sampling in Area of Concern No. 8: Onsite Residential Structure (January 2006)

The preliminary results of the sub-slab vapor and indoor air sampling performed in September 2005 (summarized in **Section 3.1.7**) were submitted to the NYSDEC by TRC in a letter dated November 9, 2005. As a result of the review, the NYSDEC requested an additional round of sub-slab vapor/indoor air sampling during the following heating season in AOC No. 8. This additional round of sub-slab vapor and indoor air sampling was performed on January 11, 2006. The following field activities were completed by TRC as part of the additional sampling:

- Installation of one sub-slab vapor point in the basement floor of the Onsite Residential Structure; and,
- Collection and analysis of three air samples for VOCs by USEPA Method TO-15 (one sub-slab vapor sample, one indoor air sample, and a duplicate indoor air sample).

Based on the NYSDOH guidance for evaluating vapor intrusion, the sub-slab vapor and indoor air sampling results indicated that no further action was required. These results were documented in the TRC letter report dated January 31, 2006.

3.1.9 Work Plan for the Evaluation of the Unconsolidated Overburden Aquifer (May 2006)

Based on a review of the January 2006 SI Report, the NYSDEC issued a letter to Mr. Kaufman, dated March 29, 2006, indicating that further delineation of a potential source area (AOC No. 6: Former Solvent Recovery Still/Oil Water Separator Area) was required. The NYSDEC letter also indicated that the VOC concentrations in sub-slab vapor/indoor air of AOC No. 8: Onsite Residential Structure required further evaluation.

In May 2006, TRC submitted a Work Plan for the Evaluation of the Unconsolidated Overburden Aquifer to address concerns and data gaps in the overall Site characterization. The Work Plan scope included the following:

- Installation of deep soil borings to determine the depth to bedrock within the AOCs;
- Collection of soil samples and analysis of VOCs in potential remaining onsite source areas;
- Installation of new shallow and deep groundwater monitoring wells in the unconsolidated overburden aquifer;
- Collection of groundwater samples for VOC analysis from existing and proposed onsite shallow and deep groundwater monitoring wells within the unconsolidated overburden aquifer;
- Collection of sub-slab vapor/indoor air samples for VOC analysis from AOC No. 8: Onsite Residential Structure; and

- Preparation of a final report summarizing the results and findings and presenting relevant conclusions and recommendations.

The principal objectives of the planned investigation were as follows:

- Establish site-wide post-remediation groundwater conditions in the unconsolidated overburden aquifer;
- Evaluate variability of VOC concentrations with depth in the overburden aquifer, to assess potential impacts in the underlying bedrock aquifer;
- Delineate the extent of VOC contamination in the unconsolidated overburden groundwater in the vicinity of AOC No. 6: Former Solvent Recovery Still/Oil Water Separator Area and, if warranted, in other AOCs;
- Characterize the unconsolidated overburden aquifer properties and determine depth to bedrock in the study areas; and
- Determine VOC concentrations in the sub-slab vapor/indoor air in AOC No. 8: Onsite Residential Structure.

The NYSDEC acknowledged receipt of the Work Plan; however, comments on the Work Plan were not issued by the NYSDEC.

3.1.10 Sub-Slab Depressurization System Field Pilot Testing in Area of Concern No. 7: Onsite Main Warehouse Building (December 2008)

In accordance with TRC correspondence dated November 9, 2005 and NYSDEC correspondence dated November 29, 2005, an SSDS pilot test consisting of a single sub-slab depressurization pit below the floor slab of the Onsite Main Warehouse Building, piping, and a roof suction fan was completed. The following field activities were completed as part of the SSDS field pilot testing:

- Temporary test points were installed through the floor slab (at approximately 25-foot intervals) to the north, south, east, and west of the sub-slab pit located in the Onsite Main Warehouse Building. The temporary test points were installed at increasing distances from the sub-slab pit until no influence was detected (a total of 13 temporary test points were installed);
- Collection and recording of differential pressure measurements of the sub-slab relative to indoor air at each temporary test point with the use of a magnehelic pressure gauge.

<u>SSDS Field Pilot Test Findings</u>

The results of the SSDS testing were compared to the guidelines in the USEPA document titled *Radon Prevention in the Design and Construction of Schools and Other Large Buildings (EPA/625/R-92/016)*. According to this document, a minimum sub-slab vacuum of 0.002 inch of water column is recommended for an effective SSDS.

Based on the results of the SSDS testing, TRC concluded in a December 2008 letter report that a work plan could be developed for the installation of additional sub-slab depressurization pits and additional indoor air sampling in the Onsite Main Warehouse Building. NYSDEC comments regarding the December 2008 letter have not been received to date.

3.1.11 Remedial Investigation/Feasibility Study Work Plan (October 2016)

In October 2016, TRC, on behalf of Cornwall, submitted an RI/FS Work Plan to the NYSDEC to address continued NYSDEC concerns and data gaps in the overall Site characterization with respect to DER-10 and March 2016 NYSDEC comments.

The RI Work Plan scope included the following:

- Initial Site survey (proposed, but not completed/required as part of the RI activities);
- Initial monitoring well development and baseline groundwater sampling of 21 existing groundwater monitoring wells;
- Soil boring program;
- Bedrock core collection;
- Monitoring well installation (shallow overburden, deep overburden and bedrock wells);
- Monitoring well development;
- Groundwater sampling of newly installed monitoring wells;
- Collection of sub-slab vapor, indoor ambient air, and outdoor ambient samples;
- Final Site survey; and
- RI Report

The principal objectives of the RI Work Plan were as follows:

- Establish site-wide groundwater conditions (i.e., groundwater surface elevation, groundwater flow direction, and VOCs in groundwater) in the unconsolidated overburden and bedrock aquifers;
- Evaluate VOC concentrations in soil and groundwater with depth across the Site, in the overburden aquifer (shallow and deep), and assess potential for impacts to the underlying bedrock aquifer;
- Evaluate VOC concentrations in the bedrock aquifer and connectivity (if any) between the bedrock and overburden at the Site;
- Evaluate SVOC concentrations in soil and groundwater in the unconsolidated overburden in the vicinity of AOC No. 3: Former Wastewater Treatment Area and AOC No. 5: Former Wastewater Treatment Area – East;
- Evaluate the metals concentrations (if any) in soil and groundwater in the unconsolidated overburden in the vicinity of AOC No. 1: Former Landfill and AOC No. 4: Former Scrap Metal/Waste Oil Storage Area;
- Characterize soil and bedrock types, determine depth to bedrock, and the rock quality designation (RQD) of bedrock in the areas under study;

- Evaluate VOC concentrations in sub-slab vapor and indoor air samples in AOC No. 7: Onsite Main Building Warehouse and AOC No. 8: Onsite Residential Structure; and
- Collect data necessary for the selection of an appropriate remedial action, to the extent required to meet applicable SCOs and groundwater quality standards (for VOCs, SVOCs and metals).

4.0 Remedial Investigation Activities

The RI field activities described in this section were completed by TRC from December 2016 to March 2020. All activities were completed in accordance with the NYSDEC approved *October 2016 RI/FS Work Plan* (summarized in **Section 3.1.11** above) and DER-10, Technical Guidance for Site Investigation and Remediation.

A chronological summary of the completed RI field activities is presented below:

- December 2016 – Monitoring well redevelopment;
- January 2017 – Baseline groundwater monitoring event;
- March 2017 – Soil vapor intrusion investigation (AOC Nos. 7 and 8 SVI assessments);
- January 2018 – Soil boring program;
- September 2018 – Surface water sampling;
- April to May 2019 – Monitoring well installations;
- July to August 2019 – Groundwater sampling of new monitoring wells;
- November 2019 – Site survey; and
- March 2020 – Investigation derived waste (IDW) disposal.

The scope of work (SOW) and associated field implementation methods are described in **Sections 4.1** through **4.9** below. All field activities were completed in adherence to a Site-specific Health and Safety Plan (HASP), Community Air Monitoring Plan (CAMP), and a Quality Assurance Project Plan (QAPP). **Figure 2** presents the RI sample locations.

Standard chain-of-custody procedures were followed for all collected samples. All samples were submitted to an Environmental Laboratory Approval Program (ELAP) laboratory. NYSDEC Analytical Services Protocol (ASP) Category B data deliverable packages were requested, and 10 percent of the samples were validated by TRC. A summary of all environmental samples collected as part of this RI is provided in **Table 1**.

4.1 Monitoring Well Redevelopment (December 2016)

From December 6 to 8, 2016, TRC located and redeveloped monitoring wells previously installed at the Site. Ad part of this task, TRC located 18 of the 21 monitoring wells identified in the *October 2016 RI/FS Work Plan*. Monitoring wells MW-101 and MW-102 where thought to be located within AOC No. 7, but were not located during the Site reconnaissance. Monitoring well LF-6, assumed to be located between AOC Nos. 1 and 2 could not be located. Additionally, one previously unidentified well (SMWO-MW-2))was located within AOC No. 4and redeveloped. Two monitoring wells, SMWO-MW-3 and LF-12, previously unidentified and located in the field, were found to be damaged and could not be redeveloped.

The remaining monitoring wells were redeveloped using standard pump and surge techniques utilizing a submersible pump. Development was considered complete when either the turbidity of the purge water was consistently below 50 nephelometric turbidity units (NTUs), the well purged dry, or 10 well volumes were removed, whichever occurred first. The volume of water removed, the well development time, and water-quality parameters including pH, conductivity, dissolved oxygen (DO), temperature, turbidity, oxidation-reduction potential (ORP) and salinity was monitored during development activities. Purge water was containerized in 55-gallon drums for offsite disposal.

The December 2016 monitoring well redevelopment activities were additionally summarized in the *February 2018 Groundwater and Vapor Intrusion Sampling Update*, which was submitted to the NYSDEC to provide a status update on the RI activities.

4.2 Baseline Groundwater Monitoring Event (January 2017)

From January 4 to 6, 2017, groundwater samples were collected from 17 monitoring wells (BR-1, BR-3, FB-1, MW-3R, LF-1, LF-2, LF-3, LF-4, LF-8, LF-9, LF-9M, LF-9D, LF-10, LF-11S, LF-11D, SMWO-MW-1, and SMWO-MW-2) utilizing standard low-flow sampling techniques. Following stabilization of groundwater parameters (pH, conductivity, DO, ORP, temperature, and turbidity), samples were collected in laboratory supplied containers, placed on ice, and submitted to Alpha Analytical of Westborough, Massachusetts (Alpha) for analysis of TCL VOCs by USEPA Method 8260. The sampling logs for the January 2017 baseline groundwater monitoring event can be found in **Appendix A**.

The January 2017 baseline groundwater monitoring event and analytical results were additionally summarized in TRC's *February 2018 Groundwater and Vapor Intrusion Sampling Update*.

4.3 Soil Vapor Intrusion Investigation (March 2017)

On March 16, 2017, six temporary sub-slab vapor points (SSVP-101 through SSVP-106) were installed within AOC No. 7: Onsite Main Warehouse Building. As proposed in the *October 2016 RI/FS Work Plan,* the two proposed temporary sub-slab vapor points within AOC No. 8: Onsite Residential Structure (SSVP-107 and SSVP-108) were not installed as access could not be obtained. The six temporary sub-slab vapor points were installed by drilling an approximately 1½-inch diameter hole through the floor slab at each location. Teflon™ tubing was then installed no deeper than two-inches below the sub-slab at each location, and the annulus between the floor and tubing was sealed with modeling clay.

Prior to sub-slab vapor sample collection, all six sub-slab vapor points were helium leak tested in accordance with NYSDOH methods to ensure that each location was capturing sub-slab vapors, rather than short circuiting ambient indoor air from the surface. In addition to the six sub-slab vapor samples, six co-located indoor air samples (SSVP-IA-101 through SSVP-IA-106), and one outdoor ambient air sample (AA-101) was collected for analysis. Record of Vapor Sampling forms, detailing the helium leak test results, vapor sample photoionization detector (PID) readings, and sample times can be found in **Appendix B**.

All 13 air samples were collected utilizing batch certified 6-liter Summa® canisters equipped with 8-hour flow controllers and submitted to Con-Test Laboratories of East Long Meadow, Massachusetts (Con-Test) for analysis of VOCs by USEPA Method TO-15.

The March 2017 SVI event and analytical results were additionally summarized in the *February 2018 Groundwater and Vapor Intrusion Sampling Update*.

4.4 Surface Water Sampling (September 2018)

On September 6, 2018, TRC collected three surface water samples from the Woodbury Creek (upstream, midstream, and downstream). All three surface water samples were collected into laboratory supplied containers, preserved in a cooler with ice, and submitted to Alpha for analysis of TCL VOCs by USEPA Method 8260.

4.5 Subsurface Investigation Activities (2018 and 2019)

4.5.1 Private Utility Survey

Prior to the commencement of ground-intrusive activities in January 2018 and April to May 2019, private utility surveys were completed to identify any subsurface utilities or anomalies around each of the proposed soil borings/monitoring wells. Any detected subsurface structure within the investigation radius was identified on the ground surface with paint using the American Public Works Association (APWA) utility color codes.

4.5.2 Community Air Monitoring Plan

In accordance with the NYSDEC Generic CAMP (DER-10, Appendix 1A), air monitoring was conducted during all ground intrusive investigation activities. The CAMP included monitoring for both fugitive dust and organic vapors. Fugitive dust and organic vapor action levels provided in the NYSDOH Generic CAMP were used.

On a daily basis, one CAMP enclosure was deployed downwind of the work site. The enclosure contained a Dust Trak II unit for dust monitoring and a PID for organic vapor monitoring. Additionally, one handheld PID was utilized within the work area to field screen soil samples/drill cuttings and monitor breathing air vapor concentrations.

NYSDOH CAMP action levels were not exceeded (for either fugitive dust and organic vapors) during any of the 2018 and 2019 ground intrusive activities.

4.5.3 Soil Boring Program (January 2018)

From January 15 to 18, 2018, Cascade Technical Services of Schenectady, New York (Cascade) installed 12 soil borings (SB-101 through SB-112) to terminal depths ranging from 4 feet bgs (SB-105) to 39 feet bgs

(SB-104), the depth of drilling refusal, utilizing a Geoprobe® and direct push technology (DPT) sampling techniques. Continuous soil cores were collected from each boring location utilizing 1.5-inch inner diameter by 5-foot long poly vinyl chloride (PVC) Macrocores®. The boring logs from the January 2018 soil boring program can be found in **Appendix C**.

Soil cores were visually classified and screened for the visual, olfactory, and photo-ionic evidence of contamination by TRC. To screen for volatile vapors, measurements were collected from soil headspace immediately following the opening of each Macrocore® utilizing a PID equipped with a 10.6 eV lamp and calibrated to 100 ppm of isobutylene.

Generally, one to two soil samples were collected from each boring location for laboratory analysis. Where applicable, the selected soil samples were collected from the depth interval displaying the highest PID reading and the depth interval of the encountered overburden-water table interface. If drilling refusal was encountered prior to the water table, the depth interval above the refusal depth was selected for laboratory analysis. If no elevated PID readings were observed in a borehole, samples biased towards those depths were not collected.

A total of 14 soil samples were collected from the 12 soil borings, transferred directly from the Macrocore® into laboratory supplied containers, preserved in a cooler with ice, and submitted to Alpha for analysis of TCL VOCs by USEPA Method 8260. For borings completed within AOC No. 3: Former Wastewater Treatment Area (SWMU-3) (SB-101, SB-102, and SB-104) and AOC No. 5: Former Wastewater Treatment Area East (SB-103), soil samples were additionally submitted for analysis of TCL SVOCs by USEPA Method 8270. For borings completed within AOC No. 1: Former Landfill (SWMU-1) (SB-111 and SB-112) and AOC No. 4: Former Scrap Metal/Waste Oil Storage Area (SB-105), soil samples were additionally submitted for analysis of Target Analyte List (TAL) Metals by USEPA Method 6010.

4.5.4 Monitoring Well Installations (April and May 2019)

From April 29 to May 23, 2019, Aztech Technologies Inc. of Ballston Spa, New York (Aztech) installed 7 shallow overburden groundwater monitoring wells (MW-104S, MW-105S, MW-106S, and MW-108S through MW-111S), 6 co-located deep overburden groundwater monitoring wells (MW-104D, MW-105D, MW-106D, MW-109D, and MW-110D), and 4 bedrock groundwater monitoring wells (BMW-204, BMW-205, BMW-207, and MW-111D). Prior to well installation, soil samples were collected continuously, or if soil conditions were known, at intermittent intervals to the termination depth of each borehole. Drill cuttings, decontamination fluids, and well development water were containerized in steel 55-gallon drums and staged onsite for offsite disposal. A summary of the monitoring well installation activities is provided in the subsections below.

It should be noted that due to drilling refusals and equipment limitations, proposed monitoring wells MW-107S, MW-108D, BMW-101, BMW-102, BMW-103, BMW-106, and BMW-208 (as proposed in the October 2016 RS/FS Work Plan) could not be installed. Conditions preventing the installation of these seven monitoring wells are further described below in **Section 4.5.4.3**.

4.5.4.1 Soil Screening/Sampling

Prior to monitoring well installation, soil was screened at 12 locations (MW-104S/D through MW-111S/D, BMW-204, BMW-205, BMW-207, and BMW-208) utilizing a Geoprobe® and DPT with 1.5-inch diameter by 5-foot long PVC Macrocores® or hollow stem augers (HSAs) and 2-inch diameter by 2-foot long split spoons to terminal depths ranging from 14 feet bgs (MW-107S) to 77 feet bgs (SB/BMW-205). The boring logs for the April and May 2019 monitoring wells can be found in **Appendix D**.

In 10 boring locations (MW-104S/D, MW-105S/D, MW-106S/D, MW-107S, MW-108S/D through MW-111S/D, BMW-207, and BMW-208), the depth interval either at or just above the encountered water table was selected for laboratory analysis. Elevated PID readings were not measured in any completed soil boring and as a result, soil samples biased towards these depths were not collected.

As a result of soil screening and sampling, a total of 10 soil samples were collected and submitted to Alpha for analysis of TCL VOCs by USEPA Method 8260. For wells completed within AOC No. 3: Former Wastewater Treatment Area (SWMU-3) (MW-105S/D, MW-106S/D and BMW-108), soil samples were additionally submitted for analysis of TCL SVOCs by USEPA Method 8270. For borings completed within AOC No. 1: Former Landfill (SWMU-1) (MW-109S/D), 1 location within AOC No. 3: Former Wastewater Treatment Area (SWMU-1) (MW-106S/D), AOC No. 4: Former Scrap Metal / Waste Oil Storage Area (MW-107), soil samples were additionally submitted for analysis of TAL Metals by USEPA Method 6010.

4.5.4.2 Bedrock Coring

Following the advancement of each soil boring as described above at 4 bedrock monitoring well locations (BMW-204, BMW-205, BMW-207, and MW-111D), a temporary 4-inch diameter steel casing was installed from ground surface and set approximately five feet into competent rock. Following casing installation, continuous rock cores were collected at 5-foot intervals from the onset of competent rock, ranging in initial depth from 26 feet bgs (MW-111D) to 95 feet bgs (BMW-205), to the 1st water-bearing/fractured zone or where feasible due to equipment limitations. Final terminal coring depths ranged from 39 feet bgs (MW-111D) to 105 feet bgs (BMW-205)).

After retrieval from the core barrel, rock cores were placed into wooden boxes, labeled, and reviewed for evidence of contamination. Additionally, lithology and the presence of fractures were logged for each 5-foot core section to determine the RQD. Boring logs for the completed bedrock coring activities are provided in **Appendix D**.

4.5.4.3 Monitoring Well Installations

Following soil boring and bedrock coring activities, monitoring wells were installed to their targeted terminal depth using 4.25-inch inner diameter (ID) HSAs, roller bit, or air hammer (where applicable to bedrock monitoring wells). All monitoring wells were constructed utilizing 2-inch PVC riser and 10 to 15 feet of 0.01-slot PVC screen. The annulus between the well and borehole wall was backfilled with a clean silica sand pack to a minimum of 1-foot above the screen, followed by a minimum 2-foot thick hydrated bentonite seal,

then grout to the surface. Dependent on the surrounding land use, each monitoring well was completed at ground surface within a concrete pad and bolt down manhole cover or locking standpipe. Monitoring well construction logs can be found in **Appendix E.** A summary of monitoring well constructions are provided in **Table 2** and are further detailed below.

Shallow Overburden Monitoring Wells

As a result of the drilling activities, seven shallow groundwater monitoring wells (MW-104S, MW-105S, MW-106S, and MW-108S through MW-111S) were installed. Generally, shallow overburden monitoring wells were installed with a screened interval spanning a minimum of 5 feet above and 10 feet below the encountered water table. Final shallow overburden monitoring well terminal depths ranged from 16 feet bgs (MW-106S) to 24 feet bgs (MW-108S).

Proposed shallow monitoring well MW-107S could not be installed due to multiple drilling refusals at an approximate depth of 15 feet bgs.

Deep Overburden Monitoring Wells

As a result of the drilling activities, five deep groundwater monitoring wells (MW-104D, MW-105D, MW-106D, MW-109D, and MW-110D), co-located with their respective shallow wells, were installed. Generally, deep overburden monitoring wells were installed in locations where a minimum of 25 feet of soil was present beneath the encountered water table. Each installed deep overburden monitoring well included 10 feet to 15 feet of screen above the encountered top of bedrock surface or drilling refusal depth. Final deep overburden monitoring well terminal depths ranged from 30 feet bgs (MW-105D) to 40 feet bgs (MW-104D and MW-106D)

Proposed deep monitoring well MW-107D could not be installed due to multiple drilling refusals at an approximate depth of 15 feet bgs. Additionally, proposed deep overburden monitoring wells MW-108D and MW-111D could not be installed due to the presence of bedrock at depths of 32 feet bgs and 26 feet bgs, respectively. Due to the presence of shallow bedrock at MW-111D, a bedrock monitoring well was installed and is further described below.

Bedrock Monitoring Wells

As a result of the drilling activities, four bedrock monitoring wells (MW-111D, BMW-204, BMW-205, and BMW-207) were installed. Generally, bedrock monitoring wells were installed into competent rock to the first water-bearing/fracture zone or where feasible due to equipment limitations. Each installed bedrock monitoring well included 10 feet of screen within the subsurface rock and ranged in terminal depth from 39 feet bgs (MW-111D, BMW-207) to 105 feet bgs (BMW-205).

Proposed bedrock monitoring well BMW-208 could not be installed due to drilling equipment limitations encountered downhole while drilling. Proposed bedrock monitoring wells BMW-101, BMW-102, BMW-103, and BMW-106 were not installed due to the presence of competent bedrock which impacted drilling

conditions and equipment limitations. Due to shallow encountered bedrock at MW-111D (depth of 26 feet bgs), bedrock was cored at from 26 feet bgs to 39 feet bgs, and a bedrock monitoring well was installed.

4.5.4.4 Monitoring Well Development

Following installation, all newly installed monitoring wells were developed utilizing standard pump and surge methods. Depth to groundwater was measured using a water level meter prior to well development activities. Temperature, conductivity, pH, DO, turbidity, and ORP were periodically measured with a water quality meter during development. The monitoring wells were considered developed once turbidity fell below 50 NTUs, the well purged dry, or 10 well volumes were removed, whichever occurred first. Non-aqueous phase liquid (NAPL) and evidence of contamination (sheens, odors, etc.) were not observed in any well development water. All generated liquids were containerized in steel 55-gallon drums and staged onsite for offsite disposal. The monitoring well development logs are included in **Appendix F**.

4.6 Groundwater Monitoring, Well Gauging and Sampling (July to August 2019)

On July 22, 2019, prior to groundwater sampling activities, all Site monitoring wells were gauged with a water level meter to determine static potentiometric surface elevations and flow direction.

From July 23 to 24, 2019, groundwater samples were collected from the newly installed 16 monitoring wells (MW-104S/D, MW-105S/D, MW-106S/D, MW-108S, MW-109S/D, MW-110S/D, MW-111S/D, BMW-204, BMW-205, and BMW-207) utilizing standard low-flow sampling techniques. Following stabilization of groundwater parameters (pH, conductivity, DO, ORP, temperature, and turbidity), samples were collected in laboratory supplied containers, placed on ice, and submitted to Alpha for analysis of TCL VOCs by USEPA Method 8260. For groundwater samples collected within AOC No. 3: Former Wastewater Treatment Area (SWMU-3) (MW-105S/D and MW-106S/D), samples were additionally submitted for analysis of TCL SVOCs by USEPA Method 8270. For groundwater samples collected within AOC No. 1: Former Landfill (SWMU-1) (MW-109S/D), samples were additionally submitted for analysis of TAL Metals by USEPA Method 6010.

Upon an NYSDEC request in a September 5, 2018 letter and to evaluate the presence/absence of emerging contaminants (ECs) in groundwater at the Site, select samples (representative of vertical and horizontal Site limits) were additionally collected during the July 2019 sampling event and submitted for laboratory analysis of per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane by USEPA Methods 537 Modified and 8270 selected ion monitoring (SIM), respectively. Monitoring wells selected for EC analyses included BR-3, MW-3R, MW-105S, MW-109D, MW-111D, and SMWO-MW-2. Additional details and procedures regarding the collection and analysis of EC groundwater samples were provided to the NYSDEC in TRC's *November 2018 Emerging Contaminants Work Plan*.

Due to field collection errors during the July 2019 sampling event, additional groundwater samples were collected from MW-111D and MW-3R on August 6 ,2019, and resubmitted to Alpha for laboratory analysis of TCL VOCs by USEPA Method 8260 and 1,4-dioxane by USEPA Method 8270 SIM, respectively.

The sampling logs for the July and August 2019 groundwater sampling activities can be found in **Appendix G**.

4.7 Site Survey (November 2019)

On November 5, 2019, Susan M. Anacker Professional Land Surveyor, PLLC of Deerfield, New York (Anacker), a New York State licensed land surveyor, surveyed the locations and elevations of the monitoring wells and other Site features of interest to RI activities. A physical features and property boundary survey was not completed as part of this RI. The survey letter report provided by Anacker can be found in **Appendix H**.

4.8 Investigation Derived Waste Disposal (March 2020)

IDW generated during the investigation included soil from drilling activities and water from equipment decontamination, well development, and groundwater sampling. Solid and liquid IDW drums were transported offsite on March 26, 2020 to American Bio Mass of Walterboro, South Carolina for disposal. The waste disposal manifests are included in **Appendix I**.

5.0 Discussion of Results

The following subsections discuss the regulatory standards, criteria, and guidance (SCGs) used to evaluate field observations and RI sample analytical results.

In general accordance with NYSDEC DER-10, Appendix 2B, TRC performed data validation on 10 percent of all laboratory ASP Category B deliverables. The analytical data validation results are summarized in the Data Usability Summary Reports (DUSRs), provided in **Appendix J**. Following NYSDEC RI Report approval, the electronic data deliverables (EDDs) will be uploaded to the NYSDEC EQuIS database.

5.1 Standards, Criteria, and Guidance

The regulatory SCGs used to evaluate the groundwater, SVI, surface water, and soil analytical results are outlined below:

- **Groundwater** – NYSDEC Division of Water Technical Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Class GA, June 1998 and NYSDEC Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs, January 2020.
- **SVI** – NYSDOH Center for Environmental Health (CEH), Bureau of Environmental Exposure Investigation (BEEI), Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006, amended May 2017 (Matrices A, B, and C).
- **Surface Water** – NYSDEC TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Class AA, June 1998.
- **Soil** – Title 6 New York Codes, Rules, and Regulations (NYCRR) Part 375, Table 375-6.8(a): Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Commercial Use Soil Cleanup Objectives (CUSCOs), December 2006.

5.2 Baseline Groundwater Monitoring Event (January 2017)

A brief overview of the January 2017 baseline groundwater analytical results is provided in the subsection below. The groundwater sample locations including analytes exceeding the applicable SCGs, can be found on **Figure 3**. A summary of the January 2017 groundwater analytical results is presented in **Table 3**.

5.2.1 Volatile Organic Compounds

Of the 17 groundwater samples collected for analysis, 6 contained concentrations of 1 to 4 VOCs exceeding their respective Class GA GWQS. Generally, of these exceeding compounds, the highest measurement in each sample was cis-1,2-dichloroethene (c12-DCE) at concentrations ranging from 6.2 micrograms per liter (µg/L) (LF-10) to 100 µg/L (SMWO-MW-2), which exceeds its respective Class GA GWQS of 5 µg/L. The compound exhibiting the highest measurement in all 17 samples was 1,1-dichloroethane (11-DCE) in SMWO-MW-2 at a concentration of 140 µg/L, which exceeds its respective Class GA GWQS of 5 µg/L.

5.3 Soil Vapor Intrusion Investigation (March 2017)

A brief overview of the March 2017 SVI analytical results is provided in the subsection below. The SVI sample locations including analytes exceeding their applicable SCGs, can be found on **Figure 4**. A summary of the March 2017 SVI analytical results is presented in **Table 4**.

The March 2017 SVI analytical results within AOC No. 7: Onsite Main Warehouse Building indicated the presence of several Site COCs including TCE, PCE, TCA), c12-DCE, 11-DCE, and vinyl chloride (VC).

Of the six sub-slab vapor samples collected for analysis, VOCs were detected in all. The compound exhibiting the highest measurement in all 6 sub-slab samples was TCE at a concentration of 4,500,000 micrograms per cubic meter (µg/m^3) (SSVP-106). Additionally, VC was detected above the laboratory quantitation limits in 1 sub-slab vapor sample location (SSVP-106) at a concentration of 52,000 µg/m^3.

Of the six co-located indoor air samples collected for analysis, VOCs were detected in all. The compound exhibiting the highest measurement in all 6 indoor air samples was ethanol at a concentration of 150,000 µg/m^3 (SSVP-IA-105). VC was not detected above laboratory quantification limits in any indoor air sample collected for analysis.

A comparison of the detected chlorinated VOC (cVOC) sub-slab detections to their respective co-located indoor air sample analytical results and Matrices A, B, and C of the *October 2006 NYSDOH SVI Guidance* (amended May 2017) indicates the following:

- TCE (NYSDOH Matrix A) – “Mitigation” is required at all co-located sample locations.
- c12-DCE (NYSDOH Matrix A) – “Mitigation” is required at SSVP-103, SSVP-104, and SSVP-106.
- 11-DCE (NYSDOH Matrix A) – “Mitigation” is required at SSVP-103, SSVP-105, and SSVP-106.
- PCE (NYSDOH Matrix B) – “Mitigation” is required at SSVP-103 through SSVP-106.
- TCA (NYSDOH Matrix B) – “Mitigation” is required at SSVP-103, SSVP-105, and SSVP-106.
- VC (NYSDOH Matrix C) – “Mitigation” is required at SSVP-106 only.

5.4 Surface Water Sampling (September 2018)

Of the three surface water samples collected from the Woodbury Creek (upstream, midstream, downstream) and submitted for analysis, VOCs were either not detected above laboratory quantitation limits or were detected at concentrations below their respective Class AA Ambient Water Quality Standard. A summary of the September 2018 surface water analytical results can be found in **Table 5**.

5.5 Subsurface Investigation Activities (2018 and 2019)

5.5.1 Subsurface Investigation Results (January 2018)

As indicated by the 12 soil borings, encountered Site soils primarily consisted of sand with varying amounts of silt and gravel, which is consistent with historical documentation. Drilling refusal, likely due to the

presence of bedrock, was encountered at all borings and ranged in depth from 4 feet bgs (SB-105) to 39 feet bgs (SB-104). Groundwater was observed in 6 borings and typically was encountered in the 10 to 15 feet bgs or 15 to 20 feet bgs sample intervals.

Elevated PID readings (over 50 ppm) were detected at two soil borings (SB-103 and SB-104) and ranged from 70.5 ppm (SB-103 at a depth of 0 to 5 feet bgs) to 204 ppm (SB-104 at a depth of 0 to 5 feet bgs). No other indications of contamination (i.e., visual, olfactory, or photo-ionic) were present in any other screened soil.

A brief overview of the soil analytical results is provided in the subsections below. The soil sample locations included analytes exceeding their applicable SCGs, can be found on **Figure 5**. A summary of the soil sampling analytical results is provided in **Table 6**.

5.5.1.1 Volatile Organic Compounds

Of the 14 soil samples submitted for analysis, only 2 contained concentrations of 1 to 2 compounds exceeding their respective Part 375 UUSCOs. Of these exceeding compounds, the highest measurement was TCE at a concentration of 15 milligrams per kilogram (mg/kg) (SB-102 from a depth of 15 to 20 feet bgs), which exceeds its Part 375 UUSCO of 0.47 mg/kg. No compounds were found to exceed their respective Part 375 CUSCO.

5.5.1.2 Semi-Volatile Organic Compounds

Of the 6 soil samples submitted for analysis, SVOCs were either not detected above laboratory quantification limits or were detected at concentrations below their respective Part 375 UUSCOs.

5.5.1.3 Metals

Of the 3 soil samples submitted for analysis, metals were either not detected above laboratory quantification limits or were detected at concentrations below their respective Part 375 UUSCOs.

5.5.2 Monitoring Well Installation Soil Analytical Results (April 2019)

As indicated in the 12 soil borings (converted into 16 monitoring wells), encountered Site soils primarily consisted of sand with varying amounts of silt and gravel and, which is generally consistent with January 2018 subsurface investigation. Drilling refusal, likely due to the presence of bedrock, was encountered in 3 of the proposed overburden monitoring well locations and included 14 feet bgs (MW-107S), 32 feet bgs (MW-108D), and 40.5 feet bgs (MW-106S/D). No visual, olfactory, or photo-ionic evidence of contamination was observed in soil during the monitoring well installations.

Bedrock was cored at 4 bedrock monitoring well locations at total thicknesses ranging from 10 feet (BMW-205 with an initial bedrock depth of 95 feet bgs) to 15 feet (BMW-204 with an initial bedrock depth of 55 feet bgs). The RQD was low in BMW-204 (ranging from 0 (at depths of 60 to 65 feet bgs and 65 to 70 feet

bgs) to 35 (at a depth of 55 to 60 feet bgs)) as fractured shale was primarily encountered. The RQD was generally high in BMW-205 and BMW-207 (ranging from 30 (BMW-207 at a depth of 49 to 54 feet bgs) to 93 (BMW-205 at a depth of 101.5 to 105 feet bgs)). Bedrock encountered at BMW-205 and BMW-207 consisted of quartzite.

A brief overview of the soil analytical results is provided in the subsections below. The soil sample locations included analytes exceeding their applicable SCGs, can be found on **Figure 5**. A summary of the soil sample analytical results is provided in **Table 7**.

5.5.2.1 Volatile Organic Compounds

Of the 10 soil samples submitted for analysis, only 2 contained concentrations of 1 to 4 compounds exceeding their respective Part 375 UUSCOs. Of these exceeding compounds, the highest measurement was PCE at a concentration of 1.4 mg/kg (MW-110S from a depth of 9 to 11 feet bgs), which exceeds its Part 375 UUSCO of 1.3 mg/kg. No compounds were found to exceed their respective Part 375 CUSCO.

5.5.2.2 Semi-Volatile Organic Compounds

Of the 3 soil samples submitted for analysis, SVOCs were either not detected above laboratory quantification limits or were detected at concentrations below their respective Part 375 UUSCOs.

5.5.2.3 Metals

Of the 3 soil samples submitted for analysis, only 2 contained concentrations of 1 to 3 compounds exceeding their respective Part 375 UUSCOs. Of these exceeding compounds, the highest measurement was manganese at a concentration of 2,200 mg/kg (MW-107 from a depth of 8 to 9 feet bgs), which exceeds its Part 375 UUSCO of 1,600 mg/kg. No compounds were found to exceed their respective Part 375 CUSCO.

5.6 Groundwater Monitoring Well Gauging and Sampling (July to August 2019)

Measured depth to groundwater during the July 22, 2019 gauging event ranged from 6.68 feet below top of riser (TOR) (LF-12) to 24.25 feet below TOR (BMW-205). When adjusted to feet above mean sea level (AMSL) (North American Vertical Datum of 1988 (NAVD 88)), groundwater elevations ranged from 238.87 feet (LF-9M) to 262.13 feet (MW-104S). Monitoring well LF-9D was found to be dry upon gauging. Shallow overburden groundwater flow direction, as shown on **Figure 6**, is generally to the east or southeast, toward the Woodbury Creek. Deep overburden and bedrock groundwater flow directions were not determined due to a insufficient amount of data points in both formations. A summary of the July 22, 2019 groundwater elevations is provided in **Table 8**.

A brief overview of the July and August 2019 groundwater analytical results is provided in the subsections below. The groundwater sample locations including analytes exceeding the applicable SCGs, can be found on **Figure 7**. A summary of the groundwater analytical results is presented in **Table 9**.

5.6.1 Volatile Organic Compounds

Of the 16 groundwater samples submitted for analysis, 4 contained concentrations of 1 to 5 VOCs exceeding their respective Class GA GWQS. Of these exceeding compounds, the highest measurement in 3 samples was c12-DCE at concentrations ranging from 120 µg/L (MW-104S) to 220 µg/L (MW-105), which exceeds its respective Class GA GWQS of 5 µg/L. Chloroethane, the only exceeding VOC in the sample collected from MW-109S, was detected at a concentration of 18 µg/L, which exceeds its Class GA GWQS of 5 µg/L.

1,4-dioxane was detected in 5 of the 6 groundwater samples submitted for analysis and ranged in concentration from 0.0015 µg/L (MW-3R) to 2.09 µg/L (SMWO-MW-2).

5.6.2 Semi-Volatile Organic Compounds

Of the 5 groundwater samples submitted for analysis, 2 contained concentrations of 3 to 4 SVOCs exceeding their respective Class GA GWQS. Of these exceeding compounds, the highest measurement in each was benzo(a)anthracene at a concentration of 0.02 µg/L (MW-105D duplicate) and 0.09 µg/L (MW-106S), which both exceed its Class GA GWQS of 0.002 µg/L.

5.6.3 Metals

Of the 2 groundwater samples submitted for analysis, both contained concentrations of 2 metals exceeding Class GA GWQS. Manganese was detected at concentrations of 833 µg/L (MW-109D) and 1,520 µg/L (MW-109S), which both exceed its respective Class GA GWQS of 300 µg/L. Additionally, iron was detected at concentrations of 541 µg/L (MW-109D) and 14,400 µg/L (MW-109S), which both exceed its Class GA GWQS of 300 µg/L.

5.6.4 Per- and Polyfluoroalkyl Substances

Of the 6 groundwater samples submitted for analysis, various PFAS compounds were detected in all. Of these analytes, perfluorooctanoic acid (PFOA) exceeded its January 2020 NYSDEC Guidance Value of 10 nanograms per liter (ng/L) in the sample collected in only MW-3R at a concentration of 25.8 ng/L (MW-3R). Perfluorooctanesulfonic acid (PFOS) exceeded its January 2020 NYSDEC Guidance Value of 10 ng/L in only MW-3R sample at concentrations of 32.4 ng/L. The remaining detected concentrations did not exceed their respective January 2020 NYSDEC Guidance Values. Total detected PFAS in all samples ranged from 0.92 ng/L (MW-111D) to 85.986 ng/L (MW-3R) and did not exceed the January 2020 NYSDEC Guidance Value of 500 ng/L.

5.7 Data Usability

The data validation results for the above referenced analytical results are summarized in the DUSRs. The DUSRs are provided in **Appendix J** and include a discussion of each qualified result, the potential bias and the effects on data usability. Generally, the groundwater, SVI, surface water, and soil analytical results were

found to be valid and usable for decision making purposes. Exceptions are reflected on summary analytical data tables (**Tables 3, 4, 5, 6, 7,** and **9**) and are detailed in their respective DUSR.

6.0 Conceptual Site Model

The following Conceptual Site Model (CSM) presents the current understanding of the relevant Site characteristics, as well as the source, transport, and fate of contaminants in soil, groundwater, and soil vapor at each Site AOC. Contamination resulting from historical Site operations in the eight AOCs (includes three SWMUs) is further summarized in **Section 2.6**.

The primary Site COCs have been identified as VOCs (primarily cVOCs), SVOCs, and metals as they relate to each AOC and historical former use. Additionally, PFAS was recently detected in groundwater samples collected across the Site in both the overburden and bedrock aquifers. The former Site use as a manufacturing facility and past waste storage, handling, and disposal practices have resulted in localized contamination of soil, groundwater, and soil vapor.

Key findings and conclusions based on the RI activities and available historical documentation are presented below for each AOC. A map showing Site lithological cross section transects is provided on **Figure 8** and are further referenced in the subsections below.

6.1 AOC No. 1: Former Landfill (SWMU-1)

- AOC No. 1 (SWMU-1) is located on the northeast side of the Site.
- Based on historical reports, this area had metal and plastic off-specification products, ash from an onsite incinerator that burned non-hazardous rubbish, and floor sweepings, and encompassed approximately a 10,600 square foot area.
- Based on historical reports, AOC No. 1 (SWMU-1) COCs include elevated concentrations of metals and VOCs in soil and VOCs in groundwater. Contaminated soil and waste materials comprising the landfill were excavated and disposed offsite.
- Overburden soils within AOC No. 1 primarily consist of sand with varying amounts of silt and gravel with a total average thickness of 30 feet (based on drilling refusals encountered during the January 2018 and April to May 2019 drilling events). A lithological cross section showing soils encountered within AOC No. 1 during RI activities is provided on **Figure 9**.
- The results of the RI soil sampling activities (2 soil borings (SB-111 and SB-112) and 2 monitoring wells (MW-109S/D) indicate that several VOCs (primarily cVOCs) and one metal (zinc) exceeds Part 375 UUSCOs in the central portion (MW-109S/D at a depth of 9.5 to 10.5 feet bgs) of AOC No. 1. Soil samples collected on the western (SB-111) and eastern (SB-112) portions however, did not exceed applicable Part 375 UUSCOs for VOCs or metals. It should also be noted that no detected compounds in any soil sample exceeded their respective Part 375 CUSCO. The source of these soil impacts is unknown, but assumed to be the result of previous Site activities documented in this area left in place following the previously reported excavations.
- Overburden groundwater in AOC No. 1 is impacted with cVOCs, as evidenced by the Class GA GWQS exceedances in groundwater samples collected from MW-109S. cVOC groundwater impacts are further apparent in this area as shown by the Class GA GWQS exceedances in

downgradient monitoring well samples collected in January 2017 (LF-8, LF-9, LF-10, and BR-3). Since VOCs were either not detected above laboratory quantitation limits or were detected at concentrations below their respective Class GA GWQS for all Woodbury Creek surface water samples, shallow overburden groundwater cVOC impacts do not appear to extend offsite. The likely source of these impacts is the residual waste potentially left in place following the aforementioned excavations.

6.2 AOC No. 2: Former Waste Pile Area (SWMU-2)

- AOC No. 2 is located in the central eastern portion of the Site.
- Based on historical reports, this area reportedly received non-hazardous hydroxide wastewater sludge, which was excavated and disposed at an offsite facility prior to any site investigation work was completed.
- Based on historical reports, AOC No. 2 (SWMU-2) COCs include elevated concentrations of VOCs in groundwater. Prior remediation of this area included grading and capping.
- Overburden soils within AOC No. 2 primarily consist of sand with varying amounts of silt and gravel with a total average thickness of 15.5 feet (based on drilling refusals encountered during the January 2018 and April to May 2019 drilling events). A lithological cross section showing soils encountered within AOC No. 2 during RI activities is provided on **Figure 10**.
- The results of the RI soil sampling activities (5 soil borings (SB-106 through SB-110) and 1 monitoring well (MW-108S)) indicates that VOCs were either not detected above laboratory quantification limits or were detected at concentrations below their respective Part 375 UUSCOs in all samples. Based upon the RI soil sample analytical results, the data suggests that the prior remedial work performed by others was successful in removing subsurface VOC impacts.
- Overburden groundwater in AOC No. 2, as evidenced by the groundwater sample collected from MW-108S, indicates that concentrations of VOCs are present but are below their respective Class GA GWQS. Additionally, the groundwater sample collected from bedrock monitoring well BMW-205, located northeast and adjacent to AOC No. 2, contains similar results to that of MW-108S. As indicated by these two groundwater samples, overburden and bedrock groundwater within the vicinity of AOC No. 2 does not appear to be impacted by VOCs.

6.3 AOC No. 3: Former Wastewater Treatment Area (SWMU-3) and AOC No. 5: Former Wastewater Treatment Area East

- AOC Nos. 3 and 5 are located in the southeastern portion of the Site.
- Based on historical reports, these areas reportedly treated facility industrial wastewater in accordance with a NYSDEC SPDES permit.
- Based on historical reports and information, various remedial activities including equalization tank removal and soil excavations occurred in these areas.

- With the exception of MW-106S/D, overburden soils within AOC Nos. 3 and 5 primarily consist of sand with varying amounts of silt and gravel. In MW-106S/D only, appreciable amounts of clay were observed throughout the boring (terminal depth of 40.5 feet bgs). Based on the drilling refusals encountered during the January 2018 and April to May 2019 drilling events, the average overburden thickness within AOC Nos. 3 and 5 is approximately 39 feet. Lithological cross sections showing soils encountered during RI activities are provided on **Figures 11** and **12**.
- The results of the RI soil sampling activities (5 soil borings (SB-101 though SB-104 and BMW-208) and 4 monitoring wells (MW-105S/D and MW-106S/D) show that several VOCs were detected above Part 375 UUSCOs in 2 soil borings (SB-102 at a depth of 15 to 20 feet bgs and SB-104 at a depth of 5 to 10 feet bgs). Part 375 CUSCOs however, were not exceeded at either location. The likely source of the Part 375 UUSCO VOC exceedances are impacted residual soils left in place following historical remedial excavations. SVOCs were either not detected above laboratory quantification limits or were detected at concentrations below their respective Part 375 UUSCOs in the soil samples collected from MW-105S/D and MW-106S/D.
- Overburden groundwater in AOC No. 3 is impacted with cVOCs in the vicinity of MW-105S. These Class GA GWQS exceedances do not appear to extend vertically in depth in this area as cVOCs were not detected above SCGs the sample collected from MW-105D. In the central portion of AOC Nos. 3 and 5, as indicated by the groundwater sample collected from FB-1, TCE, the only detected VOC, was detected at a concentration below its respective GWQS. Potential cVOC impacts from AOC No. 3 may extend downgradient (east) in the direction of AOC No. 4, as elevated cVOC concentrations were detected in monitoring wells SMWO-MW-1 and SMWO-MW-2 in January 2017. The likely source of the GWQS exceedances are impacted residual soils left in place following historical remedial excavations.
- SVOCs, in particular polycyclic aromatic hydrocarbons (PAHs), were detected above Class GA GWQS in AOC No. 3 overburden monitoring wells MW-105D (duplicate) and MW-106S. The apparent source of these SVOC impacts appears to be within the vicinity of MW-106 as indicated by the minor soil sample detections at a depth of 13 to 15 feet bgs at this location.

6.4 AOC No. 4: Former Scrap Metal/Waste Oil Storage Area

- AOC No. 4 is located in the central eastern portion of the Site.
- Based on correspondence from the NYSDEC, AOC No. 4 required soil sampling to determine the presence of absence of VOCs.
- Overburden soils within AOC No. 4 primarily consist of sand with varying amounts of silt and gravel with a total average thickness of 13.5 feet (based on drilling refusals encountered during the January 2018 and April to May 2019 drilling events).
- The results of the RI soil sampling activities (2 soil borings (SB-105 and MW-107S/D) indicates that metals, specifically arsenic, manganese, and nickel, exceed Part 375 UUSCOs in the eastern portion of the AOC (as exhibited by the soil sample collected from MW-107S at a depth of 8 to 9 feet bgs). Part 375 CUSCOs however, were not exceeded at this location.

- Groundwater within and upgradient of AOC No. 4, is impacted with VOCs. As cVOCs were either not detected above laboratory quantification limits or were detected at concentrations below their respective Part 375 UUSCOs in the collected soil samples, an apparent overburden source within this AOC has not been identified. As a result, it is likely that the groundwater cVOC source is upgradient in the direction of AOC No. 3 and/or AOC Nos. 6 and 7.

6.5 AOC No. 6: Former Solvent Recovery Still / Oil Water Separator Area

- AOC No. 6 is located in the central portion of the Site and along the eastern side of the main warehouse building.
- Overburden soils east and adjacent to AOC No. 6 primarily consist of either sand with varying amounts of silt and gravel or clay with varying amounts of sand and silt. Bedrock was encountered at a depth of 49 feet bgs (BMW-207) and cored to a terminal depth of 60 feet bgs.
- The results of the RI soil sampling activities east and adjacent to AOC No. 6 (4 overburden monitoring wells (MW-104S/D and MW-110S/D) and 1 bedrock monitoring well (BMW-207) indicates that cVOCs, specifically PCE, exceed Part 375 UUSCOs at one location (MW-110S at a depth of 9 to 11 feet bgs) downgradient of AOC No. 6. It should be noted however that Part 375 CUSCOs were not exceeded at this location.
- Shallow overburden groundwater within the vicinity of AOC No. 6 is impacted with cVOCs, as indicated by several Class GA GWQS exceedances in groundwater samples collected from MW-104S and MW-110S. These impacts do not appear to extend vertically into the deeper overburden soil or bedrock aquifers as no cVOCs were detected above Class GA GWQS in groundwater samples collected from MW-104D, MW-110D, or BMW-207.
- As a result of the soil and groundwater sampling, it is likely that the soil and groundwater cVOC source is upgradient of the completed borings/monitoring wells in the vicinity of AOC Nos. 6 and 7.

6.6 AOC No. 7: Onsite Main Warehouse Building

- AOC No. 7 is located in the western portion of the Site and is the predominant structure on the property.
- The SVI activities indicate that cVOCs, predominantly TCE, are present at elevated concentrations in all sub-slab vapor samples collected as part of this investigation. Per the applicable NYSDOH SVI Matrices, “mitigation” is required at all sampled locations.
- As a result of the elevated cVOC concentrations in all sub-slab vapor samples, the potential for impacted soils underlying AOC No. 7 exists. If impacted soils are present underneath the building slab, this area may be a source of shallow overburden groundwater cVOC contamination, as observed in groundwater samples collected downgradient of AOC No. 6 (MW-104S and MW-109S).
- Elevated concentrations of acetone, methyl-ethyl ketone, ethanol, and various other aromatics were detected in the collected indoor air samples. Also, higher concentrations of some of those

compounds did not necessarily correlate with higher concentrations of the compounds typically associated with the Site or listed in the NYSDOH Decision Matrices. This indicates that ongoing operations within the warehouse may be contributing to the observed indoor air results.

6.7 AOC No. 8: Onsite Residential Structure

- AOC No. 8 is located in the central portion of the Site and northeast of AOC No. 7.
- Based on the NYSDOH guidance for evaluating vapor intrusion, historical sub-slab vapor and indoor air sampling results indicated that no further action was required. These results were documented in the TRC letter report dated January 31, 2006. Additional SVI sampling could not be completed within AOC No. 8 during this RI as access could not be obtained.

6.8 Site Wide Bedrock Aquifer Assessment

- During this RI, the encountered bedrock was predominately quartzite, which was difficult to drill/core due to its inherent physical characteristics (i.e., high hardness rating, non-foliated composition, and interlocking crystalline structure).
- As a result of the difficult drilling conditions, only four bedrock monitoring wells (BMW-204, BMW-205, BMW-207, and MW-111D) of the proposed eight could be installed.
- Bedrock aquifer flow direction was not determined during this RI as the bedrock monitoring wells were screened at varying depths and further investigation into their interconnectedness was not performed.
- Based on the January and August 2019 groundwater analytical results for the 4 newly installed bedrock monitoring wells, VOCs were either not detected above laboratory quantification limits or were detected at concentrations below their respective Class GA GWQS. As a result, the analytical data suggests that the VOC impacts observed in the overburden aquifer have not impacted the underlying bedrock.

6.9 Site Wide Emerging Contaminant Assessment

- Six groundwater samples, representative of vertical and horizontal Site limits, were submitted for analysis of PFAS and 1,4-dioxane.
- PFOA exceeded its January 2020 NYSDEC Guidance Value of 10 ng/L in MW-3R at a concentration of 25.8 ng/L. PFOS exceeded its respective January 2020 NYSDEC Guidance Value of 10 ng/L in only the MW-3R sample at a concentration of 32.4 ng/L. Total detected PFAS in all samples ranged from 0.92 ng/L (MW-111D) to 85.986 ng/L (MW-3R) and did not exceed the January 2020 NYSDEC Guidance Value of 500 ng/L.
- 1,4-dioxane was detected in 5 of the 6 groundwater samples submitted for analysis and ranged in concentration from 0.0015 µg/L (MW-3R) to 2.09 µg/L (SMWO-MW-2).

7.0 Qualitative Exposure Assessment

An exposure pathway consists of five elements: (1) a contaminant source, (2) a contaminant release, and transport mechanism, (3) a point of exposure, (4) a route of exposure, and (5) a receptor population. An exposure pathway is complete when all five elements of an exposure pathway are complete. If one or more elements is absent, the pathway is potentially incomplete. An exposure pathway may be eliminated from consideration if any one of the five elements has not existed in the past, does not exist in the present, and will not exist in the future.

As discussed in **Section 6.0**, the Site COCs primarily consist of VOCs, SVOCs, and metals in select areas. Sources of these COCs include the waste associated with former use AOC No. 1, industrial waste water associated with the former use of AOC Nos. 3 and 5, and former manufacturing operations associated with AOC Nos. 6 and 7. Impacted environmental media includes soil and groundwater across the Site and sub-slab/indoor air within AOC No. 7. The primary source of groundwater cVOC contamination is likely attributable to the former manufacturing operations associated with AOC Nos. 6 and 7.

Soil contaminant concentrations across the Site do not exceed or marginally exceed applicable Part 375 UUSCOs and do not exceed Part 375 CUSCOs. Detected soil contaminants are limited in extent or are situated such that the source has been determined to not be significant with respect to contaminant fate and transport scenarios.

Groundwater contaminant concentrations within and downgradient of AOC No. 1, within AOC No. 3, upgradient of AOC No. 4, and downgradient of AOC No. 6 exceed Class GA GWQS Values. Based on available information from the Site, shallow groundwater is not utilized for potable or non-potable purposes and ingestion or absorption of contaminated groundwater does not represent a significant potential exposure pathway The limited extent of groundwater impacts reduces the likelihood that someon will be exposed through this pathway. There is a potential for exposure to contaminated groundwater during redevelopment and any associated dewatering activities; however, the frequency and duration of potential exposure to contaminated groundwater is expected to be low and would be mitigated by appropriate health and safety procedures.

Based on the RI sampling results, the following COCs are present at concentrations above SCGs in the various Site environmental media:

- **Soil**: VOCs and metals;
- **Groundwater**: VOCs, SVOCs, metals, and PFAS; and
- **Sub-Slab Vapor/Indoor Air**: VOCs.

Dermal contact, incidental ingestion, or inhalation of vapors or dust represent the potential routes of exposure at the Site. Potential receptors include the property owners, Site visitors, or workers. As such, a qualitative exposure assessment was prepared to evaluate the potential receptor populations to be exposed

to COCs, source material, and environmental media specific above based on the RI findings. The assessment results are presented below:

Considering the current Site conditions, the following exposure routes are considered incomplete:

- **Ingestion – soil and surface water**: Occupancy at the Site is limited to AOC Nos. 7 and 8 with a majority of land being developed and paved. The potential for ingestion (intentional or incidental) of soil or surface water by the property owners, Site visitors, or Site workers is low since these receptor populations would likely be adults who are generally less likely to ingest non-food items and are less sensitive to the potential negative effects of ingesting environmental media. Since the potential for downstream migration of contaminated surface water is low (given the RI surface water sample analytical results) and there are a limited number of residential properties east of the Site, the potential for ingestion of soil and/or surface water by offsite populations is also low. As a result, this exposure route is considered incomplete.
- **Ingestion – groundwater**: There are no known potable water supply wells at the Site. Groundwater monitoring wells at the Site are locked and secured. Therefore, this exposure route is incomplete for potential onsite receptors.

The following exposure routes are considered potentially complete:

- **Dermal contact – soil, groundwater, and surface water**: Although the duration would likely be short, onsite activities (e.g., property maintenance or improvement)) by the property owners, Site visitors, or Site workers could result in contact with impacted media and/or source material. Impacted media and source material may contact skin directly or adhere to and permeate clothing or shoes.
- **Ingestion – groundwater**: Per the online NYSDEC registry, there are active supply wells in the vicinity of the site, including one located directly east of the Woodbury Creek. Therefore, this exposure route for offsite receptors is considered potentially complete.
- **Inhalation of vapors and dust**: There are currently two structures on the Site: AOC No. 7: Main Onsite Warehouse Building and AOC No. 8: Onsite Residential Structure. As exhibited in the RI SVI samples collected from AOC No. 7, potential vapor intrusion into the Main Onsite Warehouse Building is a concern. Historical SVI sampling within AOC No. 8 indicated that sub-slab/indoor air analytical results warranted no further action. As a result of the historical SVI however, the NYSDEC/NYSDOH requested additional sub-slab/indoor air sampling during this RI. TRC was unable to obtain access to AOC No. 8 during completion of this RI, therefore, this exposure route is considered potentially complete. TRC concluded based on the historical SVI sampling within AOC No. 8 (as detailed in **Section 3.1.8**) that no further action was warranted within this structure. The majority of the Site is developed, paved, or vegetated with limited bare areas; therefore, the potential for dust generation by wind, vehicles, or other activities is low. However, potential future construction, maintenance, or remedial activities could result in the generation of and exposure to impacted dust and vapors.

8.0 Conclusions and Recommendations

The purpose of the RI was to evaluate the Site subsurface characteristics; reduce and/or eliminate possible data gaps; identify the source, nature, and extent of contamination, determined the actual or potential threats to public health and the environmental from the contamination, ascertain whether completed routes of exposures exist; and, identify if Interim Remedial Measures (IRMs) are necessary to address contamination and/or Site conditions. The RI SOW included a baseline groundwater sampling event, SVI, subsurface investigations, monitoring well installations, and follow up groundwater sampling. The RI scope additionally expanded to include surface water sampling of the Woodbury Creek and EC groundwater sampling. The RI field investigation activities were implemented between December 2016 and March 2020. The following conclusions and recommendations are based on the findings of the RI, as well as information obtained from prior Site investigations, where known and applicable.

8.1 Subsurface Characteristics

The topography, geology and hydrogeology observed at the Site during the RI are generally consistent with historical documentation except for the bedrock encountered during monitoring well installation. Historic reports indicate the Site is underlain by dolomite and the encountered Site bedrock has been identified as quartzite. This difference is likely attributed to the Site's location near a mapped contact point between three distinct bedrock units, which contain various types of rock (i.e., shale, sandstone, siltstone, granite, gneiss, limestone, etc.). As shown in the cross-sections, included as **Figures 9** through **12**, subsurface soils typically consist of sand with varying amounts of silt and gravel. Appreciable amounts of clay were observed in soil borings completed east and adjacent to AOC Nos. 6 and 7. Shallow overburden groundwater flow is predominantly to the east or southeast in the direction of the Woodbury Creek. Deep overburden and bedrock groundwater flow directions were not determined during this RI due to an insufficient amount of data points.

8.2 Contaminant Sources

The primary source of cVOC contamination is likely attributable to the former manufacturing operations associated with AOC Nos. 6 and 7. Smaller sources of contamination are potentially present in residual impacted soils left in place following remedial excavations within AOC Nos. 1, 3, and 5. The primary source of metals in soil and groundwater is likely attributable to the former Site operations at AOC Nos. 1 and 4.

8.3 Contaminants of Concern

The primary Site COCs are identified as VOCs (primarily cVOCs). Additional Site COCs include SVOCs and metals, however these contaminants have only been identified in limited portions of the Site. PFAS (detected above SCGs at one location) and 1,4-dioxane were detected in the overburden and bedrock groundwater aquifers but were not observed to be wide-spread, nor were they detected at concentrations lower than those identified as the primary COCs.

8.4 Contamination Extent

While cVOCs were observed to be fairly widespread across the Site, the highest soil concentrations were found within one boring (SB-102) in AOC No. 3 and the highest groundwater concentrations were found within AOC No. 3 (MW-105S), upgradient of AOC No. 4, and downgradient of AOC No. 6. Additionally, January 2017 groundwater concentrations of cVOCs exceeded applicable SCGs in the eastern corner of the Site (LF-8, LF-9 LF-10, and BR-3), suggesting possible offsite impacts. No cVOCs were identified in any Woodbury Creek surface water sample collected for analysis.

Elevated cVOC concentrations were found in all sub-slab vapor samples collected from AOC No. 6, indicating that soils, and potentially groundwater, underlying the main warehouse building are possible source material.

8.5 Exposure Pathways

The results of the qualitative human health exposure assessment indicated that the exposure pathways of soil, surface water, and groundwater are incomplete; however, there is a potential for exposure pathways to become complete based on possible dermal contact with soil, surface water, groundwater, and inhalation of dust if construction, maintenance, or similar activities occur at the Site. The exposure pathways for SVI within AOC No. 7: Onsite Main Warehouse Building is considered to be complete based on the co-located sub-slab/indoor air samples collected for analysis. The exposure pathway for SVI within AOC No. 8: Onsite Residential Structure is considered potentially complete. Although the results of historical SVI sampling within AOC No. 8 indicated that no further action was required, additional SVI sampling could not be completed during this RI due to access limitations.

8.6 Recommendations

8.6.1 Additional Investigation Activities

Site COCs, as they relate to each AOC Nos. 1 through 7, have been fully investigated during the RI activities and additional investigation activities are not recommended at this time. It may be necessary in the future to further investigate conditions and further delineate the limits of groundwater impacts to support design of a remedial action, depending on the selected alternative.

Per the request of the NYSDEC and NYSDOH, additional SVI sampling is needed within AOC No. 8. As access could not be obtained during this RI, TRC recommends continuing to pursue access. If access is made, TRC will implement SVI sampling activities as outlined below in **Section 8.6.4.3**.

8.6.2 Recommended Media For No Further Investigation

As the Site is predominately used for commercial purposes and no soil samples exceeded Part 375 CUSCOs where applicable, TRC recommends that no investigation activities be required with respect to

soils in AOC Nos. 1 through 5. Soil within these AOCs has been investigated to an extent where the impacts are known, and source areas have been determined.

Based on the RI groundwater SVOC analytical results where applicable, TRC recommends that no further investigation or sampling be required with these constituents in AOC Nos. 3 and 5. Groundwater SCG exceedances were found in two of the four overburden monitoring wells and were shown to be marginal. Additionally, as outlined in **Section 7.0**, human contact with the impacted groundwater is not likely and can be mitigated with the appropriate measures.

Based on the RI groundwater metal analytical results, TRC recommends that no further investigation or sampling be required with these constituents in AOC No. 1. Groundwater SCG exceedances for metals were found in both monitoring wells installed as part of the RI. The exceedances for iron and manganese are not considered to present a high risk. While these metals may not be indicative of Site contaminants and are typically regulated for aesthetic purposes such as odor, taste, and clarity in drinking water, they me be indicative of the overall geochemical quality of the aquifer. Additionally, as outlined in **Section 7.0** above, human contact with the metals impacted water is not likely and can be mitigated with the appropriate measures.

Based on the RI groundwater EC analytical results, TRC recommends that no further investigation or sampling be required with these constituents across the Site. As stated in **Section 8.3**, PFAS (detected above SCGs at one location) and 1,4-dioxane were detected in the overburden and bedrock groundwater aquifers but were not observed to be wide-spread or were detected at concentrations lower than those identified as the primary COCs. Additionally, as outlined in **Section 7.0**, human contact with the PFAS/1,4-dioxane impacted water is not likely and can be mitigated with the appropriate measures.

8.6.3 Interim Remedial Measures

Based on the results of the RI, additional IRMs are not necessary at this time to address soil or groundwater at the Site.

8.6.4 Additional Monitoring Activities

8.6.4.1 Additional Site Wide Groundwater Sampling Event

It is recommended that one additional Site wide groundwater sampling event be performed to support the RI collected data and establish concentration trends for use/presentation in the FS. To reduce sampling and IDW disposal costs associated with Site monitoring, groundwater samples will be collected from all monitoring wells utilizing passive diffusion bags (PDBs) and submitted for laboratory analysis of TCL VOCs by USEPA Method 8260. Prior to PDB deployment, the monitoring wells will be screened with a PID and gauged for total well depth and depth to water. PDBs will be suspended within each respective monitoring well approximately five feet above the gauged depth to bottom. All PDBs will be retrieved from the Site and submitted to an ELAP accredited laboratory approximately three months following deployment. If it is determined that the Site will require long-term groundwater monitoring, the PDBs will be replaced.

Quality control samples including MS/MSDs, duplicates, and trip blanks will be collected at the frequencies specified in the QAPP. Laboratory deliverables will be in accordance with NYSDEC ASP Category B and subjected to data validation with the issuance of a DUSR.

TRC will provide an Interim Groundwater Sampling Results Letter Report summarizing the completed sampling activities and include a comparison to the applicable NYSDEC guidance.

8.6.4.2 Additional SVI Assessments – AOC Nos. 7 and 8

Due to elevated sub-slab/indoor air concentrations in the 2017 SVI samples collected within AOC No. 7, it is recommended that an additional SVI assessment be performed during the 2020-2021 heating season.

To reduce costs associated with current and potential future SVI samples, TRC proposes to install six semi-permanent sub-slab vapor points adjacent to the March 2017 temporary locations. Each semi-permanent point will be constructed of a stainless-steel VAPOR PIN® device and in general accordance with the *October 2006 Final NYSDOH Soil Vapor Intrusion Guidance*. Each location will be finished with a small flush mount tamper resistant cap to allow access for future sampling. Drawings, showing a cross-sectional view of the VAPOR PIN® device, are provided in **Appendix K**. Standard operating procedures (SOPs) detailing the VAPOR PIN® device installation methods, can be found at www.VaporPin.com. If access can be obtained within AOC No. 8 prior to mobilization, a ninth semi-permanent sub-slab vapor point will be installed within the residence.

Prior to SVI sampling and in accordance with NYSDEC/NYSDOH guidance, all interior and exterior sampling locations and their adjacent vicinities will be inspected/screened for the presence of volatile organic vapor with a PID capable of reading in the ppb range. If interfering conditions, such as open chemical or petroleum products containers are identified, TRC will coordinate with the Site owner/occupants on mitigation methods and whether or not ventilation is required following material removal. The NYSDEC form entitled *Structure Sampling Questionnaire and Building Inventory* will be completed by TRC before and during vapor sampling and is provided for reference in **Appendix L**.

Prior to sample collection, each sub-slab vapor point will be helium leak tested in accordance with NYSDOH methods to ensure the capture of sub-slab vapors, rather than the short circuiting of ambient surface air. Following leak testing, each sub-slab vapor point will be purged of 1 to 3 air volumes and screened for the presence of volatile organic vapor utilizing a PID.

All samples will be collected utilizing batch certified 6-liter Summa® canisters equipped with 8-hour flow regulators and submitted to an ELAP accredited laboratory for the analysis of VOCs by USEPA Method TO-15. Laboratory deliverables will be in accordance with NYSDEC ASP Category B and subjected to data validation with the issuance of a DUSR.

TRC will provide an SVI Assessment Letter Report summarizing the completed sampling activities and include recommendations as appropriate in accordance with NYSDOH guidance.

8.6.5 Focused Feasibility Study

It is recommended that Cornwall proceeds with the preparation of an FFS to develop potential remedial action alternatives which may be used for Site cleanup. The FFS will review alternatives to address the impacts to groundwater (VOCs) and soil vapor concentrations at the Site.

9.0 Certification of Environmental Professionals

TRC completed an RI for the Site by behalf of Cornwall. The focus of the RI was impacts from the Former Star Anchors and Fasteners Site located in Mountainville, New York and performed in accordance with the NYSDEC approved *October 2016 RI/FS Workplan*.

TRC Engineers, Inc.

Prepared By: _____
Justin King
Project Manager

Reviewed By: _____
Jeffrey LaRock, P.G.
Office Practice Leader

I, Jeffrey LaRock, certify that I am currently a New York State Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

_____
Jeffrey LaRock, P.G. (NY)
Office Practice Leader

10.0 References

6 NYCRR 375, Remedial Program Requirements.

6 NYCRR 703, Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations.

NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation, May 2010.

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Site Investigation and Remedial Action Plan, Innovative Recycling Technologies, Inc., February 1997.

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Site Investigation Work Plan, TRC Engineers, Inc., September 2005

Site Investigation Report, TRC Engineers, Inc., January 2006.

Work Plan for the Evaluation of the Unconsolidated Overburden Aquifer, TRC Engineers, Inc., May 2006.

Hazardous Waste Compliance Inspection Date: September 18, 2008 Letter, Cornwall Properties, LLC, December 2008.

Order On Consent and Administrative Settlement Index No. CO 3-20150226-27, executed between Cornwall Properties, LLC and the NYSDEC, October 21, 2015.

Remedial Investigation / Feasibility Study Work Plan, TRC Engineers, Inc., October 2016

Groundwater and Vapor Intrusion Sampling Update, TRC Engineers, Inc., February 2018

Emerging Contaminants Work Plan, TRC Engineers, Inc., November 2018

Table 7
Summary of Analytical Results for Monitoring Well Soil Samples - May 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

			Sample Location:	TRC-MW-104	TRC-MW-105S	TRC-MW-106	TRC-MW-107	TRC-MW-108S	TRC-MW-109
			Lab Sample ID:	L1921587-01	L1919138-01	L1917637-01	L1921400-02	L1918098-01	L1921400-01
			Sample Depth (feet bgs):	9 - 10	7 - 9	13 - 15	8 - 9	17 - 19	9.5 - 10.5
			Sample Date:	05/22/2019	05/08/2019	04/29/2019	05/21/2019	05/01/2019	05/20/2019
Analyte	**Unit**	**UUSCO***	**CUSCO***	**Results**					
VOCs									
Methylene chloride	mg/kg	0.05	500	0.0035 U	0.0043 U	0.0058 U	0.0056 U	0.0046 U	0.3 U
1,1-Dichloroethane	mg/kg	0.27	240	0.0007 U	0.0009 U	0.0008 J	0.0011 U	0.0009 U	**0.54**
Chloroform	mg/kg	0.37	350	0.001 U	0.0013 U	0.0017 U	0.0017 U	0.0011 J	0.089 U
Carbon tetrachloride	mg/kg	0.76	22	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
1,2-Dichloropropane	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
Dibromochloromethane	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
1,1,2-Trichloroethane	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
Tetrachloroethene	mg/kg	1.3	150	0.0004 U	0.0004 U	0.0006 U	0.0008	0.0005 U	0.03 U
Chlorobenzene	mg/kg	1.1	500	0.0004 U	0.0004 U	0.0006 U	0.0006 U	0.0005 U	0.03 U
Trichlorofluoromethane	mg/kg	NC	NC	0.0028 U	0.0034 U	0.0046 U	0.0045 U	0.0036 U	0.24 U
1,2-Dichloroethane	mg/kg	0.27	30	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
1,1,1-Trichloroethane	mg/kg	0.68	500	0.0004 U	0.0004 U	0.0006 U	0.0006 U	0.0005 U	0.085
Bromodichloromethane	mg/kg	NC	NC	0.0004 U	0.0004 U	0.0006 U	0.0006 U	0.0005 U	0.03 U
trans-1,3-Dichloropropene	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
cis-1,3-Dichloropropene	mg/kg	NC	NC	0.0004 U	0.0004 U	0.0006 U	0.0006 U	0.0005 U	0.03 U
Bromoform	mg/kg	NC	NC	0.0028 U	0.0034 U	0.0046 U	0.0045 U	0.0036 U	0.24 U
1,1,2,2-Tetrachloroethane	mg/kg	NC	NC	0.0004 U	0.0004 U	0.0006 U	0.0006 U	0.0005 U	0.03 U
Benzene	mg/kg	0.06	44	0.0004 U	0.0002 J	0.0006 U	0.0006 U	0.0005 U	0.03 U
Toluene	mg/kg	0.7	500	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	**0.49**
Ethylbenzene	mg/kg	1	390	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0002 J	0.035 J
Chloromethane	mg/kg	NC	NC	0.0028 U	0.0034 U	0.0046 UJ	0.0045 U	0.0036 U	0.24 U
Bromomethane	mg/kg	NC	NC	0.0014 U	0.0017 U	0.0023 UJ	0.0022 U	0.0018 U	0.12 U
Vinyl chloride	mg/kg	0.02	13	0.0007 U	0.0009 U	0.0018	0.0011 U	0.0009 U	0.059 U
Chloroethane	mg/kg	NC	NC	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.12 U
1,1-Dichloroethene	mg/kg	0.33	500	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
trans-1,2-Dichloroethene	mg/kg	0.19	500	0.001 U	0.0013 U	0.0017 U	0.0017 U	0.0014 U	0.049 J
Trichloroethene	mg/kg	0.47	200	0.0039	0.0001 J	0.0006 U	0.0006 U	0.0005 U	**0.78**
1,2-Dichlorobenzene	mg/kg	1.1	500	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.12 U
1,3-Dichlorobenzene	mg/kg	2.4	280	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.12 U
1,4-Dichlorobenzene	mg/kg	1.8	130	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.12 U
Methyl tert-butyl ether	mg/kg	0.93	500	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.12 U
m,p-Xylene	mg/kg	0.26	500(a)	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.033 J
o-Xylene	mg/kg	0.26	500(a)	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.024 J
cis-1,2-Dichloroethene	mg/kg	0.25	500	0.0092	0.0006 J	0.0002 J	0.0011 U	0.0009 U	**1.1**
Styrene	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
Dichlorodifluoromethane	mg/kg	NC	NC	0.007 U	0.0086 U	0.012 UJ	0.011 U	0.0091 U	0.59 U
Acetone	mg/kg	0.05	500	0.011	0.0048 J	0.014	0.0055 J	0.013	0.59 U
Carbon disulfide	mg/kg	NC	NC	0.007 U	0.0086 U	0.012 U	0.011 U	0.0091 U	0.59 U
2-Butanone (MEK)	mg/kg	0.12	500	0.005 J	0.0086 U	0.012 U	0.011 U	0.0091 U	0.59 U
4-Methyl-2-pentanone	mg/kg	NC	NC	0.007 U	0.0086 U	0.012 U	0.011 U	0.0091 U	0.59 U
2-Hexanone	mg/kg	NC	NC	0.007 U	0.0086 U	0.012 U	0.011 U	0.0091 U	0.59 U
Bromochloromethane	mg/kg	NC	NC	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.059 U
n-Butylbenzene	mg/kg	12	500	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.086
sec-Butylbenzene	mg/kg	11	500	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.068
tert-Butylbenzene	mg/kg	5.9	500	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.0086 J
1,2-Dibromo-3-chloropropane	mg/kg	NC	NC	0.0021 U	0.0026 U	0.0034 U	0.0034 U	0.0027 U	0.18 U
Isopropylbenzene	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.018 J
4-Isopropyltoluene	mg/kg	NC	NC	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.046 J
Naphthalene	mg/kg	12	500	0.0028 U	0.0034 U	0.0046 U	0.0045 U	0.0036 U	0.16 J
n-Propylbenzene	mg/kg	39	500	0.0007 U	0.0009 U	0.0012 U	0.0011 U	0.0009 U	0.044 J
1,2,4-Trichlorobenzene	mg/kg	NC	NC	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.12 U
1,3,5-Trimethylbenzene	mg/kg	8.4	190	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.091 J
1,2,4-Trimethylbenzene	mg/kg	3.6	190	0.0014 U	0.0017 U	0.0023 U	0.0022 U	0.0018 U	0.22
Methyl acetate	mg/kg	NC	NC	0.0028 U	0.0034 U	0.0046 U	0.0045 U	0.0036 U	0.24 U
Cyclohexane	mg/kg	NC	NC	0.007 U	0.0086 U	0.012 U	0.011 U	0.0091 U	0.054 J
Methylcyclohexane	mg/kg	NC	NC	0.0028 U	0.0034 U	0.0046 U	0.0045 U	0.0036 U	0.24 U
Freon 113	mg/kg	NC	NC	0.0028 U	0.0034 U	0.0046 U	0.0045 U	0.0036 U	0.24 U

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			Sample Depth (feet bgs):	9 - 10	7 - 9	13 - 15	8 - 9	17 - 19	9.5 - 10.5
			Sample Date:	05/22/2019	05/08/2019	04/29/2019	05/21/2019	05/01/2019	05/20/2019
Analyte	**Unit**	**UUSCO***	**CUSCO***	**Results**					
SVOCs									
Acenaphthene	mg/kg	20	500	NA	0.16 U	0.17 U	NA	NA	NA
Hexachlorobenzene	mg/kg	0.33	6	NA	0.12 U	0.12 U	NA	NA	NA
Bis(2-chloroethyl) ether	mg/kg	NC	NC	NA	0.18 U	0.19 U	NA	NA	NA
2-Chloronaphthalene	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
3,3'-Dichlorobenzidine	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2,4-Dinitrotoluene	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2,6-Dinitrotoluene	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Fluoranthene	mg/kg	100	500	NA	0.12 U	0.16	NA	NA	NA
4-Chlorophenyl-phenyl ether	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
4-Bromophenyl-phenylether	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	mg/kg	NC	NC	NA	0.24 U	0.25 UJ	NA	NA	NA
Bis(2-chloroethoxy)methane	mg/kg	NC	NC	NA	0.21 U	0.23 U	NA	NA	NA
Hexachlorobutadiene	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Hexachlorocyclopentadiene	mg/kg	NC	NC	NA	0.56 U	0.6 U	NA	NA	NA
Hexachloroethane	mg/kg	NC	NC	NA	0.16 U	0.17 U	NA	NA	NA
Isophorone	mg/kg	NC	NC	NA	0.18 U	0.19 U	NA	NA	NA
Naphthalene	mg/kg	12	500	NA	0.2 U	0.21 U	NA	NA	NA
Nitrobenzene	mg/kg	NC	NC	NA	0.18 U	0.19 U	NA	NA	NA
N-Nitrosodiphenylamine	mg/kg	NC	NC	NA	0.16 U	0.17 U	NA	NA	NA
n-Nitroso-di-n-propylamine	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Bis(2-ethylhexyl)phthalate	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Butylbenzylphthalate	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Di-n-butylphthalate	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Di-n-octylphthalate	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Diethyl phthalate	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Dimethylphthalate	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Benzo(a)anthracene	mg/kg	1	5.6	NA	0.12 U	0.082 J	NA	NA	NA
Benzo(a)pyrene	mg/kg	1	1	NA	0.16 U	0.085 J	NA	NA	NA
Benzo(b)fluoranthene	mg/kg	1	5.6	NA	0.12 U	0.12	NA	NA	NA
Benzo(k)fluoranthene	mg/kg	0.8	56	NA	0.12 U	0.039 J	NA	NA	NA
Chrysene	mg/kg	1	56	NA	0.12 U	0.08 J	NA	NA	NA
Acenaphthylene	mg/kg	100	500	NA	0.16 U	0.17 U	NA	NA	NA
Anthracene	mg/kg	100	500	NA	0.12 U	0.12 U	NA	NA	NA
Benzo(g,h,i)perylene	mg/kg	100	500	NA	0.16 U	0.06 J	NA	NA	NA
Fluorene	mg/kg	30	500	NA	0.2 U	0.21 U	NA	NA	NA
Phenanthrene	mg/kg	100	500	NA	0.12 U	0.062 J	NA	NA	NA
Dibenz(a,h)anthracene	mg/kg	0.33	0.56	NA	0.12 U	0.12 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	5.6	NA	0.16 U	0.11 J	NA	NA	NA
Pyrene	mg/kg	100	500	NA	0.12 U	0.11 J	NA	NA	NA
1,1'-Biphenyl	mg/kg	NC	NC	NA	0.45 U	0.48 U	NA	NA	NA
4-Chloroaniline	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2-Nitroaniline	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
3-Nitroaniline	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
4-Nitroaniline	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
Dibenzofuran	mg/kg	7	350	NA	0.2 U	0.21 U	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2-Methylnaphthalene	mg/kg	NC	NC	NA	0.24 U	0.25 U	NA	NA	NA
Acetophenone	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2,4,6-Trichlorophenol	mg/kg	NC	NC	NA	0.12 U	0.12 U	NA	NA	NA
4-Chloro-3-methylphenol	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2-Chlorophenol	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2,4-Dichlorophenol	mg/kg	NC	NC	NA	0.18 U	0.19 U	NA	NA	NA
2,4-Dimethylphenol	mg/kg	NC	NC	NA	0.2 U	0.21 U	NA	NA	NA
2-Nitrophenol	mg/kg	NC	NC	NA	0.42 U	0.45 U	NA	NA	NA
4-Nitrophenol	mg/kg	NC	NC	NA	0.27 U	0.29 U	NA	NA	NA
2,4-Dinitrophenol	mg/kg	NC	NC	NA	0.94 U	1 U	NA	NA	NA
4,6-Dinitro-2-methylphenol	mg/kg	NC	NC	NA	0.51 U	0.54 UJ	NA	NA	NA
Pentachlorophenol	mg/kg	NC	NC	NA	0.16 U	0.17 U	NA	NA	NA

Table 7
Summary of Analytical Results for Monitoring Well Soil Samples - May 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

				Sample Location:	TRC-MW-104	TRC-MW-105S	TRC-MW-106	TRC-MW-107	TRC-MW-108S	TRC-MW-109
				Lab Sample ID:	L1921587-01	L1919138-01	L1917637-01	L1921400-02	L1918098-01	L1921400-01
				Sample Depth (feet bgs):	9 - 10	7 - 9	13 - 15	8 - 9	17 - 19	9.5 - 10.5
				Sample Date:	05/22/2019	05/08/2019	04/29/2019	05/21/2019	05/01/2019	05/20/2019
Analyte	**Unit**	**UUSCO***	**CUSCO***		**Results**					
SVOCs (cont.)										
Phenol	mg/kg	0.33	500		NA	0.2 U	0.21 U	NA	NA	NA
2-Methylphenol	mg/kg	0.33	500		NA	0.2 U	0.21 U	NA	NA	NA
3- & 4-Methylphenol	mg/kg	NC	NC		NA	0.28 U	0.3 U	NA	NA	NA
2,4,5-Trichlorophenol	mg/kg	NC	NC		NA	0.2 U	0.21 U	NA	NA	NA
Carbazole	mg/kg	NC	NC		NA	0.2 U	0.21 U	NA	NA	NA
Atrazine	mg/kg	NC	NC		NA	0.16 U	0.17 U	NA	NA	NA
Benzaldehyde	mg/kg	NC	NC		NA	0.26 U	0.28 U	NA	NA	NA
Caprolactam	mg/kg	NC	NC		NA	0.2 U	0.21 U	NA	NA	NA
2,3,4,6-Tetrachlorophenol	mg/kg	NC	NC		NA	0.2 U	0.21 U	NA	NA	NA
Metals, total										
Aluminum	mg/kg	NC	NC		NA	NA	10,400	12,900	NA	9,310
Antimony	mg/kg	NC	NC		NA	NA	4.85 U	1.07 J	NA	1.04 J
Arsenic	mg/kg	13	16		NA	NA	6.92	**13.9**	NA	3.83
Barium	mg/kg	350	400		NA	NA	40.8	88.7	NA	66.1
Beryllium	mg/kg	7.2	590		NA	NA	0.427 J	1.10	NA	0.393 J
Cadmium	mg/kg	2.5	9.3		NA	NA	0.97 U	1.16	NA	0.707 J
Calcium	mg/kg	NC	NC		NA	NA	8,780	1,340	NA	3,710
Chromium	mg/kg	NC	NC		NA	NA	24.8	26.5	NA	12.9
Cobalt	mg/kg	NC	NC		NA	NA	9.28	12.7	NA	8.02
Copper	mg/kg	50	270		NA	NA	19.6	29.8	NA	20.6
Iron	mg/kg	NC	NC		NA	NA	22,900	31,100	NA	18,000
Lead	mg/kg	63	1,000		NA	NA	9.73 J-	18.8	NA	23.4
Magnesium	mg/kg	NC	NC		NA	NA	4,950	3,960	NA	3,760
Manganese	mg/kg	1,600	10,000		NA	NA	395	**2,200**	NA	1,060
Mercury	mg/kg	0.18	2.8		NA	NA	0.079 UJ	0.082 J	NA	0.074 U
Nickel	mg/kg	30	310		NA	NA	22	**30.3**	NA	20.4
Potassium	mg/kg	NC	NC		NA	NA	684	416	NA	486
Selenium	mg/kg	3.9	1,500		NA	NA	1.94 U	2.20 U	NA	1.75 U
Silver	mg/kg	2	1,500		NA	NA	0.97 U	1.10 U	NA	0.873 U
Sodium	mg/kg	NC	NC		NA	NA	194 UJ	21.4 J	NA	35.8 J
Thallium	mg/kg	NC	NC		NA	NA	1.94 U	0.550 J	NA	1.75 U
Vanadium	mg/kg	NC	NC		NA	NA	15.6	26.9	NA	14.9
Zinc	mg/kg	109	10,000		NA	NA	60.2	61.8	NA	**200**

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

J - Estimated value.

J+ - Estimated value; biased high.

NA - Sample not analyzed for the listed analyte.

NC - No NYSDEC standard exists for this analyte.

U - Analyte was not detected at specified quantitation limit.

UJ - Estimated nondetect.

Bold - Indicated that the detected value exceeds the applicable UUSCO.

VOCs - Volatile Organic Compounds.

SVOCs - Semivolatile Organic Compounds.

UUSCO - Unrestricted Use Soil Cleanup Objective.

CUSCO - Commerical Use Soil Cleanup Objective.

* - New York State Department of Enviromental Conservation, Soil Cleanup Objectives.

(a) - Criteria applicable to xylene (total), the sum of the xylene isomers.

Table 7
Summary of Analytical Results for Monitoring Well Soil Samples - May 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

			Sample Location:	TRC-MW-110S	TRC-MW-111	TRC-SB_BMW-207	TRC-SB_BMW-208
			Lab Sample ID:	L1918678-01	L1920300-01	L1918678-02	L1919732-01
			Sample Depth (feet bgs):	9 - 11	11.5	15 - 17	2 - 4
			Sample Date:	05/06/2019	05/15/2019	05/06/2019	05/09/2019
Analyte	**Unit**	**UUSCO***	**CUSCO***	**Results**			
VOCs							
Methylene chloride	mg/kg	0.05	500	0.38 U	0.0061 U	0.0045 U	0.0046 U
1,1-Dichloroethane	mg/kg	0.27	240	0.033 J	0.0012 U	0.0009 U	0.002
Chloroform	mg/kg	0.37	350	0.11 U	0.0018 U	0.0013 U	0.0014 U
Carbon tetrachloride	mg/kg	0.76	22	0.076 U	0.0012 U	0.0009 U	0.0009 U
1,2-Dichloropropane	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
Dibromochloromethane	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
1,1,2-Trichloroethane	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
Tetrachloroethene	mg/kg	1.3	150	**1.4**	0.0006 U	0.0005 U	0.001
Chlorobenzene	mg/kg	1.1	500	0.038 U	0.0006 U	0.0005 U	0.0005 U
Trichlorofluoromethane	mg/kg	NC	NC	0.3 U	0.0049 U	0.0036 U	0.0037 U
1,2-Dichloroethane	mg/kg	0.27	30	0.076 U	0.0012 U	0.0009 U	0.0009 U
1,1,1-Trichloroethane	mg/kg	0.68	500	0.11	0.0006 U	0.0005 U	0.0004 J
Bromodichloromethane	mg/kg	NC	NC	0.038 U	0.0006 U	0.0005 U	0.0005 U
trans-1,3-Dichloropropene	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
cis-1,3-Dichloropropene	mg/kg	NC	NC	0.038 U	0.0006 U	0.0005 U	0.0005 U
Bromoform	mg/kg	NC	NC	0.3 U	0.0049 U	0.0036 U	0.0037 U
1,1,2,2-Tetrachloroethane	mg/kg	NC	NC	0.038 U	0.0006 U	0.0005 U	0.0005 U
Benzene	mg/kg	0.06	44	0.038 U	0.0006 U	0.0005 U	0.0008
Toluene	mg/kg	0.7	500	0.076 U	0.0012 U	0.0009 U	0.0009
Ethylbenzene	mg/kg	1	390	0.076 U	0.0012 U	0.0009 U	0.0009 U
Chloromethane	mg/kg	NC	NC	0.3 U	0.0049 U	0.0036 U	0.0037 U
Bromomethane	mg/kg	NC	NC	0.095 J	0.0024 U	0.0018 U	0.0018 U
Vinyl chloride	mg/kg	0.02	13	0.076 U	0.0012 U	0.0009 U	0.0009 U
Chloroethane	mg/kg	NC	NC	0.15 U	0.0024 U	0.0018 U	0.0018 U
1,1-Dichloroethene	mg/kg	0.33	500	0.076 U	0.0012 U	0.0009 U	0.0009 U
trans-1,2-Dichloroethene	mg/kg	0.19	500	0.11 U	0.0018 U	0.0013 U	0.0014 U
Trichloroethene	mg/kg	0.47	200	0.32	0.0006 U	0.0005 U	0.0025
1,2-Dichlorobenzene	mg/kg	1.1	500	0.15 U	0.0024 U	0.0018 U	0.0018 U
1,3-Dichlorobenzene	mg/kg	2.4	280	0.15 U	0.0024 U	0.0018 U	0.0018 U
1,4-Dichlorobenzene	mg/kg	1.8	130	0.15 U	0.0024 U	0.0018 U	0.0018 U
Methyl tert-butyl ether	mg/kg	0.93	500	0.15 U	0.0024 U	0.0018 U	0.0018 U
m,p-Xylene	mg/kg	0.26	500(a)	0.15 U	0.0024 U	0.0018 U	0.0018 U
o-Xylene	mg/kg	0.26	500(a)	0.076 U	0.0012 U	0.0009 U	0.0009 U
cis-1,2-Dichloroethene	mg/kg	0.25	500	0.16	0.0012 U	0.0009 U	0.0036
Styrene	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
Dichlorodifluoromethane	mg/kg	NC	NC	0.76 U	0.012 U	0.0089 U	0.0092 U
Acetone	mg/kg	0.05	500	0.76 U	0.012 U	0.007 J	0.05
Carbon disulfide	mg/kg	NC	NC	0.76 U	0.012 U	0.0089 U	0.0092 U
2-Butanone (MEK)	mg/kg	0.12	500	0.76 U	0.012 U	0.0089 U	0.0071 J
4-Methyl-2-pentanone	mg/kg	NC	NC	0.76 U	0.012 U	0.0089 U	0.0092 U
2-Hexanone	mg/kg	NC	NC	0.76 U	0.012 U	0.0089 U	0.0092 U
Bromochloromethane	mg/kg	NC	NC	NA	NA	NA	NA
1,2-Dibromoethane	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
n-Butylbenzene	mg/kg	12	500	0.076 U	0.0012 U	0.0009 U	0.0009 U
sec-Butylbenzene	mg/kg	11	500	0.076 U	0.0012 U	0.0009 U	0.0009 U
tert-Butylbenzene	mg/kg	5.9	500	0.15 U	0.0024 U	0.0018 U	0.0018 U
1,2-Dibromo-3-chloropropane	mg/kg	NC	NC	0.23 U	0.0037 U	0.0027 U	0.0028 U
Isopropylbenzene	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
4-Isopropyltoluene	mg/kg	NC	NC	0.076 U	0.0012 U	0.0009 U	0.0009 U
Naphthalene	mg/kg	12	500	0.3 U	0.0049 U	0.0036 U	0.0037 U
n-Propylbenzene	mg/kg	39	500	0.076 U	0.0012 U	0.0009 U	0.0009 U
1,2,4-Trichlorobenzene	mg/kg	NC	NC	0.15 U	0.0024 U	0.0018 U	0.0018 U
1,3,5-Trimethylbenzene	mg/kg	8.4	190	0.15 U	0.0024 U	0.0018 U	0.0018 U
1,2,4-Trimethylbenzene	mg/kg	3.6	190	0.15 U	0.0024 U	0.0018 U	0.0018 U
Methyl acetate	mg/kg	NC	NC	0.3 U	0.0017 J	0.0036 U	0.0037 U
Cyclohexane	mg/kg	NC	NC	0.76 U	0.012 U	0.0089 U	0.0092 U
Methylcyclohexane	mg/kg	NC	NC	0.3 U	0.0049 U	0.0036 U	0.0037 U
Freon 113	mg/kg	NC	NC	0.3 U	0.0049 U	0.0036 U	0.0037 U

Table 7
Summary of Analytical Results for Monitoring Well Soil Samples - May 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

			Sample Location:	TRC-MW-110S	TRC-MW-111	TRC-SB_BMW-207	TRC-SB_BMW-208
			Lab Sample ID:	L1918678-01	L1920300-01	L1918678-02	L1919732-01
			Sample Depth (feet bgs):	9 - 11	11.5	15 - 17	2 - 4
			Sample Date:	05/06/2019	05/15/2019	05/06/2019	05/09/2019
Analyte	**Unit**	**UUSCO***	**CUSCO***	**Results**			
SVOCs							
Acenaphthene	mg/kg	20	500	NA	NA	NA	0.17 U
Hexachlorobenzene	mg/kg	0.33	6	NA	NA	NA	0.13 U
Bis(2-chloroethyl) ether	mg/kg	NC	NC	NA	NA	NA	0.19 U
2-Chloronaphthalene	mg/kg	NC	NC	NA	NA	NA	0.21 U
3,3'-Dichlorobenzidine	mg/kg	NC	NC	NA	NA	NA	0.21 U
2,4-Dinitrotoluene	mg/kg	NC	NC	NA	NA	NA	0.21 U
2,6-Dinitrotoluene	mg/kg	NC	NC	NA	NA	NA	0.21 U
Fluoranthene	mg/kg	100	500	NA	NA	NA	0.032 J
4-Chlorophenyl-phenyl ether	mg/kg	NC	NC	NA	NA	NA	0.21 U
4-Bromophenyl-phenylether	mg/kg	NC	NC	NA	NA	NA	0.21 U
2,2'-Oxybis(1-chloropropane)	mg/kg	NC	NC	NA	NA	NA	0.25 U
Bis(2-chloroethoxy)methane	mg/kg	NC	NC	NA	NA	NA	0.23 U
Hexachlorobutadiene	mg/kg	NC	NC	NA	NA	NA	0.21 U
Hexachlorocyclopentadiene	mg/kg	NC	NC	NA	NA	NA	0.61 U
Hexachloroethane	mg/kg	NC	NC	NA	NA	NA	0.17 U
Isophorone	mg/kg	NC	NC	NA	NA	NA	0.19 U
Naphthalene	mg/kg	12	500	NA	NA	NA	0.21 U
Nitrobenzene	mg/kg	NC	NC	NA	NA	NA	0.19 U
N-Nitrosodiphenylamine	mg/kg	NC	NC	NA	NA	NA	0.17 U
n-Nitroso-di-n-propylamine	mg/kg	NC	NC	NA	NA	NA	0.21 U
Bis(2-ethylhexyl)phthalate	mg/kg	NC	NC	NA	NA	NA	0.21 U
Butylbenzylphthalate	mg/kg	NC	NC	NA	NA	NA	0.21 U
Di-n-butylphthalate	mg/kg	NC	NC	NA	NA	NA	0.21 U
Di-n-octylphthalate	mg/kg	NC	NC	NA	NA	NA	0.21 U
Diethyl phthalate	mg/kg	NC	NC	NA	NA	NA	0.21 U
Dimethylphthalate	mg/kg	NC	NC	NA	NA	NA	0.21 U
Benzo(a)anthracene	mg/kg	1	5.6	NA	NA	NA	0.13 U
Benzo(a)pyrene	mg/kg	1	1	NA	NA	NA	0.17 U
Benzo(b)fluoranthene	mg/kg	1	5.6	NA	NA	NA	0.13 U
Benzo(k)fluoranthene	mg/kg	0.8	56	NA	NA	NA	0.13 U
Chrysene	mg/kg	1	56	NA	NA	NA	0.044 J
Acenaphthylene	mg/kg	100	500	NA	NA	NA	0.17 U
Anthracene	mg/kg	100	500	NA	NA	NA	0.13 U
Benzo(g,h,i)perylene	mg/kg	100	500	NA	NA	NA	0.17 U
Fluorene	mg/kg	30	500	NA	NA	NA	0.21 U
Phenanthrene	mg/kg	100	500	NA	NA	NA	0.13 U
Dibenz(a,h)anthracene	mg/kg	0.33	0.56	NA	NA	NA	0.13 U
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	5.6	NA	NA	NA	0.17 U
Pyrene	mg/kg	100	500	NA	NA	NA	0.044 J
1,1'-Biphenyl	mg/kg	NC	NC	NA	NA	NA	0.48 U
4-Chloroaniline	mg/kg	NC	NC	NA	NA	NA	0.21 U
2-Nitroaniline	mg/kg	NC	NC	NA	NA	NA	0.21 U
3-Nitroaniline	mg/kg	NC	NC	NA	NA	NA	0.21 U
4-Nitroaniline	mg/kg	NC	NC	NA	NA	NA	0.21 U
Dibenzofuran	mg/kg	7	350	NA	NA	NA	0.21 U
1,2,4,5-Tetrachlorobenzene	mg/kg	NC	NC	NA	NA	NA	0.21 U
2-Methylnaphthalene	mg/kg	NC	NC	NA	NA	NA	0.25 U
Acetophenone	mg/kg	NC	NC	NA	NA	NA	0.21 U
2,4,6-Trichlorophenol	mg/kg	NC	NC	NA	NA	NA	0.13 U
4-Chloro-3-methylphenol	mg/kg	NC	NC	NA	NA	NA	0.21 U
2-Chlorophenol	mg/kg	NC	NC	NA	NA	NA	0.21 U
2,4-Dichlorophenol	mg/kg	NC	NC	NA	NA	NA	0.19 U
2,4-Dimethylphenol	mg/kg	NC	NC	NA	NA	NA	0.21 U
2-Nitrophenol	mg/kg	NC	NC	NA	NA	NA	0.46 U
4-Nitrophenol	mg/kg	NC	NC	NA	NA	NA	0.3 U
2,4-Dinitrophenol	mg/kg	NC	NC	NA	NA	NA	1 U
4,6-Dinitro-2-methylphenol	mg/kg	NC	NC	NA	NA	NA	0.55 U
Pentachlorophenol	mg/kg	NC	NC	NA	NA	NA	0.17 U

Table 7
Summary of Analytical Results for Monitoring Well Soil Samples - May 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

			Sample Location:	TRC-MW-110S	TRC-MW-111	TRC-SB_BMW-207	TRC-SB_BMW-208
			Lab Sample ID:	L1918678-01	L1920300-01	L1918678-02	L1919732-01
			Sample Depth (feet bgs):	9 - 11	11.5	15 - 17	2 - 4
			Sample Date:	05/06/2019	05/15/2019	05/06/2019	05/09/2019
Analyte	**Unit**	**UUSCO***	**CUSCO***	**Results**			
SVOCs (cont.)							
Phenol	mg/kg	0.33	500	NA	NA	NA	0.21 U
2-Methylphenol	mg/kg	0.33	500	NA	NA	NA	0.21 U
3- & 4-Methylphenol	mg/kg	NC	NC	NA	NA	NA	0.3 U
2,4,5-Trichlorophenol	mg/kg	NC	NC	NA	NA	NA	0.21 U
Carbazole	mg/kg	NC	NC	NA	NA	NA	0.21 U
Atrazine	mg/kg	NC	NC	NA	NA	NA	0.17 U
Benzaldehyde	mg/kg	NC	NC	NA	NA	NA	0.28 U
Caprolactam	mg/kg	NC	NC	NA	NA	NA	0.21 U
2,3,4,6-Tetrachlorophenol	mg/kg	NC	NC	NA	NA	NA	0.21 U
Metals, total							
Aluminum	mg/kg	NC	NC	NA	NA	NA	NA
Antimony	mg/kg	NC	NC	NA	NA	NA	NA
Arsenic	mg/kg	13	16	NA	NA	NA	NA
Barium	mg/kg	350	400	NA	NA	NA	NA
Beryllium	mg/kg	7.2	590	NA	NA	NA	NA
Cadmium	mg/kg	2.5	9.3	NA	NA	NA	NA
Calcium	mg/kg	NC	NC	NA	NA	NA	NA
Chromium	mg/kg	NC	NC	NA	NA	NA	NA
Cobalt	mg/kg	NC	NC	NA	NA	NA	NA
Copper	mg/kg	50	270	NA	NA	NA	NA
Iron	mg/kg	NC	NC	NA	NA	NA	NA
Lead	mg/kg	63	1,000	NA	NA	NA	NA
Magnesium	mg/kg	NC	NC	NA	NA	NA	NA
Manganese	mg/kg	1,600	10,000	NA	NA	NA	NA
Mercury	mg/kg	0.18	2.8	NA	NA	NA	NA
Nickel	mg/kg	30	310	NA	NA	NA	NA
Potassium	mg/kg	NC	NC	NA	NA	NA	NA
Selenium	mg/kg	3.9	1,500	NA	NA	NA	NA
Silver	mg/kg	2	1,500	NA	NA	NA	NA
Sodium	mg/kg	NC	NC	NA	NA	NA	NA
Thallium	mg/kg	NC	NC	NA	NA	NA	NA
Vanadium	mg/kg	NC	NC	NA	NA	NA	NA
Zinc	mg/kg	109	10,000	NA	NA	NA	NA

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

J - Estimated value.

J+ - Estimated value; biased high.

NA - Sample not analyzed for the listed analyte.

NC - No NYSDEC standard exists for this analyte.

U - Analyte was not detected at specified quantitation limit.

UJ - Estimated nondetect.

Bold - Indicated that the detected value exceeds the applicable UUSCO.

VOCs - Volatile Organic Compounds.

SVOCs - Semivolatile Organic Compounds.

UUSCO - Unrestricted Use Soil Cleanup Objective.

CUSCO - Commerical Use Soil Cleanup Objective.

* - New York State Department of Enviromental Conservation, Soil Cleanup Objectives.

(a) - Criteria applicable to xylene (total), the sum of the xylene isomers.

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

	Sample Location:		BR-3	MW-3R		BMW-204	BMW-205	BMW-207
	Sample Name:		STAR-BR-3	STAR-MW-3R	STAR-MW-3R	STAR-BMW-204	STAR-BMW-205	STAR-BMW-207
	Sample Date:		07/24/2019	07/23/2019	08/06/2019	07/23/2019	07/24/2019	07/24/2019
Analyte	**Unit**	**GWQS***	**Results**					
VOCs								
Methylene chloride	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,1-Dichloroethane	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Chloroform	ug/L	7	NA	NA	NA	2.5 U	2.5 U	2.5 U
Carbon tetrachloride	ug/L	5	NA	NA	NA	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	ug/L	1	NA	NA	NA	1 U	1 U	1 U
Dibromochloromethane	ug/L	50	NA	NA	NA	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	ug/L	1	NA	NA	NA	1.5 U	1.5 U	1.5 U
Tetrachloroethene	ug/L	5	NA	NA	NA	0.5 U	0.5 U	0.5 U
Chlorobenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Trichlorofluoromethane	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,2-Dichloroethane	ug/L	0.6	NA	NA	NA	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	ug/L	5	NA	NA	NA	2.5 U	0.8 J	2.5 U
Bromodichloromethane	ug/L	50	NA	NA	NA	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	ug/L	0.4(a)	NA	NA	NA	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	ug/L	0.4(a)	NA	NA	NA	0.5 U	0.5 U	0.5 U
Bromoform	ug/L	50	NA	NA	NA	2 U	2 U	2 U
1,1,2,2-Tetrachloroethane	ug/L	5	NA	NA	NA	0.5 U	0.5 U	0.5 U
Benzene	ug/L	1	NA	NA	NA	0.5 U	0.33 J	0.5 U
Toluene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Ethylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Chloromethane	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Bromomethane	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Vinyl chloride	ug/L	2	NA	NA	NA	1 U	1 U	1 U
Chloroethane	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,1-Dichloroethene	ug/L	5	NA	NA	NA	0.5 U	0.46 J	0.5 U
trans-1,2-Dichloroethene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Trichloroethene	ug/L	5	NA	NA	NA	0.5 U	0.5 U	0.5 U
1,2-Dichlorobenzene	ug/L	3	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,3-Dichlorobenzene	ug/L	3	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,4-Dichlorobenzene	ug/L	3	NA	NA	NA	2.5 U	2.5 U	2.5 U
Methyl tert-butyl ether	ug/L	10	NA	NA	NA	2.5 U	2.5 U	2.5 U
m,p-Xylene	ug/L	5(b)	NA	NA	NA	2.5 U	2.5 U	2.5 U
o-Xylene	ug/L	5(b)	NA	NA	NA	2.5 U	2.5 U	2.5 U
cis-1,2-Dichloroethene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Styrene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Dichlorodifluoromethane	ug/L	5	NA	NA	NA	5 U	5 U	5 U
Acetone	ug/L	50	NA	NA	NA	8.1	8.6	7.7
Carbon disulfide	ug/L	60	NA	NA	NA	5 U	5 U	1.3 J
2-Butanone (MEK)	ug/L	50	NA	NA	NA	5 U	5 U	5 U
4-Methyl-2-pentanone	ug/L	NC	NA	NA	NA	5 U	5 U	5 U
2-Hexanone	ug/L	50	NA	NA	NA	5 U	5 U	5 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	0.0006	NA	NA	NA	2 U	2 U	2 U
n-Butylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
sec-Butylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
tert-Butylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,2-Dibromo-3-chloropropane	ug/L	0.04	NA	NA	NA	2.5 U	2.5 U	2.5 U
Isopropylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
4-Isopropyltoluene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Naphthalene	ug/L	10	NA	NA	NA	2.5 U	2.5 U	2.5 U
n-Propylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,2,4-Trichlorobenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,3,5-Trimethylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,2,4-Trimethylbenzene	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
Methyl acetate	ug/L	NC	NA	NA	NA	2 U	2 U	2 U
Cyclohexane	ug/L	NC	NA	NA	NA	10 U	10 U	10 U
Methylcyclohexane	ug/L	NC	NA	NA	NA	10 U	10 U	10 U
Freon 113	ug/L	5	NA	NA	NA	2.5 U	2.5 U	2.5 U
1,4-Dioxane	ug/L	NC	0.24	NA	0.0015	NA	NA	NA
SVOCs								
1,2,4-Trichlorobenzene	ug/L	5	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl) ether	ug/L	1	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	ug/L	3	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	ug/L	3	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	ug/L	3	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	ug/L	5	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	ug/L	5	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	ug/L	5	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenyl ether	ug/L	NC	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	ug/L	NC	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	ug/L	5	NA	NA	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	ug/L	5	NA	NA	NA	NA	NA	NA

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

		Sample Location:	BR-3	MW-3R		BMW-204	BMW-205	BMW-207
		Sample Name:	STAR-BR-3	STAR-MW-3R	STAR-MW-3R	STAR-BMW-204	STAR-BMW-205	STAR-BMW-207
		Sample Date:	07/24/2019	07/23/2019	08/06/2019	07/23/2019	07/24/2019	07/24/2019
Analyte	**Unit**	**GWQS***	**Results**					
SVOCs (cont.)								
Hexachlorocyclopentadiene	ug/L	5	NA	NA	NA	NA	NA	NA
Isophorone	ug/L	50	NA	NA	NA	NA	NA	NA
Nitrobenzene	ug/L	0.4	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	ug/L	50	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	ug/L	NC	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	ug/L	5	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	ug/L	50	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	ug/L	50	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	ug/L	50	NA	NA	NA	NA	NA	NA
Diethyl phthalate	ug/L	50	NA	NA	NA	NA	NA	NA
Dimethylphthalate	ug/L	50	NA	NA	NA	NA	NA	NA
1,1'-Biphenyl	ug/L	5	NA	NA	NA	NA	NA	NA
4-Chloroaniline	ug/L	5	NA	NA	NA	NA	NA	NA
2-Nitroaniline	ug/L	5	NA	NA	NA	NA	NA	NA
3-Nitroaniline	ug/L	5	NA	NA	NA	NA	NA	NA
4-Nitroaniline	ug/L	5	NA	NA	NA	NA	NA	NA
Dibenzofuran	ug/L	NC	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	ug/L	5	NA	NA	NA	NA	NA	NA
Acetophenone	ug/L	NC	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
2-Chlorophenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	ug/L	5	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	ug/L	50	NA	NA	NA	NA	NA	NA
2-Nitrophenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
4-Nitrophenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	ug/L	10	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
Phenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
2-Methylphenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
3- & 4-Methylphenol (m,p-Cresol)	ug/L	1(c)	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
Benzoic acid	ug/L	NC	NA	NA	NA	NA	NA	NA
Benzyl alcohol	ug/L	NC	NA	NA	NA	NA	NA	NA
Carbazole	ug/L	NC	NA	NA	NA	NA	NA	NA
Acenaphthene	ug/L	20	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	ug/L	10	NA	NA	NA	NA	NA	NA
Fluoranthene	ug/L	50	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	ug/L	0.04	NA	NA	NA	NA	NA	NA
Naphthalene	ug/L	10	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	ug/L	0.002	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	ug/L	ND	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	ug/L	0.002	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	ug/L	0.002	NA	NA	NA	NA	NA	NA
Chrysene	ug/L	0.002	NA	NA	NA	NA	NA	NA
Acenaphthylene	ug/L	NC	NA	NA	NA	NA	NA	NA
Anthracene	ug/L	50	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	ug/L	NC	NA	NA	NA	NA	NA	NA
Fluorene	ug/L	50	NA	NA	NA	NA	NA	NA
Phenanthrene	ug/L	50	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	ug/L	NC	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	ug/L	0.002	NA	NA	NA	NA	NA	NA
Pyrene	ug/L	50	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	ug/L	NC	NA	NA	NA	NA	NA	NA
Pentachlorophenol	ug/L	1(c)	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	ug/L	0.5	NA	NA	NA	NA	NA	NA
Hexachloroethane	ug/L	5	NA	NA	NA	NA	NA	NA
Metals, total								
Aluminum	ug/L	NC	NA	NA	NA	NA	NA	NA
Antimony	ug/L	3	NA	NA	NA	NA	NA	NA
Arsenic	ug/L	25	NA	NA	NA	NA	NA	NA
Barium	ug/L	1,000	NA	NA	NA	NA	NA	NA
Beryllium	ug/L	3	NA	NA	NA	NA	NA	NA
Cadmium	ug/L	5	NA	NA	NA	NA	NA	NA
Calcium	ug/L	NC	NA	NA	NA	NA	NA	NA
Chromium	ug/L	50	NA	NA	NA	NA	NA	NA
Cobalt	ug/L	NC	NA	NA	NA	NA	NA	NA
Copper	ug/L	200	NA	NA	NA	NA	NA	NA
Iron	ug/L	300	NA	NA	NA	NA	NA	NA
Lead	ug/L	25	NA	NA	NA	NA	NA	NA

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

	Sample Location:		BR-3	MW-3R		BMW-204	BMW-205	BMW-207
	Sample Name:		STAR-BR-3	STAR-MW-3R	STAR-MW-3R	STAR-BMW-204	STAR-BMW-205	STAR-BMW-207
	Sample Date:		07/24/2019	07/23/2019	08/06/2019	07/23/2019	07/24/2019	07/24/2019
Analyte	**Unit**	**GWQS***	**Results**					
Metals, total (cont.)								
Magnesium	ug/L	35,000	NA	NA	NA	NA	NA	NA
Manganese	ug/L	300	NA	NA	NA	NA	NA	NA
Mercury	ug/L	0.7	NA	NA	NA	NA	NA	NA
Nickel	ug/L	100	NA	NA	NA	NA	NA	NA
Potassium	ug/L	NC	NA	NA	NA	NA	NA	NA
Selenium	ug/L	10	NA	NA	NA	NA	NA	NA
Silver	ug/L	50	NA	NA	NA	NA	NA	NA
Sodium	ug/L	20,000	NA	NA	NA	NA	NA	NA
Thallium	ug/L	0.5	NA	NA	NA	NA	NA	NA
Vanadium	ug/L	NC	NA	NA	NA	NA	NA	NA
Zinc	ug/L	2,000	NA	NA	NA	NA	NA	NA
PFAS								
Perfluorobutanoic acid (PFBA)	ng/L	100**	0.712 J	5.91	NA	NA	NA	NA
Perfluoropentanoic acid (PFPeA)	ng/L	100**	1.78 U	5.15	NA	NA	NA	NA
Perfluorobutanesulfonic acid (PFBS)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluorohexanoic acid (PFHxA)	ng/L	100**	0.463 J	7.08	NA	NA	NA	NA
Perfluoroheptanoic acid (PFHpA)	ng/L	100**	0.228 J	4.5	NA	NA	NA	NA
Perfluorohexanesulfonic acid (PFHxS)	ng/L	100**	1.78 U	1.93	NA	NA	NA	NA
Perfluorooctanoic acid (PFOA)	ng/L	10**	0.520 J	**25.8**	NA	NA	NA	NA
6:2 Perfluorooctane Sulfonate (6:2 FTS)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluoroheptanesulfonic acid (PFHpS)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluorononanoic acid (PFNA)	ng/L	100**	1.78 U	2.79	NA	NA	NA	NA
Perfluorooctanesulfonic acid (PFOS)	ng/L	10**	0.733 J	**32.4**	NA	NA	NA	NA
Perfluorodecanoic acid (PFDA)	ng/L	100**	1.78 U	0.426 J	NA	NA	NA	NA
8:2 Perfluorodecane Sulfonate (8:2 FTS)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
2-(N-methyl perfluorooctanesulfonamido) acetic acid (N-MeFOSA	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluoroundecanoic acid (PFUnA)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluorodecanesulfonic acid (PFDS)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluorooctane Sulfonamide (PFOSA)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
N-Ethyl-N-((heptadecafluorooctyl)sulphonyl) glycine (N-EtFOSAA	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluorododecanoic acid (PFDoA)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluorotridecanoic acid (PFTriA)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Perfluorotetradecanoic acid (PFTeA)	ng/L	100**	1.78 U	1.85 U	NA	NA	NA	NA
Total PFAS	ng/L	500**	2.66 J	85.986	NA	NA	NA	NA

Notes:
ng/L - nanograms per liter.
ug/L - micrograms per liter.
J - Estimated value.
J+ - Estimated value; biased high.
NA - Sample not analyzed for the listed analyte.
ND - A non-detectable concentration by the approved analytical method specified in section 700.3 of the NYCRR Water Quality Regulations.
NC - No NYSDEC Class GA Value exists for this analyte.
U - Analyte was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Bold - Indicated the detected value exceeds the applicable GWQS.
VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PFAS - Per- and Polyfluoroalkyl Substances.
(a) - criteria applicable to the sum of the cis and trans isomers.
(b) - criteria applicable to xylenes, the sum of the xylene isomers.
(c) - criteria applicable to total phenolics.
GWQS - Groundwater Quality Standard
* - NYSDEC Ambient Water Quality Standards and Guidance Values for Class GA water, June 1998 with the April 2000 Addendum.
** - Guidelines for Sampling and Analysis of PFAS, NYSDEC Part 375 Remedial Programs, January 2020.

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

	Sample Location:		MW-104S	MW-104D	MW-105D		MW-105S	MW-106S
	Sample Name:		STAR-MW-104S	STAR-MW-104D	STAR-MW-105D	STAR-DUP-1	STAR-MW-105S	STAR-MW-106S
	Sample Date:		07/24/2019	07/24/2019	07/23/2019	07/23/2019	07/23/2019	07/23/2019
Analyte	**Unit**	**GWQS***	**Results**					
VOCs								
Methylene chloride	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,1-Dichloroethane	ug/L	5	1.1 J	2.5 U	2.5 U	2.5 U	**5.9 J**	2.5 U
Chloroform	ug/L	7	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Carbon tetrachloride	ug/L	5	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
1,2-Dichloropropane	ug/L	1	1 U	1 U	1 U	1 U	2.5 U	1 U
Dibromochloromethane	ug/L	50	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
1,1,2-Trichloroethane	ug/L	1	1.5 U	1.5 U	1.5 U	1.5 U	3.8 U	1.5 U
Tetrachloroethene	ug/L	5	0.86	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
Chlorobenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Trichlorofluoromethane	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,2-Dichloroethane	ug/L	0.6	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
1,1,1-Trichloroethane	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Bromodichloromethane	ug/L	50	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
trans-1,3-Dichloropropene	ug/L	0.4(a)	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
cis-1,3-Dichloropropene	ug/L	0.4(a)	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
Bromoform	ug/L	50	2 U	2 U	2 U	2 U	5 U	2 U
1,1,2,2-Tetrachloroethane	ug/L	5	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
Benzene	ug/L	1	0.5 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
Toluene	ug/L	5	1.6 J	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Ethylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Chloromethane	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Bromomethane	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 UJ	2.5 U
Vinyl chloride	ug/L	2	**8**	1 U	0.12 J	0.1 J	**68**	1.4
Chloroethane	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,1-Dichloroethene	ug/L	5	0.96	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U
trans-1,2-Dichloroethene	ug/L	5	0.91 J	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Trichloroethene	ug/L	5	**72**	0.18 J	0.5 U	0.5 U	1.2 U	0.5 U
1,2-Dichlorobenzene	ug/L	3	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,3-Dichlorobenzene	ug/L	3	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,4-Dichlorobenzene	ug/L	3	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Methyl tert-butyl ether	ug/L	10	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
m,p-Xylene	ug/L	5(b)	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
o-Xylene	ug/L	5(b)	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
cis-1,2-Dichloroethene	ug/L	5	**120**	2.5 U	2.5 U	2.5 U	**220**	3.7
Styrene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Dichlorodifluoromethane	ug/L	5	5 U	5 U	5 U	5 U	12 UJ	5 U
Acetone	ug/L	50	12	9.3	12	11	12 U	11
Carbon disulfide	ug/L	60	5 U	5 U	5 U	5 U	12 U	5 U
2-Butanone (MEK)	ug/L	50	2.9 J	5.1	5 U	5 U	12 U	5 U
4-Methyl-2-pentanone	ug/L	NC	5 U	5 U	5 U	5 U	12 U	5 U
2-Hexanone	ug/L	50	5 U	5 U	5 U	5 U	12 U	5 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	0.0006	2 U	2 U	2 U	2 U	5 U	2 U
n-Butylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
sec-Butylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
tert-Butylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,2-Dibromo-3-chloropropane	ug/L	0.04	2.5 U	2.5 U	2.5 U	2.5 U	6.2 UJ	2.5 U
Isopropylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
4-Isopropyltoluene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Naphthalene	ug/L	10	2.5 U	2.5 U	2.5 U	2.5 U	6.2 UJ	2.5 U
n-Propylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,2,4-Trichlorobenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 UJ	2.5 U
1,3,5-Trimethylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,2,4-Trimethylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
Methyl acetate	ug/L	NC	2 U	2 U	2 U	2 U	5 U	2 U
Cyclohexane	ug/L	NC	10 U	10 U	10 U	10 U	25 U	10 U
Methylcyclohexane	ug/L	NC	0.48 J	10 U	10 U	10 U	25 U	10 U
Freon 113	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U
1,4-Dioxane	ug/L	NC	NA	NA	NA	NA	0.478	NA
SVOCs								
1,2,4-Trichlorobenzene	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
Bis(2-chloroethyl) ether	ug/L	1	NA	NA	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	ug/L	3	NA	NA	2 U	2 U	2 U	2 U
1,3-Dichlorobenzene	ug/L	3	NA	NA	2 U	2 U	2 U	2 U
1,4-Dichlorobenzene	ug/L	3	NA	NA	2 U	2 U	2 U	2 U
3,3'-Dichlorobenzidine	ug/L	5	NA	NA	5 U	5 U	5 UJ	5 U
2,4-Dinitrotoluene	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
2,6-Dinitrotoluene	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
4-Chlorophenyl-phenyl ether	ug/L	NC	NA	NA	2 U	2 U	2 U	2 U
4-Bromophenyl-phenylether	ug/L	NC	NA	NA	2 U	2 U	2 U	2 U
2,2'-Oxybis(1-chloropropane)	ug/L	5	NA	NA	2 U	2 U	2 U	2 U
Bis(2-chloroethoxy)methane	ug/L	5	NA	NA	5 U	5 U	5 U	5 U

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

	Sample Location:		MW-104S	MW-104D	MW-105D		MW-105S	MW-106S
	Sample Name:		STAR-MW-104S	STAR-MW-104D	STAR-MW-105D	STAR-DUP-1	STAR-MW-105S	STAR-MW-106S
	Sample Date:		07/24/2019	07/24/2019	07/23/2019	07/23/2019	07/23/2019	07/23/2019
Analyte	**Unit**	**GWQS***	**Results**					
SVOCs (cont.)								
Hexachlorocyclopentadiene	ug/L	5	NA	NA	20 U	20 U	20 U	20 U
Isophorone	ug/L	50	NA	NA	5 U	5 U	5 U	5 U
Nitrobenzene	ug/L	0.4	NA	NA	2 U	2 U	2 U	2 U
N-Nitrosodiphenylamine	ug/L	50	NA	NA	2 U	2 U	2 U	2 U
n-Nitroso-di-n-propylamine	ug/L	NC	NA	NA	5 U	5 U	5 U	5 U
Bis(2-ethylhexyl)phthalate	ug/L	5	NA	NA	3 U	3 U	3 U	3 U
Butylbenzylphthalate	ug/L	50	NA	NA	5 U	5 U	5 U	5 U
Di-n-butylphthalate	ug/L	50	NA	NA	5 U	5 U	5 U	5 U
Di-n-octylphthalate	ug/L	50	NA	NA	5 U	5 U	5 U	5 U
Diethyl phthalate	ug/L	50	NA	NA	5 U	5 U	5 U	5 U
Dimethylphthalate	ug/L	50	NA	NA	5 U	5 U	5 U	5 U
1,1'-Biphenyl	ug/L	5	NA	NA	2 U	2 U	2 U	2 U
4-Chloroaniline	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
2-Nitroaniline	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
3-Nitroaniline	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
4-Nitroaniline	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
Dibenzofuran	ug/L	NC	NA	NA	2 U	2 U	2 U	2 U
1,2,4,5-Tetrachlorobenzene	ug/L	5	NA	NA	10 U	10 U	10 U	10 U
Acetophenone	ug/L	NC	NA	NA	5 U	5 U	5 U	5 U
2,4,6-Trichlorophenol	ug/L	1(c)	NA	NA	5 U	5 U	5 U	5 U
4-Chloro-3-methylphenol	ug/L	1(c)	NA	NA	2 U	2 U	2 U	2 U
2-Chlorophenol	ug/L	1(c)	NA	NA	2 U	2 U	2 U	2 U
2,4-Dichlorophenol	ug/L	5	NA	NA	5 U	5 U	5 U	5 U
2,4-Dimethylphenol	ug/L	50	NA	NA	5 U	5 U	5 UJ	5 U
2-Nitrophenol	ug/L	1(c)	NA	NA	10 U	10 U	10 U	10 U
4-Nitrophenol	ug/L	1(c)	NA	NA	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	ug/L	10	NA	NA	20 U	20 U	20 U	20 U
4,6-Dinitro-2-methylphenol	ug/L	1(c)	NA	NA	10 U	10 U	10 U	10 U
Phenol	ug/L	1(c)	NA	NA	5 U	5 U	5 U	5 U
2-Methylphenol	ug/L	1(c)	NA	NA	5 U	5 U	5 U	5 U
3- & 4-Methylphenol (m,p-Cresol)	ug/L	1(c)	NA	NA	5 U	5 U	5 U	5 U
2,4,5-Trichlorophenol	ug/L	1(c)	NA	NA	5 U	5 U	5 U	5 U
Benzoic acid	ug/L	NC	NA	NA	50 U	50 U	50 UJ	50 U
Benzyl alcohol	ug/L	NC	NA	NA	2 U	2 U	2 U	2 U
Carbazole	ug/L	NC	NA	NA	2 U	2 U	2 U	2 U
Acenaphthene	ug/L	20	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
2-Chloronaphthalene	ug/L	10	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U
Fluoranthene	ug/L	50	NA	NA	0.1 U	0.1 U	0.1 U	0.24
Hexachlorobenzene	ug/L	0.04	NA	NA	0.8 U	0.8 U	0.8 U	0.8 U
Naphthalene	ug/L	10	NA	NA	0.1 U	0.1 U	0.1 U	0.05 J
Benzo(a)anthracene	ug/L	0.002	NA	NA	0.1 U	**0.02 J**	0.1 U	**0.09 J**
Benzo(a)pyrene	ug/L	ND	NA	NA	0.1 U	0.1 U	0.1 U	0.03 J
Benzo(b)fluoranthene	ug/L	0.002	NA	NA	0.1 U	**0.02 J**	0.1 U	**0.05 J**
Benzo(k)fluoranthene	ug/L	0.002	NA	NA	0.1 U	**0.01 J**	0.1 U	**0.03 J**
Chrysene	ug/L	0.002	NA	NA	0.1 U	0.1 U	0.1 UJ	**0.07 J**
Acenaphthylene	ug/L	NC	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
Anthracene	ug/L	50	NA	NA	0.1 U	0.1 U	0.1 U	0.09 J
Benzo(g,h,i)perylene	ug/L	NC	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
Fluorene	ug/L	50	NA	NA	0.1 U	0.1 U	0.1 U	0.05 J
Phenanthrene	ug/L	50	NA	NA	0.1 U	0.1 U	0.1 U	0.32
Dibenz(a,h)anthracene	ug/L	NC	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
Indeno(1,2,3-cd)pyrene	ug/L	0.002	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
Pyrene	ug/L	50	NA	NA	0.1 U	0.1 U	0.1 U	0.19
2-Methylnaphthalene	ug/L	NC	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U
Pentachlorophenol	ug/L	1(c)	NA	NA	0.8 U	0.8 U	0.8 U	0.8 U
Hexachlorobutadiene	ug/L	0.5	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
Hexachloroethane	ug/L	5	NA	NA	0.8 U	0.8 U	0.8 U	0.8 U
Metals, total								
Aluminum	ug/L	NC	NA	NA	NA	NA	NA	NA
Antimony	ug/L	3	NA	NA	NA	NA	NA	NA
Arsenic	ug/L	25	NA	NA	NA	NA	NA	NA
Barium	ug/L	1,000	NA	NA	NA	NA	NA	NA
Beryllium	ug/L	3	NA	NA	NA	NA	NA	NA
Cadmium	ug/L	5	NA	NA	NA	NA	NA	NA
Calcium	ug/L	NC	NA	NA	NA	NA	NA	NA
Chromium	ug/L	50	NA	NA	NA	NA	NA	NA
Cobalt	ug/L	NC	NA	NA	NA	NA	NA	NA
Copper	ug/L	200	NA	NA	NA	NA	NA	NA
Iron	ug/L	300	NA	NA	NA	NA	NA	NA
Lead	ug/L	25	NA	NA	NA	NA	NA	NA

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

	Sample Location:		MW-104S	MW-104D	MW-105D		MW-105S	MW-106S
	Sample Name:		STAR-MW-104S	STAR-MW-104D	STAR-MW-105D	STAR-DUP-1	STAR-MW-105S	STAR-MW-106S
	Sample Date:		07/24/2019	07/24/2019	07/23/2019	07/23/2019	07/23/2019	07/23/2019
Analyte	**Unit**	**GWQS***	**Results**					
Metals, total (cont.)								
Magnesium	ug/L	35,000	NA	NA	NA	NA	NA	NA
Manganese	ug/L	300	NA	NA	NA	NA	NA	NA
Mercury	ug/L	0.7	NA	NA	NA	NA	NA	NA
Nickel	ug/L	100	NA	NA	NA	NA	NA	NA
Potassium	ug/L	NC	NA	NA	NA	NA	NA	NA
Selenium	ug/L	10	NA	NA	NA	NA	NA	NA
Silver	ug/L	50	NA	NA	NA	NA	NA	NA
Sodium	ug/L	20,000	NA	NA	NA	NA	NA	NA
Thallium	ug/L	0.5	NA	NA	NA	NA	NA	NA
Vanadium	ug/L	NC	NA	NA	NA	NA	NA	NA
Zinc	ug/L	2,000	NA	NA	NA	NA	NA	NA
PFAS								
Perfluorobutanoic acid (PFBA)	ng/L	100**	NA	NA	NA	NA	3.73	NA
Perfluoropentanoic acid (PFPeA)	ng/L	100**	NA	NA	NA	NA	5.42	NA
Perfluorobutanesulfonic acid (PFBS)	ng/L	100**	NA	NA	NA	NA	1.11 J	NA
Perfluorohexanoic acid (PFHxA)	ng/L	100**	NA	NA	NA	NA	4.29	NA
Perfluoroheptanoic acid (PFHpA)	ng/L	100**	NA	NA	NA	NA	2.38	NA
Perfluorohexanesulfonic acid (PFHxS)	ng/L	100**	NA	NA	NA	NA	0.434 J	NA
Perfluorooctanoic acid (PFOA)	ng/L	10**	NA	NA	NA	NA	7.62	NA
6:2 Perfluorooctane Sulfonate (6:2 FTS)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluoroheptanesulfonic acid (PFHpS)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluorononanoic acid (PFNA)	ng/L	100**	NA	NA	NA	NA	0.544 J	NA
Perfluorooctanesulfonic acid (PFOS)	ng/L	10**	NA	NA	NA	NA	3.06 J+	NA
Perfluorodecanoic acid (PFDA)	ng/L	100**	NA	NA	NA	NA	0.345 J	NA
8:2 Perfluorodecane Sulfonate (8:2 FTS)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
2-(N-methyl perfluorooctanesulfonamido) acetic acid (N-MeFOSA	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluoroundecanoic acid (PFUnA)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluorodecanesulfonic acid (PFDS)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluorooctane Sulfonamide (PFOSA)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
N-Ethyl-N-((heptadecafluorooctyl)sulphonyl) glycine (N-EtFOSAA	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluorododecanoic acid (PFDoA)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluorotridecanoic acid (PFTriA)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Perfluorotetradecanoic acid (PFTeA)	ng/L	100**	NA	NA	NA	NA	1.78 U	NA
Total PFAS	ng/L	500**	NA	NA	NA	NA	28.933	NA

Notes:
ng/L - nanograms per liter.
ug/L - micrograms per liter.
J - Estimated value.
J+ - Estimated value; biased high.
NA - Sample not analyzed for the listed analyte.
ND - A non-detectable concentration by the approved analytical method specified in section 700.3 of the NYCRR Water Quality Regulations.
NC - No NYSDEC Class GA Value exists for this analyte.
U - Analyte was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Bold - Indicated the detected value exceeds the applicable GWQS.
VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PFAS - Per- and Polyfluoroalkyl Substances.
(a) - criteria applicable to the sum of the cis and trans isomers.
(b) - criteria applicable to xylenes, the sum of the xylene isomers.
(c) - criteria applicable to total phenolics.
GWQS - Groundwater Quality Standard
* - NYSDEC Ambient Water Quality Standards and Guidance Values for Class GA water, June 1998 with the April 2000 Addendum.
** - Guidelines for Sampling and Analysis of PFAS, NYSDEC Part 375 Remedial Programs, January 2020.

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

		Sample Location:	MW-106D	MW-108S	MW-109S	MW-109D	MW-110S	MW-110D
		Sample Name:	STAR-MW-106D	STAR-MW-108S	STAR-MW-109S	STAR-MW-109D	STAR-MW-110S	STAR-MW-110D
		Sample Date:	07/23/2019	07/23/2019	07/24/2019	07/24/2019	07/23/2019	07/23/2019
Analyte	**Unit**	**GWQS***	**Results**					
VOCs								
Methylene chloride	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,1-Dichloroethane	ug/L	5	2.5 U	2.5 U	1.3 J	2.5 U	**65**	2.5 U
Chloroform	ug/L	7	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
Carbon tetrachloride	ug/L	5	0.5 U	0.5 U	0.5 U	0.30 J	1 U	0.5 U
1,2-Dichloropropane	ug/L	1	1 U	1 U	1 U	1.0 U	2 U	1 U
Dibromochloromethane	ug/L	50	0.5 U	0.5 U	0.5 U	0.50 U	1 U	0.5 U
1,1,2-Trichloroethane	ug/L	1	1.5 U	1.5 U	1.5 U	1.5 U	3 U	1.5 U
Tetrachloroethene	ug/L	5	0.5 U	0.25 J	0.5 U	0.50 U	**100**	0.61
Chlorobenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
Trichlorofluoromethane	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,2-Dichloroethane	ug/L	0.6	0.5 U	0.5 U	0.31 J	0.50 U	1 U	0.5 U
1,1,1-Trichloroethane	ug/L	5	2.5 U	1.2 J	2.5 U	2.5 U	**130**	2.5 U
Bromodichloromethane	ug/L	50	0.5 U	0.5 U	0.5 U	0.50 U	1 U	0.5 U
trans-1,3-Dichloropropene	ug/L	0.4(a)	0.5 U	0.5 U	0.5 U	0.50 U	1 U	0.5 U
cis-1,3-Dichloropropene	ug/L	0.4(a)	0.5 U	0.5 U	0.5 U	0.50 U	1 U	0.5 U
Bromoform	ug/L	50	2 U	2 U	2 U	2.0 U	4 U	2 U
1,1,2,2-Tetrachloroethane	ug/L	5	0.5 U	0.5 U	0.5 U	0.50 U	1 U	0.5 U
Benzene	ug/L	1	0.5 U	0.5 U	0.16 J	0.50 U	1 U	0.5 U
Toluene	ug/L	5	2.5 U	2.5 U	0.94 J	2.5 U	5 U	2.5 U
Ethylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
Chloromethane	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
Bromomethane	ug/L	5	2.5 U	2.5 U	2.5 UJ	2.5 U	5 U	2.5 U
Vinyl chloride	ug/L	2	1 U	1 U	0.21 J	1.0 U	0.2 J	1 U
Chloroethane	ug/L	5	2.5 U	2.5 U	**18**	2.8	5 U	2.5 U
1,1-Dichloroethene	ug/L	5	0.5 U	0.5 U	0.5 U	0.50 U	**6.1**	0.5 U
trans-1,2-Dichloroethene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	2.2 J	2.5 U
Trichloroethene	ug/L	5	0.5 U	0.37 J	0.25 J	0.50 U	**63**	0.24 J
1,2-Dichlorobenzene	ug/L	3	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,3-Dichlorobenzene	ug/L	3	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,4-Dichlorobenzene	ug/L	3	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
Methyl tert-butyl ether	ug/L	10	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
m,p-Xylene	ug/L	5(b)	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
o-Xylene	ug/L	5(b)	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
cis-1,2-Dichloroethene	ug/L	5	2.5 U	2.5 U	0.88 J	2.5 U	**190**	2.5 U
Styrene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
Dichlorodifluoromethane	ug/L	5	5 U	5 U	5 UJ	5.0 U	10 U	5 U
Acetone	ug/L	50	7.7	8.7	5 U	12	9.1 J	9.6
Carbon disulfide	ug/L	60	5 U	5 U	5 U	5.0 U	10 U	5 U
2-Butanone (MEK)	ug/L	50	5 U	5 U	5 U	5.0 U	10 U	5 U
4-Methyl-2-pentanone	ug/L	NC	5 U	5 U	5 U	5.0 U	10 U	5 U
2-Hexanone	ug/L	50	5 U	5 U	5 U	5.0 U	10 U	5 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	0.0006	2 U	2 U	2 U	2.0 U	4 U	2 U
n-Butylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
sec-Butylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
tert-Butylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,2-Dibromo-3-chloropropane	ug/L	0.04	2.5 U	2.5 U	2.5 UJ	2.5 U	5 U	2.5 U
Isopropylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
4-Isopropyltoluene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
Naphthalene	ug/L	10	2.5 U	2.5 U	0.73 J	2.5 U	5 U	2.5 U
n-Propylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,2,4-Trichlorobenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,3,5-Trimethylbenzene	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,2,4-Trimethylbenzene	ug/L	5	2.5 U	2.5 U	1.9 J	2.5 U	5 U	2.5 U
Methyl acetate	ug/L	NC	2 U	2 U	2 U	2.0 U	4 U	2 U
Cyclohexane	ug/L	NC	10 U	10 U	0.8 J	10 U	20 U	10 U
Methylcyclohexane	ug/L	NC	10 U	10 U	10 U	10 U	20 U	10 U
Freon 113	ug/L	5	2.5 U	2.5 U	2.5 U	2.5 U	5 U	2.5 U
1,4-Dioxane	ug/L	NC	NA	NA	NA	0.139 U	NA	NA
SVOCs								
1,2,4-Trichlorobenzene	ug/L	5	5 U	NA	NA	NA	NA	NA
Bis(2-chloroethyl) ether	ug/L	1	2 U	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	ug/L	3	2 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	ug/L	3	2 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	ug/L	3	2 U	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	ug/L	5	5 U	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	ug/L	5	5 U	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	ug/L	5	5 U	NA	NA	NA	NA	NA
4-Chlorophenyl-phenyl ether	ug/L	NC	2 U	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	ug/L	NC	2 U	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	ug/L	5	2 U	NA	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	ug/L	5	5 U	NA	NA	NA	NA	NA

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

		Sample Location:	MW-106D	MW-108S	MW-109S	MW-109D	MW-110S	MW-110D
		Sample Name:	STAR-MW-106D	STAR-MW-108S	STAR-MW-109S	STAR-MW-109D	STAR-MW-110S	STAR-MW-110D
		Sample Date:	07/23/2019	07/23/2019	07/24/2019	07/24/2019	07/23/2019	07/23/2019
Analyte	**Unit**	**GWQS***	**Results**					
SVOCs (cont.)								
Hexachlorocyclopentadiene	ug/L	5	20 U	NA	NA	NA	NA	NA
Isophorone	ug/L	50	5 U	NA	NA	NA	NA	NA
Nitrobenzene	ug/L	0.4	2 U	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	ug/L	50	2 U	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	ug/L	NC	5 U	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	ug/L	5	3 U	NA	NA	NA	NA	NA
Butylbenzylphthalate	ug/L	50	5 U	NA	NA	NA	NA	NA
Di-n-butylphthalate	ug/L	50	5 U	NA	NA	NA	NA	NA
Di-n-octylphthalate	ug/L	50	5 U	NA	NA	NA	NA	NA
Diethyl phthalate	ug/L	50	5 U	NA	NA	NA	NA	NA
Dimethylphthalate	ug/L	50	5 U	NA	NA	NA	NA	NA
1,1'-Biphenyl	ug/L	5	2 U	NA	NA	NA	NA	NA
4-Chloroaniline	ug/L	5	5 U	NA	NA	NA	NA	NA
2-Nitroaniline	ug/L	5	5 U	NA	NA	NA	NA	NA
3-Nitroaniline	ug/L	5	5 U	NA	NA	NA	NA	NA
4-Nitroaniline	ug/L	5	5 U	NA	NA	NA	NA	NA
Dibenzofuran	ug/L	NC	2 U	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	ug/L	5	10 U	NA	NA	NA	NA	NA
Acetophenone	ug/L	NC	5 U	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	ug/L	1(c)	5 U	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	ug/L	1(c)	2 U	NA	NA	NA	NA	NA
2-Chlorophenol	ug/L	1(c)	2 U	NA	NA	NA	NA	NA
2,4-Dichlorophenol	ug/L	5	5 U	NA	NA	NA	NA	NA
2,4-Dimethylphenol	ug/L	50	5 U	NA	NA	NA	NA	NA
2-Nitrophenol	ug/L	1(c)	10 U	NA	NA	NA	NA	NA
4-Nitrophenol	ug/L	1(c)	10 U	NA	NA	NA	NA	NA
2,4-Dinitrophenol	ug/L	10	20 U	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	ug/L	1(c)	10 U	NA	NA	NA	NA	NA
Phenol	ug/L	1(c)	5 U	NA	NA	NA	NA	NA
2-Methylphenol	ug/L	1(c)	5 U	NA	NA	NA	NA	NA
3- & 4-Methylphenol (m,p-Cresol)	ug/L	1(c)	5 U	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	ug/L	1(c)	5 U	NA	NA	NA	NA	NA
Benzoic acid	ug/L	NC	50 U	NA	NA	NA	NA	NA
Benzyl alcohol	ug/L	NC	2 U	NA	NA	NA	NA	NA
Carbazole	ug/L	NC	2 U	NA	NA	NA	NA	NA
Acenaphthene	ug/L	20	0.1 U	NA	NA	NA	NA	NA
2-Chloronaphthalene	ug/L	10	0.2 U	NA	NA	NA	NA	NA
Fluoranthene	ug/L	50	0.1 U	NA	NA	NA	NA	NA
Hexachlorobenzene	ug/L	0.04	0.8 U	NA	NA	NA	NA	NA
Naphthalene	ug/L	10	0.1 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	ug/L	0.002	0.1 U	NA	NA	NA	NA	NA
Benzo(a)pyrene	ug/L	ND	0.1 U	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	ug/L	0.002	0.1 U	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	ug/L	0.002	0.1 U	NA	NA	NA	NA	NA
Chrysene	ug/L	0.002	0.1 U	NA	NA	NA	NA	NA
Acenaphthylene	ug/L	NC	0.1 U	NA	NA	NA	NA	NA
Anthracene	ug/L	50	0.1 U	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	ug/L	NC	0.1 U	NA	NA	NA	NA	NA
Fluorene	ug/L	50	0.1 U	NA	NA	NA	NA	NA
Phenanthrene	ug/L	50	0.1 U	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	ug/L	NC	0.1 U	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	ug/L	0.002	0.1 U	NA	NA	NA	NA	NA
Pyrene	ug/L	50	0.1 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	ug/L	NC	0.1 U	NA	NA	NA	NA	NA
Pentachlorophenol	ug/L	1(c)	0.8 U	NA	NA	NA	NA	NA
Hexachlorobutadiene	ug/L	0.5	0.5 U	NA	NA	NA	NA	NA
Hexachloroethane	ug/L	5	0.8 U	NA	NA	NA	NA	NA
Metals, total								
Aluminum	ug/L	NC	NA	NA	73.9 J	75 J	NA	NA
Antimony	ug/L	3	NA	NA	4 UJ	50 U	NA	NA
Arsenic	ug/L	25	NA	NA	8.58 J	5 U	NA	NA
Barium	ug/L	1,000	NA	NA	326.1 J	30	NA	NA
Beryllium	ug/L	3	NA	NA	0.5 UJ	5 U	NA	NA
Cadmium	ug/L	5	NA	NA	0.2 UJ	5 U	NA	NA
Calcium	ug/L	NC	NA	NA	79,000 J	52,200	NA	NA
Chromium	ug/L	50	NA	NA	1 UJ	10 U	NA	NA
Cobalt	ug/L	NC	NA	NA	0.95 J	20 U	NA	NA
Copper	ug/L	200	NA	NA	0.47 J	10 U	NA	NA
Iron	ug/L	300	NA	NA	**14,400 J**	**541**	NA	NA
Lead	ug/L	25	NA	NA	0.38 J	10 U	NA	NA

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

		Sample Location:	MW-106D	MW-108S	MW-109S	MW-109D	MW-110S	MW-110D
		Sample Name:	STAR-MW-106D	STAR-MW-108S	STAR-MW-109S	STAR-MW-109D	STAR-MW-110S	STAR-MW-110D
		Sample Date:	07/23/2019	07/23/2019	07/24/2019	07/24/2019	07/23/2019	07/23/2019
Analyte	**Unit**	**GWQS***	**Results**					
Metals, total (cont.)								
Magnesium	ug/L	35,000	NA	NA	25,800 J	11,600	NA	NA
Manganese	ug/L	300	NA	NA	**1,520 J**	**833**	NA	NA
Mercury	ug/L	0.7	NA	NA	0.2 UJ	0.2 U	NA	NA
Nickel	ug/L	100	NA	NA	1.43 J	25 U	NA	NA
Potassium	ug/L	NC	NA	NA	3,870 J	3,500	NA	NA
Selenium	ug/L	10	NA	NA	5 UJ	10 U	NA	NA
Silver	ug/L	50	NA	NA	0.4 UJ	7 U	NA	NA
Sodium	ug/L	20,000	NA	NA	5,330 J	9,300	NA	NA
Thallium	ug/L	0.5	NA	NA	0.5 UJ	20 U	NA	NA
Vanadium	ug/L	NC	NA	NA	5 UJ	10 U	NA	NA
Zinc	ug/L	2,000	NA	NA	8.23 J	50 U	NA	NA
PFAS								
Perfluorobutanoic acid (PFBA)	ng/L	100**	NA	NA	NA	1.01 J	NA	NA
Perfluoropentanoic acid (PFPeA)	ng/L	100**	NA	NA	NA	0.671 J	NA	NA
Perfluorobutanesulfonic acid (PFBS)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorohexanoic acid (PFHxA)	ng/L	100**	NA	NA	NA	0.848 J	NA	NA
Perfluoroheptanoic acid (PFHpA)	ng/L	100**	NA	NA	NA	0.637 J	NA	NA
Perfluorohexanesulfonic acid (PFHxS)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorooctanoic acid (PFOA)	ng/L	10**	NA	NA	NA	3.19	NA	NA
6:2 Perfluorooctane Sulfonate (6:2 FTS)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluoroheptanesulfonic acid (PFHpS)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorononanoic acid (PFNA)	ng/L	100**	NA	NA	NA	0.581 J	NA	NA
Perfluorooctanesulfonic acid (PFOS)	ng/L	10**	NA	NA	NA	1.81	NA	NA
Perfluorodecanoic acid (PFDA)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
8:2 Perfluorodecane Sulfonate (8:2 FTS)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
2-(N-methyl perfluorooctanesulfonamido) acetic acid (N-MeFOSA	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluoroundecanoic acid (PFUnA)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorodecanesulfonic acid (PFDS)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorooctane Sulfonamide (PFOSA)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
N-Ethyl-N-((heptadecafluorooctyl)sulphonyl) glycine (N-EtFOSAA	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorododecanoic acid (PFDoA)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorotridecanoic acid (PFTriA)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Perfluorotetradecanoic acid (PFTeA)	ng/L	100**	NA	NA	NA	1.73 U	NA	NA
Total PFAS	ng/L	500**	NA	NA	NA	8.747	NA	NA

Notes:
ng/L - nanograms per liter.
ug/L - micrograms per liter.
J - Estimated value.
J+ - Estimated value; biased high.
NA - Sample not analyzed for the listed analyte.
ND - A non-detectable concentration by the approved analytical method specified in section 700.3 of the NYCRR Water Quality Regulations.
NC - No NYSDEC Class GA Value exists for this analyte.
U - Analyte was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Bold - Indicated the detected value exceeds the applicable GWQS.
VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PFAS - Per- and Polyfluoroalkyl Substances.
(a) - criteria applicable to the sum of the cis and trans isomers.
(b) - criteria applicable to xylenes, the sum of the xylene isomers.
(c) - criteria applicable to total phenolics.
GWQS - Groundwater Quality Standard
* - NYSDEC Ambient Water Quality Standards and Guidance Values for Class GA water, June 1998 with the April 2000 Addendum.
** - Guidelines for Sampling and Analysis of PFAS, NYSDEC Part 375 Remedial Programs, January 2020.

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

			Sample Location:	MW-111S	MW-111D		SMWO - MW-2
			Sample Name:	STAR-MW-111S	STAR-MW-111D	STAR-MW-111D	STAR-SMWO-MW-2
			Sample Date:	07/24/2019	07/24/2019	08/06/2019	07/24/2019
Analyte	**Unit**	**GWQS***		**Results**			
VOCs							
Methylene chloride	ug/L	5		2.5 U	NA	2.5 U	NA
1,1-Dichloroethane	ug/L	5		2.5 U	NA	2.5 U	NA
Chloroform	ug/L	7		2.5 U	NA	2.5 U	NA
Carbon tetrachloride	ug/L	5		0.5 U	NA	0.5 U	NA
1,2-Dichloropropane	ug/L	1		1 U	NA	1 U	NA
Dibromochloromethane	ug/L	50		0.5 U	NA	0.5 U	NA
1,1,2-Trichloroethane	ug/L	1		1.5 U	NA	1.5 U	NA
Tetrachloroethene	ug/L	5		0.5 U	NA	0.5 U	NA
Chlorobenzene	ug/L	5		2.5 U	NA	2.5 U	NA
Trichlorofluoromethane	ug/L	5		2.5 U	NA	2.5 U	NA
1,2-Dichloroethane	ug/L	0.6		0.5 U	NA	0.5 U	NA
1,1,1-Trichloroethane	ug/L	5		2.5 U	NA	2.5 U	NA
Bromodichloromethane	ug/L	50		0.5 U	NA	0.5 U	NA
trans-1,3-Dichloropropene	ug/L	0.4(a)		0.5 U	NA	0.5 U	NA
cis-1,3-Dichloropropene	ug/L	0.4(a)		0.5 U	NA	0.5 U	NA
Bromoform	ug/L	50		2 U	NA	2 U	NA
1,1,2,2-Tetrachloroethane	ug/L	5		0.5 U	NA	0.5 U	NA
Benzene	ug/L	1		0.5 U	NA	0.5 U	NA
Toluene	ug/L	5		2.5 U	NA	2.5 U	NA
Ethylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
Chloromethane	ug/L	5		2.5 U	NA	1.5 J	NA
Bromomethane	ug/L	5		2.5 U	NA	2.5 U	NA
Vinyl chloride	ug/L	2		1 U	NA	1 U	NA
Chloroethane	ug/L	5		2.5 U	NA	2.5 U	NA
1,1-Dichloroethene	ug/L	5		0.5 U	NA	0.5 U	NA
trans-1,2-Dichloroethene	ug/L	5		2.5 U	NA	2.5 U	NA
Trichloroethene	ug/L	5		0.5 U	NA	0.5 U	NA
1,2-Dichlorobenzene	ug/L	3		2.5 U	NA	2.5 U	NA
1,3-Dichlorobenzene	ug/L	3		2.5 U	NA	2.5 U	NA
1,4-Dichlorobenzene	ug/L	3		2.5 U	NA	2.5 U	NA
Methyl tert-butyl ether	ug/L	10		2.5 U	NA	2.5 U	NA
m,p-Xylene	ug/L	5(b)		2.5 U	NA	2.5 U	NA
o-Xylene	ug/L	5(b)		2.5 U	NA	2.5 U	NA
cis-1,2-Dichloroethene	ug/L	5		2.5 U	NA	2.5 U	NA
Styrene	ug/L	5		2.5 U	NA	2.5 U	NA
Dichlorodifluoromethane	ug/L	5		5 U	NA	5 U	NA
Acetone	ug/L	50		8.1	NA	3.3 J	NA
Carbon disulfide	ug/L	60		5 U	NA	5 U	NA
2-Butanone (MEK)	ug/L	50		5 U	NA	5 U	NA
4-Methyl-2-pentanone	ug/L	NC		5 U	NA	5 U	NA
2-Hexanone	ug/L	50		5 U	NA	5 U	NA
1,2-Dibromoethane (Ethylene dibromide)	ug/L	0.0006		2 U	NA	2 U	NA
n-Butylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
sec-Butylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
tert-Butylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
1,2-Dibromo-3-chloropropane	ug/L	0.04		2.5 U	NA	2.5 U	NA
Isopropylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
4-Isopropyltoluene	ug/L	5		2.5 U	NA	2.5 U	NA
Naphthalene	ug/L	10		2.5 U	NA	2.5 U	NA
n-Propylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
1,2,4-Trichlorobenzene	ug/L	5		2.5 U	NA	2.5 U	NA
1,3,5-Trimethylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
1,2,4-Trimethylbenzene	ug/L	5		2.5 U	NA	2.5 U	NA
Methyl acetate	ug/L	NC		2 U	NA	2 U	NA
Cyclohexane	ug/L	NC		10 U	NA	10 U	NA
Methylcyclohexane	ug/L	NC		10 U	NA	10 U	NA
Freon 113	ug/L	5		2.5 U	NA	2.5 U	NA
1,4-Dioxane	ug/L	NC		NA	0.524	NA	2.09
SVOCs							
1,2,4-Trichlorobenzene	ug/L	5		NA	NA	NA	NA
Bis(2-chloroethyl) ether	ug/L	1		NA	NA	NA	NA
1,2-Dichlorobenzene	ug/L	3		NA	NA	NA	NA
1,3-Dichlorobenzene	ug/L	3		NA	NA	NA	NA
1,4-Dichlorobenzene	ug/L	3		NA	NA	NA	NA
3,3'-Dichlorobenzidine	ug/L	5		NA	NA	NA	NA
2,4-Dinitrotoluene	ug/L	5		NA	NA	NA	NA
2,6-Dinitrotoluene	ug/L	5		NA	NA	NA	NA
4-Chlorophenyl-phenyl ether	ug/L	NC		NA	NA	NA	NA
4-Bromophenyl-phenylether	ug/L	NC		NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	ug/L	5		NA	NA	NA	NA
Bis(2-chloroethoxy)methane	ug/L	5		NA	NA	NA	NA

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

			Sample Location:	MW-111S	MW-111D		SMWO - MW-2
			Sample Name:	STAR-MW-111S	STAR-MW-111D	STAR-MW-111D	STAR-SMWO-MW-2
			Sample Date:	07/24/2019	07/24/2019	08/06/2019	07/24/2019
Analyte	**Unit**	**GWQS***		**Results**			
SVOCs (cont.)							
Hexachlorocyclopentadiene	ug/L	5		NA	NA	NA	NA
Isophorone	ug/L	50		NA	NA	NA	NA
Nitrobenzene	ug/L	0.4		NA	NA	NA	NA
N-Nitrosodiphenylamine	ug/L	50		NA	NA	NA	NA
n-Nitroso-di-n-propylamine	ug/L	NC		NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	ug/L	5		NA	NA	NA	NA
Butylbenzylphthalate	ug/L	50		NA	NA	NA	NA
Di-n-butylphthalate	ug/L	50		NA	NA	NA	NA
Di-n-octylphthalate	ug/L	50		NA	NA	NA	NA
Diethyl phthalate	ug/L	50		NA	NA	NA	NA
Dimethylphthalate	ug/L	50		NA	NA	NA	NA
1,1'-Biphenyl	ug/L	5		NA	NA	NA	NA
4-Chloroaniline	ug/L	5		NA	NA	NA	NA
2-Nitroaniline	ug/L	5		NA	NA	NA	NA
3-Nitroaniline	ug/L	5		NA	NA	NA	NA
4-Nitroaniline	ug/L	5		NA	NA	NA	NA
Dibenzofuran	ug/L	NC		NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	ug/L	5		NA	NA	NA	NA
Acetophenone	ug/L	NC		NA	NA	NA	NA
2,4,6-Trichlorophenol	ug/L	1(c)		NA	NA	NA	NA
4-Chloro-3-methylphenol	ug/L	1(c)		NA	NA	NA	NA
2-Chlorophenol	ug/L	1(c)		NA	NA	NA	NA
2,4-Dichlorophenol	ug/L	5		NA	NA	NA	NA
2,4-Dimethylphenol	ug/L	50		NA	NA	NA	NA
2-Nitrophenol	ug/L	1(c)		NA	NA	NA	NA
4-Nitrophenol	ug/L	1(c)		NA	NA	NA	NA
2,4-Dinitrophenol	ug/L	10		NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	ug/L	1(c)		NA	NA	NA	NA
Phenol	ug/L	1(c)		NA	NA	NA	NA
2-Methylphenol	ug/L	1(c)		NA	NA	NA	NA
3- & 4-Methylphenol (m,p-Cresol)	ug/L	1(c)		NA	NA	NA	NA
2,4,5-Trichlorophenol	ug/L	1(c)		NA	NA	NA	NA
Benzoic acid	ug/L	NC		NA	NA	NA	NA
Benzyl alcohol	ug/L	NC		NA	NA	NA	NA
Carbazole	ug/L	NC		NA	NA	NA	NA
Acenaphthene	ug/L	20		NA	NA	NA	NA
2-Chloronaphthalene	ug/L	10		NA	NA	NA	NA
Fluoranthene	ug/L	50		NA	NA	NA	NA
Hexachlorobenzene	ug/L	0.04		NA	NA	NA	NA
Naphthalene	ug/L	10		NA	NA	NA	NA
Benzo(a)anthracene	ug/L	0.002		NA	NA	NA	NA
Benzo(a)pyrene	ug/L	ND		NA	NA	NA	NA
Benzo(b)fluoranthene	ug/L	0.002		NA	NA	NA	NA
Benzo(k)fluoranthene	ug/L	0.002		NA	NA	NA	NA
Chrysene	ug/L	0.002		NA	NA	NA	NA
Acenaphthylene	ug/L	NC		NA	NA	NA	NA
Anthracene	ug/L	50		NA	NA	NA	NA
Benzo(g,h,i)perylene	ug/L	NC		NA	NA	NA	NA
Fluorene	ug/L	50		NA	NA	NA	NA
Phenanthrene	ug/L	50		NA	NA	NA	NA
Dibenz(a,h)anthracene	ug/L	NC		NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	ug/L	0.002		NA	NA	NA	NA
Pyrene	ug/L	50		NA	NA	NA	NA
2-Methylnaphthalene	ug/L	NC		NA	NA	NA	NA
Pentachlorophenol	ug/L	1(c)		NA	NA	NA	NA
Hexachlorobutadiene	ug/L	0.5		NA	NA	NA	NA
Hexachloroethane	ug/L	5		NA	NA	NA	NA
Metals, total							
Aluminum	ug/L	NC		NA	NA	NA	NA
Antimony	ug/L	3		NA	NA	NA	NA
Arsenic	ug/L	25		NA	NA	NA	NA
Barium	ug/L	1,000		NA	NA	NA	NA
Beryllium	ug/L	3		NA	NA	NA	NA
Cadmium	ug/L	5		NA	NA	NA	NA
Calcium	ug/L	NC		NA	NA	NA	NA
Chromium	ug/L	50		NA	NA	NA	NA
Cobalt	ug/L	NC		NA	NA	NA	NA
Copper	ug/L	200		NA	NA	NA	NA
Iron	ug/L	300		NA	NA	NA	NA
Lead	ug/L	25		NA	NA	NA	NA

Table 9
Summary of Analytical Results for Groundwater Samples - July and August 2019
Former Star Anchors and Fasteners Site
Mountainville, New York

			Sample Location:	MW-111S	MW-111D		SMWO - MW-2
			Sample Name:	STAR-MW-111S	STAR-MW-111D	STAR-MW-111D	STAR-SMWO-MW-2
			Sample Date:	07/24/2019	07/24/2019	08/06/2019	07/24/2019
Analyte	**Unit**	**GWQS***		**Results**			
Metals, total (cont.)							
Magnesium	ug/L	35,000		NA	NA	NA	NA
Manganese	ug/L	300		NA	NA	NA	NA
Mercury	ug/L	0.7		NA	NA	NA	NA
Nickel	ug/L	100		NA	NA	NA	NA
Potassium	ug/L	NC		NA	NA	NA	NA
Selenium	ug/L	10		NA	NA	NA	NA
Silver	ug/L	50		NA	NA	NA	NA
Sodium	ug/L	20,000		NA	NA	NA	NA
Thallium	ug/L	0.5		NA	NA	NA	NA
Vanadium	ug/L	NC		NA	NA	NA	NA
Zinc	ug/L	2,000		NA	NA	NA	NA
PFAS							
Perfluorobutanoic acid (PFBA)	ng/L	100**		NA	1.89 U	NA	5.73
Perfluoropentanoic acid (PFPeA)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorohexanoic acid (PFHxA)	ng/L	100**		NA	0.443 J	NA	1.3 J
Perfluoroheptanoic acid (PFHpA)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorohexanesulfonic acid (PFHxS)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorooctanoic acid (PFOA)	ng/L	10**		NA	1.89 U	NA	2.66
6:2 Perfluorooctane Sulfonate (6:2 FTS)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluoroheptanesulfonic acid (PFHpS)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorononanoic acid (PFNA)	ng/L	100**		NA	1.89 U	NA	1.03 J
Perfluorooctanesulfonic acid (PFOS)	ng/L	10**		NA	0.477 J	NA	4.79
Perfluorodecanoic acid (PFDA)	ng/L	100**		NA	1.89 U	NA	0.482 J
8:2 Perfluorodecane Sulfonate (8:2 FTS)	ng/L	100**		NA	1.89 U	NA	1.84 U
2-(N-methyl perfluorooctanesulfonamido) acetic acid (N-MeFOSA	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluoroundecanoic acid (PFUnA)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorodecanesulfonic acid (PFDS)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorooctane Sulfonamide (PFOSA)	ng/L	100**		NA	1.89 U	NA	1.84 U
N-Ethyl-N-((heptadecafluorooctyl)sulphonyl) glycine (N-EtFOSAA	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorododecanoic acid (PFDoA)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorotridecanoic acid (PFTriA)	ng/L	100**		NA	1.89 U	NA	1.84 U
Perfluorotetradecanoic acid (PFTeA)	ng/L	100**		NA	1.89 U	NA	1.84 U
Total PFAS	ng/L	500**		NA	0.920 J	NA	15.992

Notes:
ng/L - nanograms per liter.
ug/L - micrograms per liter.
J - Estimated value.
J+ - Estimated value; biased high.
NA - Sample not analyzed for the listed analyte.
ND - A non-detectable concentration by the approved analytical method specified in section 700.3 of the NYCRR Water Quality Regulations.
NC - No NYSDEC Class GA Value exists for this analyte.
U - Analyte was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Bold - Indicated the detected value exceeds the applicable GWQS.
VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PFAS - Per- and Polyfluoroalkyl Substances.
(a) - criteria applicable to the sum of the cis and trans isomers.
(b) - criteria applicable to xylenes, the sum of the xylene isomers.
(c) - criteria applicable to total phenolics.
GWQS - Groundwater Quality Standard
* - NYSDEC Ambient Water Quality Standards and Guidance Values for Class GA water, June 1998 with the April 2000 Addendum.
** - Guidelines for Sampling and Analysis of PFAS, NYSDEC Part 375 Remedial Programs, January 2020.

APPENDIX F

Fire Safety Design

Active FIRE PROTECTION
Fire Sprinklers and standpipe systems

128 Museum Village Road
Monroe, NY 10950
845.782.7494 #401
866.903.9949
www.afpfs.com

June 21, 2021

20 Industry-Expansion
Mountainville, NY 10953

Re: Fire Safety Proposal

To whom it may concern:

Following are our findings regarding the fire sprinkler system demand and outside hose requirements for the above referenced location proposed new addition of approximately 50,000 sq ft, with 40' ceiling height.

The proposed expansion will storage Class IV non-encapsulated commodities which will be stored on open racks with a minimum of 36" clearance below the sprinkler heads as required by NFPA 13.

We propose to design the system as per NFPA 13 [2016 Edit] Table 17.3.3.1, ESFR Protection of rack storage without solid shelves of cartoned non expanded group a plastic commodity over 25' in height with 35' high storage and 40' max ceiling height. This design is more stringent than the class IV commodity that is currently proposed to store.

Our initial calculations show that 1520 GPM+250 GPM as per NFPA 13 Table 12.8.6, for outside hose demand will be needed x 60 minutes, total water needed is 106,200 Gallons.

The property owner is proposing installation of a 250K gallon tank (which is way above the needed water demand) and that the water be distributed via a diesel driven fire pump rated at 1500 GPM @ 150 PSI. The water will be fed into the existing 8" ductile iron underground pipe which feeds the fire hydrants and the buildings sprinkler systems. The approximate static pressure at the hydrants will be 170 PSI.

Attached are the site plans indicating the site with the approximate location for the water storage tank and the fire pump room along with the pump specifications submittals.

Should you have any questions, feel free to contact my office @ 845-782-7494

Yours truly.

Joel Chaim
Active Fire Protection, Inc.

Hydraulic Overview

Job Number: 20 Industry S calc
Report Description: ESFR (ESFR)

Job

Job Number: 20 Industry S calc	Design Engineer
Job Name: 20 Industry Expansion	Phone / FAX
Address 1: 20 Industry Drive	State Certification/License Number
Address 2: Mountainville NY 10953	AHJ
Address 3	Job Site/Building

System

Pressure: 50.000	Area of Application: NA
Most Demanding Sprinkler Data: 25.2 K-Factor 126.00 at 25.000	Hose Streams: 250.00
Coverage Per Sprinkler: 100ft²	Number Of Sprinklers Calculated: 12 0
System Pressure Demand: 41.820	System Flow Demand: 1520.21
Total Demand: 1770.21 @ 41.820	Pressure Result: +62.869 (60.1%)

Supplies

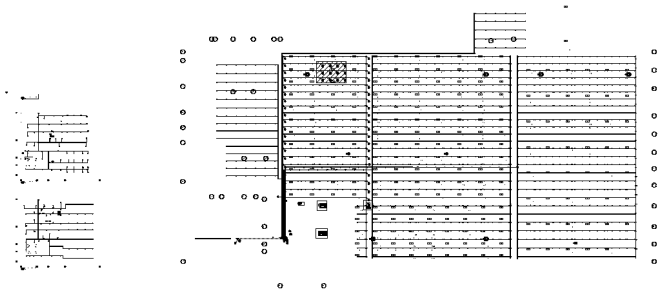
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	Water Supply	1122.00	250.00	105.000	100.000
3	Pump	1500.00		164.000	150.000

Pumps: Static = Churn (Pressure @ Zero Flow)

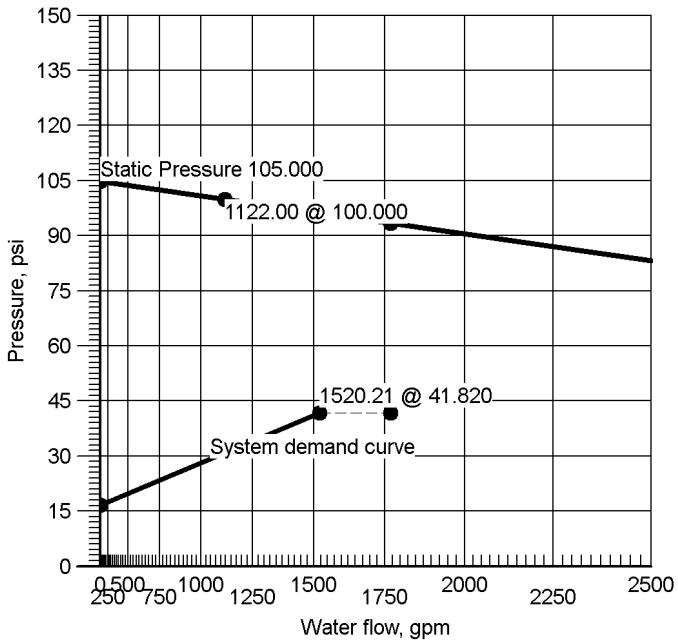
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	72.558	178.47	1520.21

57 Troop Road SP 6.22.20.cad



Water Supply at Node 1 (1122.00, 250.00, 105.000, 100.000)



Hydraulic Summary

Job

Job Number: 20 Industry S calc	Design Engineer:
Job Name: 20 Industry Expansion	State Certification/License Number:
Address 1: 20 Industry Drive	AHJ:
Address 2: Mountainville NY 10953	Job Site/Building:
Address 3:	Drawing Name: 57 Troop Road SP 6.22.20.cad

System

Most Demanding Sprinkler Data: 25.2 K-Factor 126.00 at 25.000

Hose Allowance At Source: 250.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 250.00

System Flow Demand	Total Water Required (Including Hose Allowance)
1520.21	1770.21

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 16.88 between nodes 1069 and 1075

Maximum Velocity Under Ground: 8.82 between nodes 3 and 2367

Volume capacity of Wet Pipes	Volume capacity of Dry Pipes
10691.51gal	

Remote Area(s)

Occupancy	Job Suffix
ESFR	

Pressure	Area of Application
50.000	NA

Number Of Sprinklers Calculated	Number Of Nozzles Calculated	Coverage Per Sprinkler
12	0	100ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Supplies

Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@ Flow (gpm)	Available (psi)	@ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	Water Supply	250.00	105.000	100.000	1122.00	104.689	250.00	41.820	62.869
3	Pump		164.000	150.000	1500.00	149.559	1520.21	86.690	62.869

Pumps: Static = Churn (Pressure @ Zero Flow)

Contractor

	Contractor Number	Contact Name	Contact Title
Name of Contractor:		Phone	Extension
Address 1		FAX	
Address 2		E-mail	
Address 3		Web-Site	

Summary Of Outflowing Devices

Job Number: 20 Industry S calc
Report Description: ESFR (ESFR)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	2009	127.01	126.00	25.2	25.402		
Sprinkler	2010	126.00	126.00	25.2	25.000		
Sprinkler	**2011**	**126.00**	**126.00**	**25.2**	**25.000**		
Sprinkler	2012	126.93	126.00	25.2	25.372		
Sprinkler	2067	127.10	126.00	25.2	25.437		
Sprinkler	2068	126.09	126.00	25.2	25.036		
Sprinkler	2069	126.09	126.00	25.2	25.036		
Sprinkler	2070	127.03	126.00	25.2	25.409		
Sprinkler	2125	127.49	126.00	25.2	25.594		
Sprinkler	2126	126.50	126.00	25.2	25.201		
Sprinkler	2127	126.50	126.00	25.2	25.201		
Sprinkler	2128	127.47	126.00	25.2	25.586		

Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
2009	36'-6	Spr(-25.402)	25.402	127.01	
2010	36'-6	Spr(-25.000)	25.000	126.00	
2011	36'-6	Spr(-25.000)	25.000	126.00	
2012	36'-6	Spr(-25.372)	25.372	126.93	
2067	36'-6	Spr(-25.437)	25.437	127.10	
2068	36'-6	Spr(-25.036)	25.036	126.09	
2069	36'-6	Spr(-25.036)	25.036	126.09	
2070	36'-6	Spr(-25.409)	25.409	127.03	
2125	36'-6	Spr(-25.594)	25.594	127.49	
2126	36'-6	Spr(-25.201)	25.201	126.50	
2127	36'-6	Spr(-25.201)	25.201	126.50	
2128	36'-6	Spr(-25.586)	25.586	127.47	
3	-2'-0	P2(-149.792)	86.690		
62	35'-0	PO(16'-5½)	37.268		
77	35'-0	PO(16'-5½)	34.580		
101	35'-0	PO(16'-5½)	37.270		
116	35'-0	PO(16'-5½)	34.566		
152	35'-0	PO(16'-5½)	37.300		
166	35'-0	PO(16'-5½)	34.630		
192	35'-0	PO(16'-5½)	37.386		
207	35'-0	PO(16'-5½)	34.967		
232	35'-0	PO(16'-5½)	37.552		
246	35'-0	PO(16'-5½)	35.767		
272	35'-0	PO(16'-5½)	37.742		
287	35'-0	PO(16'-5½)	36.439		
311	35'-0	PO(16'-5½)	37.947		
325	35'-0	PO(16'-5½)	36.991		
352	35'-0	PO(16'-5½)	38.169		
366	35'-0	PO(16'-5½)	37.466		
391	35'-0	PO(16'-5½)	38.407		
406	35'-0	PO(16'-5½)	37.879		
432	35'-0	PO(16'-5½)	38.659		
446	35'-0	PO(16'-5½)	38.244		
472	35'-0	PO(16'-5½)	38.935		
487	35'-0	PO(16'-5½)	38.580		
512	35'-0	PO(16'-5½)	39.223		
526	35'-0	PO(16'-5½)	38.880		
552	35'-0	PO(16'-5½)	39.523		
567	35'-0	PO(16'-5½)	39.146		
598	35'-0	PO(16'-5½)	39.837		
613	35'-0	PO(16'-5½)	39.377		
646	35'-0	PO(16'-5½)	40.198		
660	35'-0	PO(16'-5½)	39.592		
692	35'-0	PO(16'-5½)	40.592		
707	35'-0	PO(16'-5½)	39.772		
738	35'-0	PO(16'-5½)	41.011		
753	35'-0	PO(16'-5½)	39.907		
785	35'-0	PO(16'-5½)	41.459		
799	35'-0	PO(16'-5½)	39.997		
824	35'-0	PO(16'-5½)	41.956		
838	35'-0	PO(16'-5½)	40.046		
863	35'-0	PO(16'-5½)	42.482		
877	35'-0	PO(16'-5½)	40.061		
1069	1'-6	PO(30'-0)	71.852		
1075	7'-0		63.615		
2367	0'-2	CV(23'-0)	73.326		
2405	0'-10	BOR	72.558		

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •								
CM	2.6350	0.67	0.04	120		0.000003	8'-6	Pf 0.000
2011	36'-6	126.00	25.2	25.000		Sprinkler		Pe
2010	36'-6			25.000			8'-6	Pv
CM	2.6350	126.67	7.45	120		0.044605	9'-0	Pf 0.402
2010	36'-6	126.00	25.2	25.000		Sprinkler		Pe
2009	36'-6			25.402			9'-0	Pv
CM	2.6350	253.68	14.92	120		0.161203	44'-10½	Pf 11.218
2009	36'-6	127.01	25.2	25.402		Sprinkler,	24'-8½	Pe 0.650
101	35'-0			37.270		E(8'-3), PO(16'-5½)	69'-7	Pv
CM	6.3570	331.28	3.35	120		0.003624	8'-3	Pf 0.030
101	35'-0	77.60		37.270		Flow (q) from Route 9		Pe
152	35'-0			37.300			8'-3	Pv
CM	6.3570	584.90	5.91	120		0.010373	8'-3	Pf 0.086
152	35'-0	253.62		37.300		Flow (q) from Route 3		Pe
192	35'-0			37.386			8'-3	Pv
CM	6.3570	837.63	8.47	120		0.020159	8'-3	Pf 0.166
192	35'-0	252.74		37.386		Flow (q) from Route 5		Pe
232	35'-0			37.552			8'-3	Pv
CM	6.3570	899.84	9.10	120		0.023015	8'-3	Pf 0.190
232	35'-0	62.21		37.552		Flow (q) from Route 2		Pe
272	35'-0			37.742			8'-3	Pv
CM	6.3570	952.32	9.63	120		0.025560	8'-0	Pf 0.204
272	35'-0	52.48		37.742		Flow (q) from Route 12		Pe
311	35'-0			37.947			8'-0	Pv
CM	6.3570	996.70	10.08	120		0.027807	8'-0	Pf 0.222
311	35'-0	44.38		37.947		Flow (q) from Route 21		Pe
352	35'-0			38.169			8'-0	Pv
CM	6.3570	1034.31	10.46	120		0.029780	8'-0	Pf 0.238
352	35'-0	37.61		38.169		Flow (q) from Route 7		Pe
391	35'-0			38.407			8'-0	Pv
CM	6.3570	1066.52	10.78	120		0.031518	8'-0	Pf 0.252
391	35'-0	32.21		38.407		Flow (q) from Route 8		Pe
432	35'-0			38.659			8'-0	Pv
CM	6.3570	1094.82	11.07	120		0.033083	8'-4	Pf 0.276
432	35'-0	28.31		38.659		Flow (q) from Route 15		Pe
472	35'-0			38.935			8'-4	Pv
CM	6.3570	1120.80	11.33	120		0.034549	8'-4	Pf 0.288
472	35'-0	25.97		38.935		Flow (q) from Route 22		Pe
512	35'-0			39.223			8'-4	Pv
CM	6.3570	1146.29	11.59	120		0.036017	8'-4	Pf 0.300
512	35'-0	25.50		39.223		Flow (q) from Route 10		Pe
552	35'-0			39.523			8'-4	Pv
CM	6.3570	1173.16	11.86	120		0.037594	8'-4	Pf 0.313
552	35'-0	26.86		39.523		Flow (q) from Route 11		Pe
598	35'-0			39.837			8'-4	Pv
CM	6.3570	1203.03	12.16	120		0.039385	9'-2	Pf 0.361
598	35'-0	29.88		39.837		Flow (q) from Route 18		Pe
646	35'-0			40.198			9'-2	Pv
CM	6.3570	1237.71	12.51	120		0.041510	9'-6	Pf 0.394
646	35'-0	34.67		40.198		Flow (q) from Route 20		Pe
692	35'-0			40.592			9'-6	Pv
CM	6.3570	1278.55	12.92	120		0.044080	9'-6	Pf 0.419
692	35'-0	40.84		40.592		Flow (q) from Route 13		Pe
738	35'-0			41.011			9'-6	Pv
CM	6.3570	1326.51	13.41	120		0.047188	9'-6	Pf 0.448
738	35'-0	47.96		41.011		Flow (q) from Route 14		Pe
785	35'-0			41.459			9'-6	Pv
CM	6.3570	1382.35	13.97	120		0.050928	9'-9	Pf 0.497
785	35'-0	55.84		41.459		Flow (q) from Route 24		Pe
824	35'-0			41.956			9'-9	Pv
CM	6.3570	1446.87	14.63	120		0.055413	9'-6	Pf 0.526
824	35'-0	64.51		41.956		Flow (q) from Route 16		Pe
863	35'-0			42.482			9'-6	Pv
CM	6.3570	1520.21	15.37	120		0.060721	77'-7½	Pf 8.990
863	35'-0	73.35		42.482		Flow (q) from Route 17	70'-5	Pe 12.143
1075	7'-0			63.615		4E(17'-7)	148'-0½	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
FR	6.0650	1520.21	16.88	120	0.076347	4'-8½	Pf 5.857
1075	7'-0			63.615		72'-0	Pe 2.380
1069	1'-6			71.852	f, CV(32'-0), BV(10'-0), PO(30'-0)	76'-8½	Pv
MS	7.9810	1520.21	9.75	120	0.020052	3'-3	Pf 0.426
1069	1'-6			71.852		18'-0	Pe 0.280
2405	0'-10			72.558	E(18'-0), BOR	21'-3	Pv
DY	7.9810	1520.21	9.75	120	0.020052	0'-0	Pf 0.461
2405	0'-10			72.558		23'-0	Pe 0.307
2367	0'-2			73.326	CV(23'-0)	23'-0	Pv
UG	8.3900	1520.21	8.82	140	0.011820	1001'-0	Pf 12.433
2367	0'-2			73.326		50'-10½	Pe 0.930
3	-2'-0			86.690	BV(20'-4½), E(30'-6½)	1051'-10½	Pv
Pump			**Velocity**				
3		1520.21		86.690	Rating: 150.000 @ 1500.00		
2393		Q=1520.21	16.88	-62.869	Fire Pump Churn Pressure: 164.0 00		
		250.00			Hose Allowance At Source		
3		1770.21					
• • • • • Route 2 • • • • •							
CM	2.6350	125.33	7.37	120	0.043739	8'-6	Pf 0.372
2011	36'-6	126.00	25.2	25.000	Sprinkler		Pe
2012	36'-6			25.372		8'-6	Pv
CM	2.6350	252.27	14.84	120	0.159547	28'-10	Pf 8.544
2012	36'-6	126.93	25.2	25.372	Sprinkler,	24'-8½	Pe 0.650
116	35'-0			34.566	E(8'-3), PO(16'-5½)	53'-6½	Pv
CM	4.2600	174.66	3.93	120	0.007789	8'-3	Pf 0.064
116	35'-0			34.566			Pe
166	35'-0			34.630		8'-3	Pv
CM	4.2600	427.35	9.62	120	0.040774	8'-3	Pf 0.336
166	35'-0	252.69		34.630	Flow (q) from Route 4		Pe
207	35'-0			34.967		8'-3	Pv
CM	4.2600	682.58	15.36	120	0.096965	8'-3	Pf 0.800
207	35'-0	255.23		34.967	Flow (q) from Route 6		Pe
246	35'-0			35.767		8'-3	Pv
RN	2.6350	62.21	3.66	120	0.011968	99'-9	Pf 1.785
246	35'-0			35.767	PO(16'-5½)	49'-5	Pe
232	35'-0			37.552	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 3 • • • • •							
CM	2.6350	0.43	0.03	120	0.000001	8'-6	Pf 0.000
2069	36'-6	126.09	25.2	25.036	Sprinkler		Pe
2068	36'-6			25.036		8'-6	Pv
CM	2.6350	126.52	7.44	120	0.044508	9'-0	Pf 0.401
2068	36'-6	126.09	25.2	25.036	Sprinkler		Pe
2067	36'-6			25.437		9'-0	Pv
CM	2.6350	253.62	14.92	120	0.161130	44'-10½	Pf 11.212
2067	36'-6	127.10	25.2	25.437	Sprinkler,	24'-8½	Pe 0.650
152	35'-0			37.300	E(8'-3), PO(16'-5½)	69'-7	Pv
• • • • • Route 4 • • • • •							
CM	2.6350	125.66	7.39	120	0.043952	8'-6	Pf 0.374
2069	36'-6	126.09	25.2	25.036	Sprinkler		Pe
2070	36'-6			25.409		8'-6	Pv
CM	2.6350	252.69	14.87	120	0.160044	28'-10	Pf 8.571
2070	36'-6	127.03	25.2	25.409	Sprinkler,	24'-8½	Pe 0.650
166	35'-0			34.630	E(8'-3), PO(16'-5½)	53'-6½	Pv
• • • • • Route 5 • • • • •							
CM	2.6350	125.25	7.37	120	0.043685	9'-0	Pf 0.394
2126	36'-6	126.50	25.2	25.201	Sprinkler		Pe
2125	36'-6			25.594		9'-0	Pv
CM	2.6350	252.74	14.87	120	0.160100	44'-10½	Pf 11.141
2125	36'-6	127.49	25.2	25.594	Sprinkler,	24'-8½	Pe 0.650
192	35'-0			37.386	E(8'-3), PO(16'-5½)	69'-7	Pv
• • • • • Route 6 • • • • •							
CM	2.6350	1.26	0.07	120	0.000009	8'-6	Pf 0.000
2126	36'-6	126.50	25.2	25.201	Sprinkler		Pe
2127	36'-6			25.201		8'-6	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.6350	127.76	7.52	120	0.045320	8'-6	Pf 0.385
2127	36'-6	126.50	25.2	25.201	Sprinkler		Pe
2128	36'-6			25.586		8'-6	Pv
CM	2.6350	255.23	15.02	120	0.163031	28'-10	Pf 8.731
2128	36'-6	127.47	25.2	25.586	Sprinkler,	24'-8½	Pe 0.650
207	35'-0			34.967	E(8'-3), PO(16'-5½)	53'-6½	Pv
• • • • • Route 7 • • • • •							
RN	2.6350	37.61	2.21	120	0.004717	99'-9	Pf 0.704
366	35'-0	523.51		37.466	PO(16'-5½), Flow (q) from Route	49'-5	Pe
352	35'-0			38.169	25	149'-2	Pv
					2E(8'-3), PO(16'-5½)		
• • • • • Route 8 • • • • •							
CM	4.2600	485.90	10.94	120	0.051707	8'-0	Pf 0.414
366	35'-0	523.51		37.466	Flow (q) from Route 25		Pe
406	35'-0			37.879		8'-0	Pv
RN	2.6350	32.21	1.89	120	0.003541	99'-9	Pf 0.528
406	35'-0			37.879	PO(16'-5½)	49'-5	Pe
391	35'-0			38.407	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 9 • • • • •							
CM	6.3570	77.60	0.78	120	0.000247	8'-3	Pf 0.002
62	35'-0	77.60		37.268	Flow (q) from Route 23		Pe
101	35'-0			37.270		8'-3	Pv
• • • • • Route 10 • • • • •							
RN	2.6350	25.50	1.50	120	0.002299	99'-9	Pf 0.343
526	35'-0	399.42		38.880	PO(16'-5½), Flow (q) from Route	49'-5	Pe
512	35'-0			39.223	26	149'-2	Pv
					2E(8'-3), PO(16'-5½)		
• • • • • Route 11 • • • • •							
CM	4.2600	373.92	8.42	120	0.031847	8'-4	Pf 0.265
526	35'-0	399.42		38.880	Flow (q) from Route 26		Pe
567	35'-0			39.146		8'-4	Pv
RN	2.6350	26.86	1.58	120	0.002532	99'-9	Pf 0.378
567	35'-0			39.146	PO(16'-5½)	49'-5	Pe
552	35'-0			39.523	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 12 • • • • •							
CM	4.2600	620.38	13.96	120	0.081253	8'-3	Pf 0.672
246	35'-0	62.21		35.767	Flow (q) from Route 2		Pe
287	35'-0			36.439		8'-3	Pv
RN	2.6350	52.48	3.09	120	0.008739	99'-9	Pf 1.303
287	35'-0			36.439	PO(16'-5½)	49'-5	Pe
272	35'-0			37.742	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 13 • • • • •							
RN	2.6350	40.84	2.40	120	0.005495	99'-9	Pf 0.820
707	35'-0	282.51		39.772	PO(16'-5½), Flow (q) from Route	49'-5	Pe
692	35'-0			40.592	19	149'-2	Pv
					2E(8'-3), PO(16'-5½)		
• • • • • Route 14 • • • • •							
CM	4.2600	241.67	5.44	120	0.014203	9'-6	Pf 0.135
707	35'-0	282.51		39.772	Flow (q) from Route 19		Pe
753	35'-0			39.907		9'-6	Pv
RN	2.6350	47.96	2.82	120	0.007398	99'-9	Pf 1.103
753	35'-0			39.907	PO(16'-5½)	49'-5	Pe
738	35'-0			41.011	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 15 • • • • •							
CM	4.2600	453.70	10.21	120	0.045546	8'-0	Pf 0.364
406	35'-0	32.21		37.879	Flow (q) from Route 8		Pe
446	35'-0			38.244		8'-0	Pv
RN	2.6350	28.31	1.67	120	0.002789	99'-9	Pf 0.416
446	35'-0			38.244	PO(16'-5½)	49'-5	Pe
432	35'-0			38.659	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 16 • • • • •							
RN	2.6350	64.51	3.80	120	0.012803	99'-9	Pf 1.910
838	35'-0	137.86		40.046	PO(16'-5½), Flow (q) from Route	49'-5	Pe
824	35'-0			41.956	28	149'-2	Pv
					2E(8'-3), PO(16'-5½)		
• • • • • Route 17 • • • • •							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	4.2600	73.35	1.65	120	0.001564	9'-6	Pf 0.015
838	35'-0	137.86		40.046	Flow (q) from Route 28		Pe
877	35'-0			40.061		9'-6	Pv
RN	2.6350	73.35	4.32	120	0.016233	99'-9	Pf 2.421
877	35'-0			40.061	PO(16'-5½)	49'-5	Pe
863	35'-0			42.482	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 18 • • • • •							
RN	2.6350	29.88	1.76	120	0.003082	99'-9	Pf 0.460
613	35'-0	347.06		39.377	PO(16'-5½), Flow (q) from Route	49'-5	Pe
598	35'-0			39.837	27	149'-2	Pv
					2E(8'-3), PO(16'-5½)		
• • • • • Route 19 • • • • •							
CM	4.2600	317.18	7.14	120	0.023488	9'-2	Pf 0.215
613	35'-0	347.06		39.377	Flow (q) from Route 27		Pe
660	35'-0			39.592		9'-2	Pv
CM	4.2600	282.51	6.36	120	0.018960	9'-6	Pf 0.180
660	35'-0			39.592			Pe
707	35'-0			39.772		9'-6	Pv
• • • • • Route 20 • • • • •							
RN	2.6350	34.67	2.04	120	0.004059	99'-9	Pf 0.605
660	35'-0			39.592	PO(16'-5½)	49'-5	Pe
646	35'-0			40.198	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 21 • • • • •							
CM	4.2600	567.89	12.78	120	0.068996	8'-0	Pf 0.552
287	35'-0	52.48		36.439	Flow (q) from Route 12		Pe
325	35'-0			36.991		8'-0	Pv
RN	2.6350	44.38	2.61	120	0.006409	99'-9	Pf 0.956
325	35'-0			36.991	PO(16'-5½)	49'-5	Pe
311	35'-0			37.947	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 22 • • • • •							
CM	4.2600	425.39	9.58	120	0.040428	8'-4	Pf 0.337
446	35'-0	28.31		38.244	Flow (q) from Route 15		Pe
487	35'-0			38.580		8'-4	Pv
RN	2.6350	25.97	1.53	120	0.002379	99'-9	Pf 0.355
487	35'-0			38.580	PO(16'-5½)	49'-5	Pe
472	35'-0			38.935	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 23 • • • • •							
CM	4.2600	77.60	1.75	120	0.001737	8'-3	Pf 0.014
116	35'-0	174.66		34.566	Flow (q) from Route 2		Pe
77	35'-0			34.580		8'-3	Pv
RN	2.6350	77.60	4.57	120	0.018019	99'-9	Pf 2.688
77	35'-0			34.580	PO(16'-5½)	49'-5	Pe
62	35'-0			37.268	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 24 • • • • •							
CM	4.2600	193.70	4.36	120	0.009433	9'-6	Pf 0.090
753	35'-0	47.96		39.907	Flow (q) from Route 14		Pe
799	35'-0			39.997		9'-6	Pv
RN	2.6350	55.84	3.29	120	0.009803	99'-9	Pf 1.462
799	35'-0			39.997	PO(16'-5½)	49'-5	Pe
785	35'-0			41.459	2E(8'-3), PO(16'-5½)	149'-2	Pv
• • • • • Route 25 • • • • •							
CM	4.2600	523.51	11.78	120	0.059353	8'-0	Pf 0.475
325	35'-0	44.38		36.991	Flow (q) from Route 21		Pe
366	35'-0			37.466		8'-0	Pv
• • • • • Route 26 • • • • •							
CM	4.2600	399.42	8.99	120	0.035981	8'-4	Pf 0.300
487	35'-0	25.97		38.580	Flow (q) from Route 22		Pe
526	35'-0			38.880		8'-4	Pv
• • • • • Route 27 • • • • •							
CM	4.2600	347.06	7.81	120	0.027744	8'-4	Pf 0.231
567	35'-0	26.86		39.146	Flow (q) from Route 11		Pe
613	35'-0			39.377		8'-4	Pv
• • • • • Route 28 • • • • •							
CM	4.2600	137.86	3.10	120	0.005028	9'-9	Pf 0.049
799	35'-0	55.84		39.997	Flow (q) from Route 24		Pe
838	35'-0			40.046		9'-9	Pv

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
fd	Flex Drop
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Ho	Hose
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
SFx	Seismic Flex
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Job

20 Industry Expansion

20 Industry Drive

Mountainville NY 10953

Design Basis

Occupancy:	ESFR
Total Sprinklers:	1472
Number Of Sprinklers Calculated:	12
Number Of Nozzles Calculated:	0
K-Factor:	25.2
Orifice Size:	0.93
Pressure:	50.000
Average Density:	
Area of Application:	NA

Demand At Base Of Riser (BOR)

Total Demand Flow(gpm):	1520.21
Pressure(psi):	72.558

Water Supply Information At Time Of Design

Static Pressure(psi):	
Residual Pressure(psi):	
Supply Flow(gpm):	
Total Demand Flow(gpm):	1770.21
Total Demand Pressure(psi):	41.820

PENTAIR AURORA®

Submittal Data For FIRE PUMPS with ENGINE DRIVES

NO. OF PRINTS	
	For Approval
	Final
	Reproducible

Sales Office: Callaghan Pump & Controls, Inc. 201-621-0505 P.O. No. _____

Factory Order No.: _____ Service: _____

Job: 19-20 Industry

Engineer: _____

Contractor: Active Fire

Sold To: _____ P.O. No. _____

Reference: 1500@150psi

PUMP

Number of Units: 1
Model: 6-481-20
Size: 6x8x20
GPM: 1500
TDH: 347'
RPM: 1800

Construction:
- [ ] Standard Fitted
- [x] Bronze Fitted

Case: Cast Iron
Imp.: Bronze
Shaft: Steel
Sleeve: Bronze
Case Ring: _____
Imp. Ring: _____

Pump Only: [ ]

Rotation:
- RH: [x]
- LH: [ ]

Connections:
- Threaded: [ ]
- Flanged: [x]
  - [x] 125#
  - [x] 250#

Lubrication:
- Grease: [x]
- Oil: [ ]

Stuffing Box:
- Packing: [x]
- Lantern Ring: [ ]

OPTIONS

Base:
- Steel Drip Rim: [ ]
- Steel Form: [x]
- Fabricated Steel: [ ]
- Cast Iron Ring Type: [ ]

Coupling:
- Mfg: F/C
- Size: _____
- Spacer: [ ]
- Guard: [x]

Test:
- Certified Performance: [x]
- Wit. Certified Performance: [ ]
- Hydro: [x]
- _____: [ ]

ENGINE

Manufacturer: Clarke
Model: JU6H-UFADR8
RPM: 1800

- [x] Aurora To Furnish
- [ ] Others To Furnish

SPECIAL REQUIREMENTS:

_____

_____

_____

CERTIFIED PRINT:

Section: _____ Page: _____ Curve Number: _____

Special: _____ Maintenance Sent: _____

By: D. Latona Date: 01/27/2020 Office: Callaghan Pump & Controls, Inc.

This order will not be processed for manufacturing until approval is received. Prints are not to scale and are certified correct only for this order. All orders are subject to acceptance at Aurora Pump, North Aurora, Illinois.

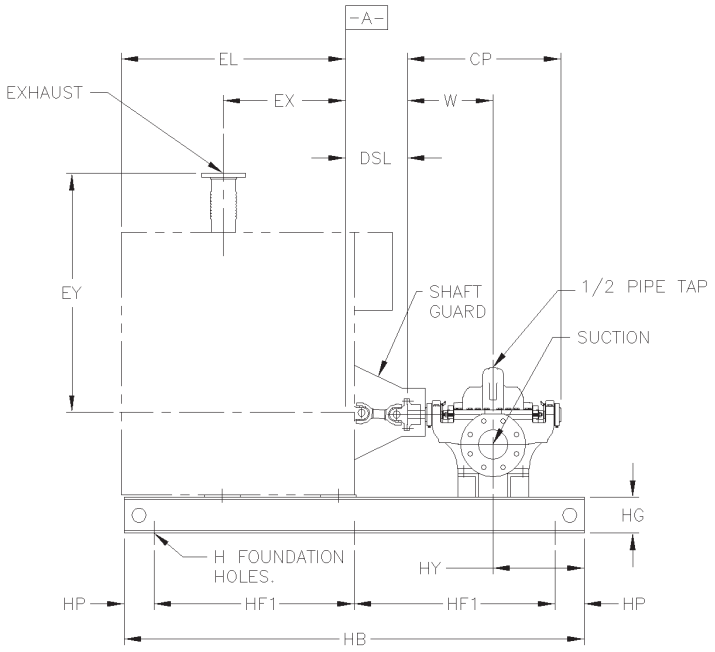
Diesel Driven						
Flow	Pressure		Speed (RPM)	Horsepower (BHP)	Maximum Shutoff (PSI)*	Pump Model
	PSI	TDH				
1500 GPM	135	312	1470	254	140	8-481-21
			1480	233	142	8-471-20A
			1760	214	147	6-481-20
			1760	240	140	8-481-21
			2100	195	141	6-471-16A
			2100	207	142	6-471-16B
			2100	232	146	6-491-14A
			2200	210	146	6-471-16B
			2300	210	146	6-471-16B
			2350	224	161	6-491-14C
			2350	246	153	6-491-14A
			2960	195	159	6-471-12B
			2960	206	153	6-471-12D
			3000	178	157	6-481-11HH
	140	323	1470	254	145	8-481-21
			1480	247	147	8-471-20A
			1760	224	152	6-481-20
			1760	252	145	8-481-21
			2100	204	146	6-471-16A
			2100	219	147	6-471-16B
			2200	220	150	6-471-16B
			2300	220	150	6-471-16B
			2350	235	167	6-491-14C
			2350	259	158	6-491-14A
			2960	206	164	6-471-12B
			3000	187	161	6-481-11HH
	142	328	2600	200	158	6-481-14HH
	144	333	3000	196	166	6-481-11HH
	145	335	1480	261	151	8-471-20A
			1760	233	159	6-481-20
			1760	268	151	8-481-21
			2100	215	151	6-471-16A
			2100	231	152	6-471-16B
			2200	233	155	6-471-16B
			2300	230	155	6-471-16B
			2350	243	175	6-491-14C
			2350	269	162	6-491-14A
			2600	207	162	6-481-14HH
			2960	218	169	6-471-12B
	150	347	1480	278	159	8-471-20A
			1760	243	164	6-481-20
			1760	280	156	8-481-21
			2100	224	155	6-471-16A
			2200	246	160	6-471-16B
			2300	243	160	6-471-16B
			2350	251	177	6-491-14C
			2350	279	167	6-491-14A
			2600	222	166	6-481-14HH
			2960	230	174	6-471-12B
	151	349	2350	252	179	6-491-14C
	152		1480	284	159	8-471-20A
	155	358	1760	250	168	6-481-20
			1760	296	161	8-481-21
			2100	236	161	6-471-16A
			2200	258	165	6-471-16B
			2300	255	165	6-471-16B
			2350	292	172	6-491-14A
			2600	233	171	6-481-14HH
			2960	247	180	6-471-12B
			3000	230	172	6-481-14HH

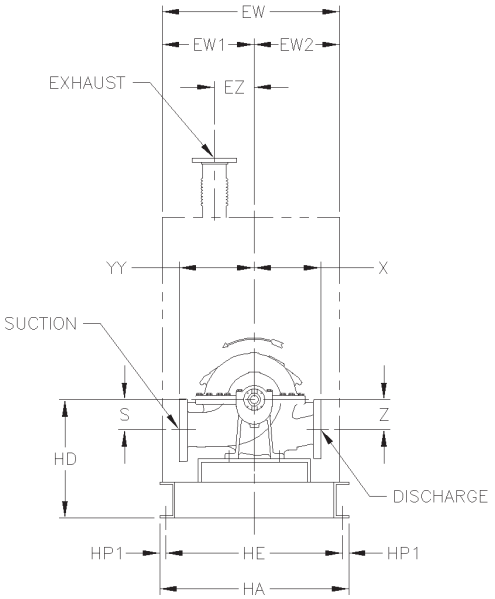
*Maximum shutoff includes Hydraulic Institute's tolerance of 6%.
Value is used to determine flange rating for the pump.

General Arrangement

WARNING

DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.





EY	EL	EX	DSL	CP	W	EW	EW1	EW2	EZ	YY	X	S
45.70	45.40	25.70	20.30	32.00	18.00	36.60	19.80	16.80	4.90	18.00	15.75	8.00

Z	HD	HG	HP	HF1	HY	HB	HP1	HE	HA	H(Holes)	H(Dia)	H(Slot)
8.00	22.00	6.00	5.00	39.00	12.00	88.00	1.00	30.00	32.00	6	1.00	2.00

NOTES:

Not for construction, installation, or application purposes unless certified.

All dimensions are in inches

Dimensions may vary ± .38" (10mm) due to normal manufacturing tolerances.

Bases are designed to be completely filled with grout.

See configuration for estimated total weight.

For additional dimensions, refer to engine manufacturer's website.

Pump Data	
Series	Horizontal Splitcase
Model	Pentair Aurora 6-481-20
Size	6x8x20
Flow	1,500.0 USgpm
Rated Pressure	150.0 psi.g
RPM	1760 rpm
Rotation	Right handed
Liquid Type	Water
Discharge Size	6.00 in
Suction Size	8.00 in
Impeller Diameter	18.94 in
Connection Type	Flanged
Base Type	Structural steel base
-	-
Pump Materials of Construction	
Pump	Bronze fitted with Cast Iron casing
Shaft	Carbon Steel AISI C1045
Engine Data	
Engine Model	JU6H-UFADR8
Power Rated	250 hp
Power Available	250 hp
Speed	1760 rpm
Tier	T3
Manufacturer	Clarke
Cooling Type	Heat exchanger
Heater Voltage	230 Volt
Muffler Type	Critical Grade, 6" (Qty 1)
Exhaust Connection	Threaded
Battery Type	Lead acid
Battery Voltage	12 Volt DC
Site Information	
Elevation	
Temperature	
Estimated Weights	
Pump	1,025.0 lb
Driver	1,747.0 lb
Quote Information	
Customer	
Customer Quote	
Job Name	
Market	-

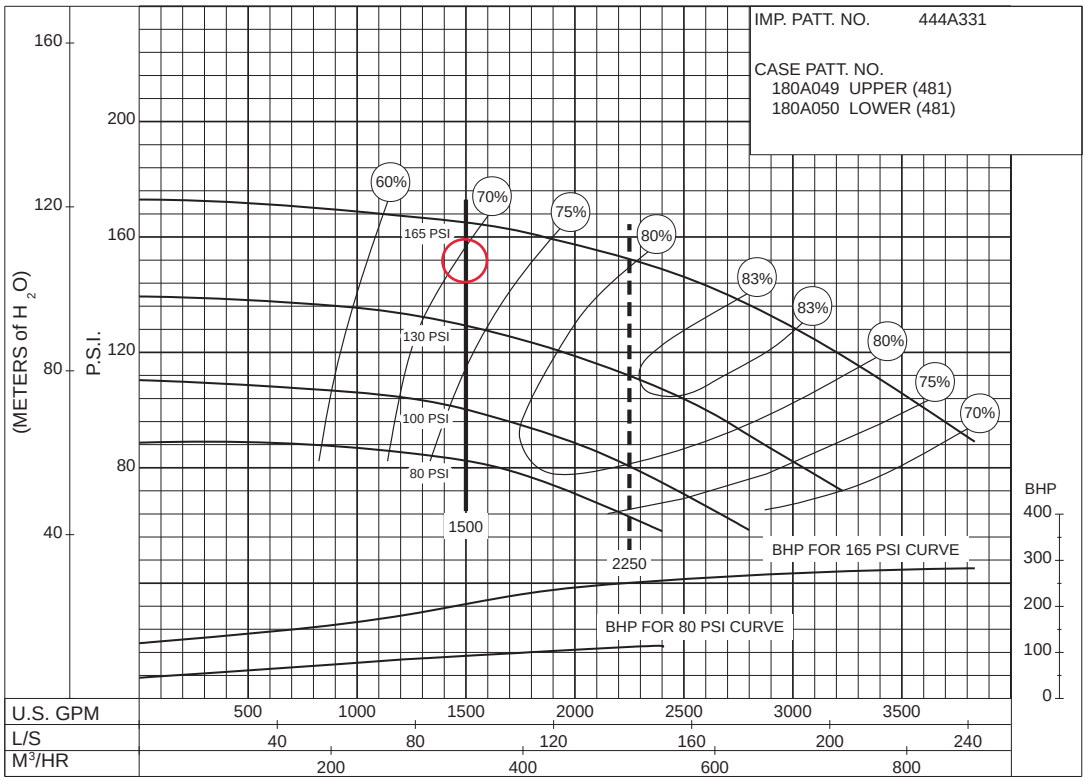
PENTAIR	Quote Item	
	Quote Date	

AURORA® 1500 GPM 913 SERIES

DIESEL ENGINE DRIVE

80 to 165 P.S.I.

SIZE : 6-481-20 **MODEL: 480** **IMPELLER : Enclosed** **R. P. M. : 1750**

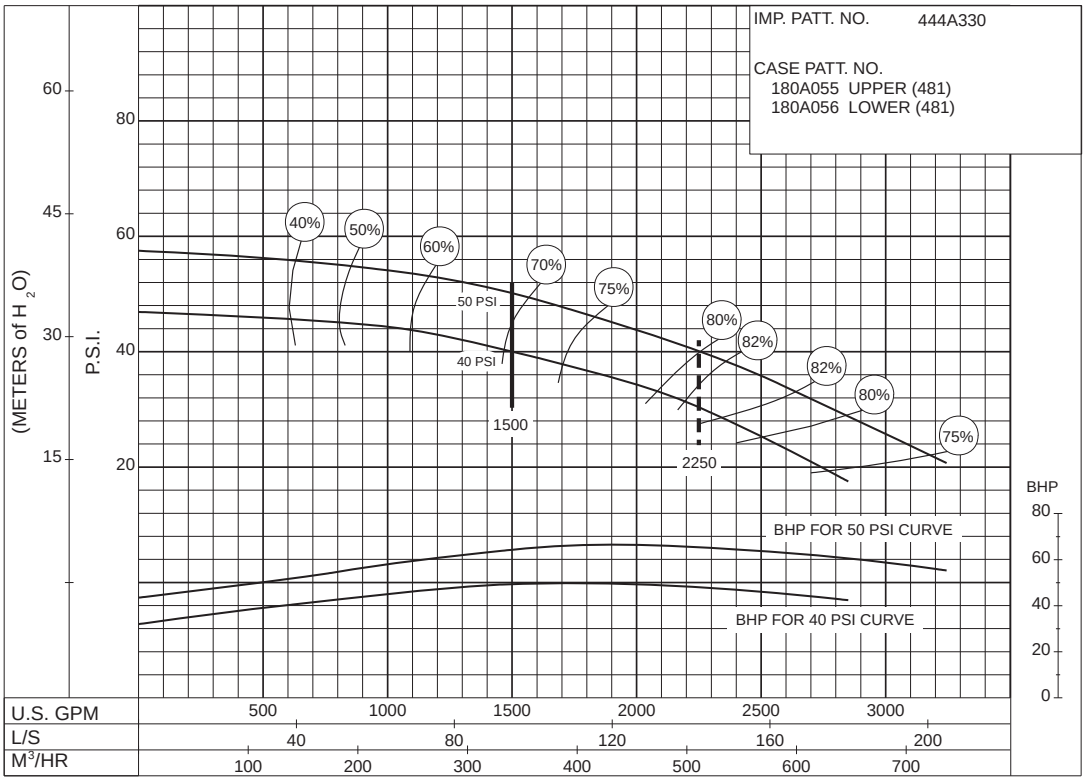


PC-123161

ADVISE SUCTION PRESSURE

40 to 50 P.S.I.

SIZE : 8-481-12 **MODEL: 480** **IMPELLER : Enclosed** **R. P. M. : 1750**



PC-123162

CLARKE®

FIRE PUMP ENGINES

MODELS

JU6H-UFADMG	JU6H-UFADP0	JU6H-UFADR0	JU6H-UFADT0
JU6H-UFAD58	JU6H-UFADP8	JU6H-UFADR8	JU6H-UFADW8
JU6H-UFADNG	JU6H-UFADQ0	JU6H-UFADS8	JU6H-UFADX8
JU6H-UFADN0	JU6H-UFAD88	JU6H-UFADS0	JU6H-UFAD98

FM-UL-cUL APPROVED RATINGS BHP/*KW*

JU6H MODEL ♦	RATED SPEED 1760		2100		2350		2400		US-EPA (NSPS) Available Until ●
UFADMG			175	*131*	175	*131*			*No Expiration*
UFAD58	183	*137*							*No Expiration*
UFADNG	190	*142*	181	*135*	183	*137*	183	*137*	*No Expiration*
UFADN0	197	*147*	197	*147*	200	*149*	200	*149*	*No Expiration*
UFADP0			209	*156*	211	*157*	211	*157*	*No Expiration*
UFADP8	220	*164*							*No Expiration*
UFADQ0			224	*167*	226	*169*	226	*169*	*No Expiration*
UFAD88	237	*177*							*No Expiration*
UFADR0			238	*177.5*	240	*179*	240	*179*	*No Expiration*
UFADR8	250	*187*							*No Expiration*
UFADS8	260	*194*							*No Expiration*
UFADS0			260	*194*	268	*200*	268	*200*	*No Expiration*
UFADT0			274	*204*	275	*205*	275	*205*	*No Expiration*
UFADW8	282	*211*							*No Expiration*
UFADX8	305	*227.5*							*No Expiration*
UFAD98	315	*235*							*No Expiration*

Picture represents JU6H-TRWA Power Tech Plus Engine Series

● USA EPA (NSPS) Tier 3 Emissions Certified Off-Road (40 CFR Part 89) and NSPS Stationary (40 CFR Part 60 Sub Part IIII). Meet EU Stage IIIA emission levels.

♦ All Models available for Export

SPECIFICATIONS

ITEM	JU6H MODELS MG	58	NG	N0	P8	88	P0	Q0	R0	S0	T0	R8	S8	W8	X8	98
Number of Cylinders	6															
Aspiration	TRWA															
Rotation*	CW															
Overall Dimensions – in. (mm)	59.8 (1519) H x 56.7 (1414) L x 36.7 (933) W						60.9 (1547) H x 58.6 (1488) L x 40.0 (1015) W									
Crankshaft Centerline Height – in. (mm)	14 (356)															
Weight – lb (kg)	1747 (791)															
Compression Ratio	19.0:1						17.0:1									
Displacement – cu. in. (L)	415 (6.8)															
Engine Type	4 Stroke Cycle – Inline Construction															
Bore & Stroke – in. (mm)	4.19 x 5.00 (106 x 127)															
Installation Drawing	D628															
Wiring Diagram AC	C07651															
Wiring Diagram DC	C071367, C072146, C071361						C071368, C072146, C071761									
Engine Series	John Deere 6068 Series Power Tech E						John Deere 6068 Series Power Tech Plus									
Speed Interpolation	N/A															

Abbreviations: CW – Clockwise TRWA – Turbocharged with Raw Water Aftercooling N/A - Not Available L – Length W – Width H - Height

*Rotation viewed from Heat Exchanger / Front of engine

CERTIFIED POWER RATING

- Each engine is factory tested to verify power and performance.
- FM-UL power ratings are shown at specific speeds, Clarke engines can be applied at a single rated RPM setting ± 50 RPM.

ENGINE RATINGS BASELINES

- Engines are to be used for stationary emergency standby fire pump service only. Engines are to be tested in accordance with NFPA 25.
- Engines are rated at standard SAE conditions of 29.61 in. (752.1 mm) Hg barometer and 77°F (25°C) inlet air temperature [approximates 300 ft. (91.4 m) above sea level] by the testing laboratory (see SAE Standard J 1349).
- A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) altitude above 300 ft. (91.4 m)
- A deduction of 1 percent from engine horsepower rating as corrected to standard SAE conditions shall be made for diesel engines for every 10°F (5.6°C) above 77°F (25°C) ambient temperature.

CLARKE®

FIRE PUMP ENGINES

MODELS

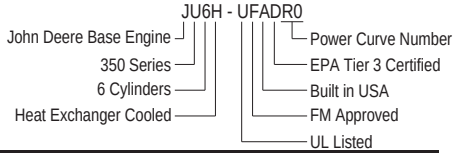
JU6H-UFADMG	JU6H-UFADP0	JU6H-UFADR0	JU6H-UFADT0
JU6H-UFAD58	JU6H-UFADP8	JU6H-UFADR8	JU6H-UFADW8
JU6H-UFADNG	JU6H-UFADQ0	JU6H-UFADS8	JU6H-UFADX8
JU6H-UFADN0	JU6H-UFAD88	JU6H-UFADS0	JU6H-UFAD98

ENGINE EQUIPMENT

EQUIPMENT	STANDARD	OPTIONAL
Air Cleaner	Direct Mounted, Washable, Indoor Service with Drip Shield	Disposable, Drip Proof, Indoor Service Outdoor Type, Single or Two Stage (Cyclonic)
Alarms	Overspeed Alarm & Shutdown, Low Oil Pressure, Low & High Coolant Temperature, Low Raw Water Flow, High Raw Water Temperature, Alternate ECM Warning, Fuel Injection Malfunction, ECM Warning and Failure with Automatic Switching	Low Coolant Level, Low Oil Level, Oil Filter Differential Pressure, Fuel Filter Differential Pressure, Air Filter Restriction
Alternator	12V-DC, 42 Amps with Poly-Vee Belt and Guard	24V-DC, 40 Amps with Poly-Vee Belt and Guard
Coupling	Bare Flywheel	UL Listed Driveshaft and Guard, JU6H-UFAD58/NG/ADMG/ADM8/K0/N0/Q0/R0-CDS30-S1; JU6H-UFADP8/P0/T0/88/R8/S8/S0/W8/X8/98- CDS50-SC at 1760/2100 RPM only
Electronic Control Module	12V-DC, Energized to Stop, Primary ECM always Powered on	24V-DC, Energized to Stop, Primary ECM always Powered on
Engine Heater	115V-AC, 1360 Watt	230V-AC, 1360 Watt
Exhaust Flex Connection	SS Flex, 150# ANSI Flanged Connection, 5" for JU6H-UFAD58/MG/NG/N0/P8/88; SS Flex, 150# ANSI Flanged Connection, 6" for JU6H-UFADP0/Q0/R0/S0/T0/R8/S8/W8/X8/98 (w/ orifice plate)	SS Flex, 150# ANSI Flanged Connection, 6" for JU6H-UFAD58/MG/NG/N0/P8/88; SS Flex, 150# ANSI Flanged Connection, 8" for JU6H-UFADP0/Q0/R0/S0/T0/R8/S8/W8/X8/98 (w/ orifice plate)
Exhaust Protection	Metal Guards on Manifolds and Turbocharger	
Flywheel Housing	SAE #3	
Flywheel Power Take Off	11.5" SAE Industrial Flywheel Connection	
Fuel Connections	Fire Resistant, Flexible, USA Coast Guard Approved, Supply and Return Lines	SS, Braided, cUL Listed, Supply and Return Lines
Fuel Filter	Primary Filter with Priming Pump	
Fuel Injection System	High Pressure Common Rail	
Governor, Speed	Dual Electronic Control Modules	
Heat Exchanger	Tube and Shell Type, 60 PSI (4 BAR), NPT(F) Connections – Sea Water Compatible	
Instrument Panel	Multimeter to Display English and Metric, Tachometer, Hourmeter, Water Temperature, Oil Pressure and One (1) Voltmeter with Toggle Switch, Front Opening	
Junction Box	Integral with Instrument Panel; For DC Wiring Interconnection to Engine Controller	
Lube Oil Cooler	Engine Water Cooled, Plate Type	
Lube Oil Filter	Full Flow with By-Pass Valve	
Lube Oil Pump	Gear Driven, Gear Type	
Manual Start Control	On Instrument Panel with Control Position Warning Light	
Overspeed Control	Electronic, Factory Set, Not Field Adjustable	
Raw Water Cooling Loop w/Alarms	Galvanized	Seawater, All 316SS, High Pressure
Raw Water Cooling Loop Solenoid Operation	Automatic from Fire Pump Controller and from Engine Instrument Panel (for Horizontal Fire Pump Applications)	Not Supplied (for Vertical Turbine Fire Pump Applications)
Run – Stop Control	On Instrument Panel with Control Position Warning Light	
Starters	Two (2) 12V-DC	Two (2) 24V-DC
Throttle Control	Adjustable Speed Control by Increase/Decrease Button, Tamper Proof in Instrument Panel	
Water Pump	Centrifugal Type, Poly-Vee Belt Drive with Guard	

Abbreviations: DC – Direct Current, AC – Alternating Current, SAE – Society of Automotive Engineers, NPT(F) – National Pipe Tapered Thread (Female), ANSI – American National Standards Institute, SS – Stainless Steel

MODEL NOMENCLATURE: (10 Digit Models)



CLARKE®

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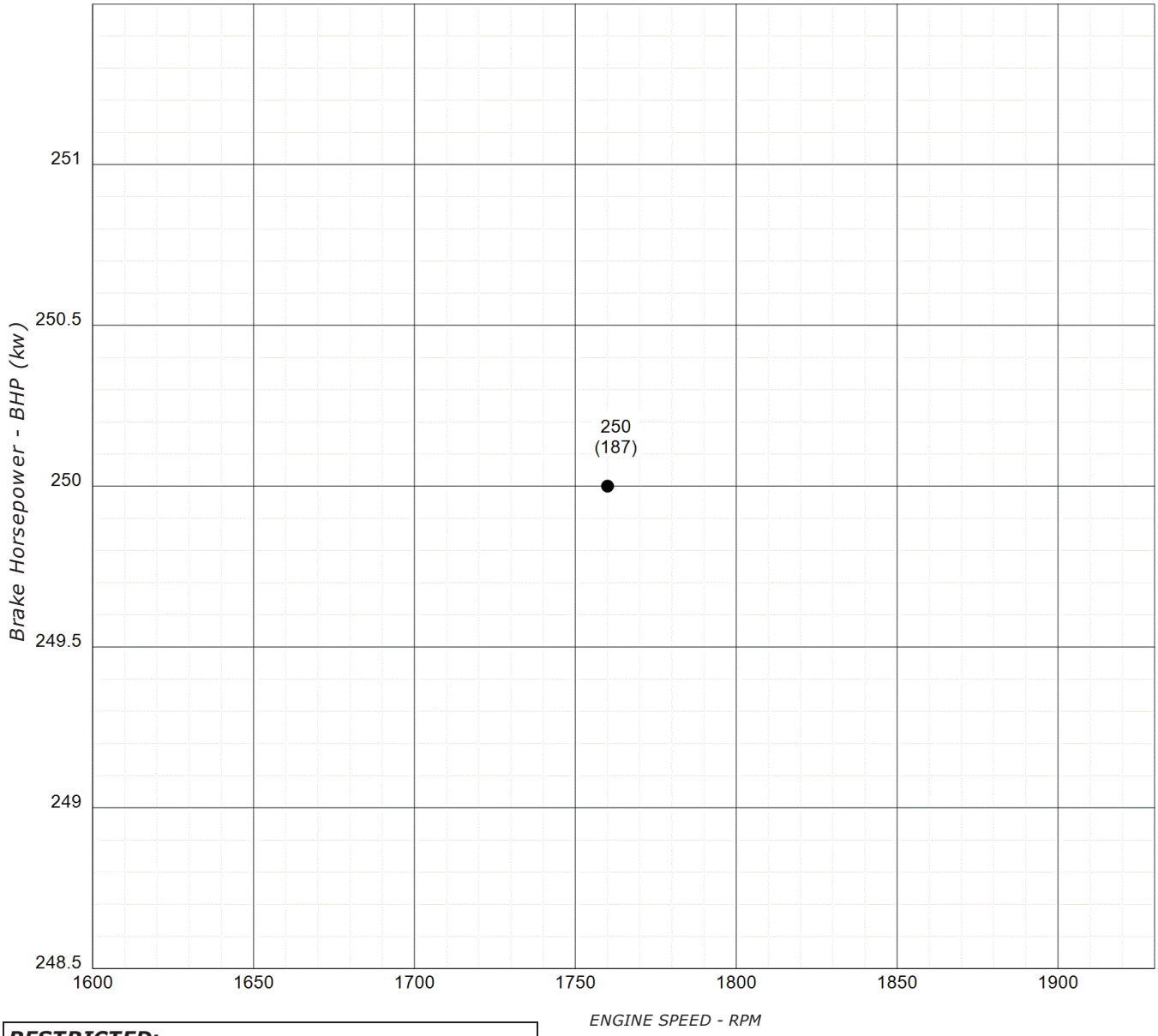
www.clarkefire.com

C133421 revR
19JUN15

CLARKE®

FIRE PUMP MODEL: JU6H-UFADR8
Heat Exchanger Cooled
Raw Water Charge Cooling
Tier 3 Emissions Certified



RESTRICTED:
Use only for Stand-By Fire Pump Applications

NAMEPLATE BHP (MAXIMUM PUMP LOAD)

ENGINE PERFORMANCE:
STANDARD CONDITIONS: (SAE J1349, ISO 3046)
77°F (25°C) AIR INLET TEMPERATURE
29.61 IN. (751.1MM) HG BAROMETRIC PRESSURE
#2 DIESEL FUEL (SEE C13940)

Kevin Kunkler 06FEB09

CREATED	DATE CREATED
KTF	02/06/09

ENGINE MODEL JU6H-UFADR8

DRAWING NO.	REV
C132964	A

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JU6H-UFADR8
INSTALLATION & OPERATION DATA (I&O)
USA Produced

Basic Engine Description

Engine Manufacturer	John Deere Co.
Ignition Type	Compression (Diesel)
Number of Cylinders	6
Bore and Stroke - in (mm)	4.19 (106) X 5 (127)
Displacement - in³ (L)	415 (6.8)
Compression Ratio	17.0:1
Valves per cylinder	
Intake	2
Exhaust	2
Combustion System	Direct Injection
Engine Type	In-Line, 4 Stroke Cycle
Fuel Management Control	Electronic, High Pressure Common Rail
Firing Order (CW Rotation)	1-5-3-6-2-4
Aspiration	Turbocharged
Charge Air Cooling Type	Raw Water
Rotation, viewed from front of engine, Clockwise (CW)	Standard
Engine Crankcase Vent System	Open
Installation Drawing	D628
Weight - lb (kg)	1747 (792)

Power Rating	**1760**
Nameplate Power - HP (kW) [1]	250 (187)

Cooling System - [C051386]	**1760**
Engine Coolant Heat - Btu/sec (kW)	118 (125)
Engine Radiated Heat - Btu/sec (kW)	17.4 (18.4)
Heat Exchanger Minimum Flow	
60°F (15°C) Raw H_2O - gal/min (L/min)	28 (106)
100°F (37°C) Raw H_2O - gal/min (L/min)	38 (144)
Heat Exchanger Maximum Cooling Raw Water	
Inlet Pressure - psi (bar)	60 (4.1)
Flow - gal/min (L/min)	40 (151)
Typical Engine H_2O Operating Temp - °F (°C)	180 (82.2) - 195 (90.6)
Thermostat	
Start to Open - °F (°C)	180 (82.2)
Fully Opened - °F (°C)	203 (95)
Engine Coolant Capacity - qt (L)	21.6 (20.4)
Coolant Pressure Cap - lb/in² (kPa)	15 (103)
Maximum Engine Coolant Temperature - °F (°C)	230 (110)
Minimum Engine Coolant Temperature - °F (°C)	160 (71.1)
High Coolant Temp Alarm Switch - °F (°C)	235 (113) - 241 (116)

Electric System - DC	**Standard**		**Optional**	
System Voltage (Nominal)	12		24	
Battery Capacity for Ambients Above 32°F (0°C)				
Voltage (Nominal)	12	{C07633}	12	{C07633}
Qty. Per Battery Bank	1		2	
SAE size per J537	8D		8D	
CCA @ 0°F (-18°C) per J537	1400		1400	
Reserve Capacity - Minutes per J537	430		430	
Battery Cable Circuit, Max Resistance - ohm	0.0012		0.0012	
Battery Cable Minimum Size				
0-120 in. Circuit Length [2]	00		00	
121-160 in. Circuit Length [2]	000		000	
161-200 in. Circuit Length [2]	0000		0000	
Charging Alternator Maximum Output - Amp,	40	{C071363}	55	{C071365}
Starter Cranking Amps, Rolling - @60°F (15°C)	440	{RE69704/RE70404}	250	{C07819/C07820}

* All footnotes are at the bottom of Page 2

JU6H-UFADR8
INSTALLATION & OPERATION DATA (I&O)
USA Produced

Exhaust System (Single Exhaust Outlet)	**1760**
Exhaust Flow - ft.³/min (m³/min)	1400 (39.6)
Exhaust Temperature - °F (°C)	961 (516)
Maximum Allowable Back Pressure - in H_2O (kPa)	30 (7.5)
Minimum Exhaust Pipe Dia. - in (mm) [3]	6 (152)

Fuel System	**1760**
Fuel Consumption - gal/hr (L/hr)	12.3 (46.6)
Fuel Return - gal/hr (L/hr)	21.3 (80.6)
Fuel Supply - gal/hr (L/hr)	33.6 (127)
Fuel Pressure - lb/in² (kPa)	3 (20.7) - 6 (41.4)
Minimum Line Size - Supply - in.	.50 Schedule 40 Steel Pipe
Pipe Outer Diameter - in (mm)	0.848 (21.5)
Minimum Line Size - Return - in.	.375 Schedule 40 Steel Pipe
Pipe Outer Diameter - in (mm)	0.675 (17.1)
Maximum Allowable Fuel Pump Suction Lift	
with clean Filter - in H_2O (mH_2O)	80 (2)
Maximum Allowable Fuel Head above Fuel pump, Supply or Return - ft (m)	6.6 (2)
Fuel Filter Micron Size	2 (Secondary)

Heater System	**Standard**	**Optional**
Engine Coolant Heater		
Wattage (Nominal)	1360	1360
Voltage - AC, 1 Phase	115 (+5% -10%)	230 (+5%, -10%)
Part Number	{C123640}	{C123644}

Air System	**1760**	
Combustion Air Flow - ft.³/min (m³/min)	402 (11.4)	
Air Cleaner	**Standard**	**Optional**
Part Number	{C03244}	{C03327}
Type	Indoor Service Only, with Shield	Canister, Single-Stage
Cleaning method	Washable	Disposable
Air Intake Restriction Maximum Limit		
Dirty Air Cleaner - in H_2O (kPa)	14 (3.5)	14 (3.5)
Clean Air Cleaner - in H_2O (kPa)	7 (1.7)	5 (1.2)
Maximum Allowable Temperature (Air To Engine Inlet) - °F (°C)	130 (54.4)	

Lubrication System	
Oil Pressure - normal - lb/in² (kPa)	40 (276) - 60 (414)
Low Oil Pressure Alarm Switch - lb/in² (kPa) to	30 (207) - 35 (241)
In Pan Oil Temperature - °F (°C)	220 (104) - 245 (118)
Total Oil Capacity with Filter - qt (L)	31.7 (30)

Lube Oil Heater	**Optional**	**Optional**
Wattage (Nominal)	150	150
Voltage	120V (+5%, -10%)	240V (+5%, -10%)
Part Number	{C04430}	{C04431}

Performance	**1760**
BMEP - lb/in² (kPa)	271 (1870)
Piston Speed - ft/min (m/min)	1467 (447)
Mechanical Noise - dB(A) @ 1m	C133375
Power Curve	C132964

NOTE: This engine is intended for indoor installation or in a weatherproof enclosure. [1] Derate 3% per every 1000 ft. 304.8m above 300 ft. 91.4m and derate 1% for every 10°F 5.55 °C above 77°F 25°C. [2] Positive and Negative Cables Combined Length. [3] Minimum Exhaust Pipe Diameter is based on: 15 feet of pipe, one 90° elbow, and one Industrial silencer. A Back-pressure flow analysis must be performed on the actual field installed exhaust system to assure engine maximum allowable back pressure is not exceeded. See Exhaust Sizing Calculator on www.clarkefire.com. { } indicates component reference part number.

CLARKE®

JU4H, JU4R & JU6H, JU6R ENGINE MODELS
ENGINE MATERIALS AND CONSTRUCTION

Air Cleaner
Type..... Indoor Usage Only
Oiled Fabric Pleats
Material..... Surgical Cotton
Aluminum Mesh

Air Cleaner - Optional
Type..... Canister
Material..... Pleated Paper
Housing..... Enclosed

Camshaft
Material..... Cast Iron
Chill Hardened
Location..... In Block
Drive..... Gear, Spur
Type of Cam..... Ground

Charge Air Cooler (JU6H-60,62,68,74,84, 94, T8, T0, T2, ADK0, AD58, ADNG, ADN0, ADQ0, ADR0, AAQ8, AARG, ADP8, ADP0, ADT0, AD88, ADR8, AD98, ADS0, ADW8, ADX8, AD98 only)
Type..... Raw Water Cooled
Materials (in contact with raw water)
Tubes..... 90/10 CU/NI
Headers ..... 36500 Muntz
Covers ..... 83600 Red Brass
Plumbing ..... 316 Stainless Steel/ Brass
90/10 Silicone

Charge Air Cooler (JU6R-AA67, 59, 61, PF, Q7, RF, S9, 83 only)
Type..... Air to Air Cooled
Materials
Core..... Aluminum

Coolant Pump
Type..... Centrifugal
Drive..... Poly Vee Belt

Coolant Thermostat
Type..... Non Blocking
Qty..... 1

Cooling Loop (Galvanized)
Tees, Elbows, Pipe..... Galvanized Steel
Ball Valves..... Brass ASTM B 124,
Solenoid Valve..... Brass
Pressure Regulator..... Bronze
Strainer..... Cast Iron (1/2" - 1" loops) or
Bronze (1.25" - 2" loops)

Cooling Loop (Sea Water)
Tees, Elbows, Pipe..... 316 Stainless Steel
Ball Valves..... 316 Stainless Steel
Solenoid Valve..... 316 Stainless Steel
Pressure Regulator/Strainer Cast Brass ASTM B176
C87800

Cooling Loop (316SS)
Tees, Elbows, Pipe..... 316 Stainless Steel
Ball Valves..... 316 Stainless Steel
Solenoid Valve..... 316 Stainless Steel
Pressure Regulator/Strainer 316 Stainless Steel

Connecting Rod
Type..... I-Beam Taper
Material..... Forged Steel Alloy

Crank Pin Bearings
Type..... Precision Half Shell
Number..... 1 Pair Per Cylinder
Material..... Wear-Guard

Crankshaft
Material..... Forged Steel
Type of Balance..... Dynamic

Cylinder Block
Type..... One Piece with
Non-Siamese Cylinders
Material..... Annealed Gray Iron

Cylinder Head
Type..... Slab 2 Valve
Material..... Annealed Gray Iron

Cylinder Liners
Type..... Centrifugal Cast, Wet Liner
Material..... Alloy Iron Plateau, Honed

Fuel Pump
Type..... Diaphragm
Drive..... Cam Lobe

Heat Exchanger (USA) - JU4H & JU6H Only
Type..... Tube & Shell
Materials
Tube & Headers..... Copper
Shell..... Copper
Electrode..... Zinc

Heat Exchanger (UK) - JU4H & JU6H Only
Type..... Tube & Bundle

Materials
Tube & Headers..... Copper
Shell..... Aluminum

Injection Pump
Type..... Rotary
Drive..... Gear

Lubrication Cooler
Type..... Plate

Lubrication Pump
Type..... Gear
Drive..... Gear

Main Bearings
Type..... Precision Half Shells
Material..... Steel Backed-Aluminum
Lined

Piston
Type and Material..... Aluminum Alloy with
Reinforced Top Ring Groove
Cooling..... Oil Jet Spray

Piston Pin
Type..... Full Floating - Offset

Piston Rings
Number/Piston..... 3
Top..... Keystone Barrel Faced -
Plasma Coated
Second..... Tapered Cast Iron
Third..... Double Rail Type
w/Expander Spring

Radiator - JU4R & JU6R Only
Type..... Plate Fin
Materials
Core..... Copper & Brass
Tank & Structure..... Steel

Optional
Marine Coating..... Baked Phenolic

Valves
Type..... Poppet
Arrangement..... Overhead Valve
Number/Cylinder..... 1 intake
1 exhaust
Operating Mechanism..... Mechanical Rocker Arm
Type of Lifter..... Large Head
Valve Seat Insert..... Replaceable

CLARKE®

Rating Specific Emissions Data

Nameplate Rating Information

Clarke Model	**JU6H-UFADR8**
Power Rating (BHP/kW)	**250/187**
Certified Speed (RPM)	**1760**

Refer to **Rating Data** section on page 2 for emissions output values

Rating Specific Emissions Data - John Deere Power Systems

Rating Data

Rating	6068HFC48A	
Certified Power(kW)	235	
Rated Speed	1760	
Vehicle Model Number	OEM (Clarke Fire Pump-Emergency)	
Units	g/kW-hr	g/hp-hr
NOx	3.61	2.69
HC	0.08	0.06
NOx + HC	N/A	N/A
Pm	0.07	0.06
CO	0.6	0.4

Certificate Data

Engine Model Year	2019
EPA Family Name	KJDXL13.5103
EPA JD Name	650HAA
EPA Certificate Number	KJDXL13.5103-007
CARB Executive Order	
Parent of Family	6135HF485A
Units	g/kW-hr
NOx	3.31
HC	0.11
NOx + HC	N/A
Pm	0.10
CO	0.6

* The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and we do not guarantee that every production engine will have identical test results. The family parent data represents multiple ratings and this data may have been collected at a different engine speed and load. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, or other conditions beyond our control.

Emissions Results by Rating run on Feb-18-2019

DO NOT SCALE

DATUMS:

-A- - MOUNTING FACE OF FLYWHEEL

-B- - ENGINE CRANKSHAFT HORIZONTAL CENTERLINE

-C- - ENGINE CRANKSHAFT VERTICAL CENTERLINE

- CENTER OF GRAVITY OF ENGINE

- CLOCKWISE ROTATION WHEN VIEWED FROM FRONT OF ENGINE

NOTE:
THE LOOP SHOWN IS BASED ON STANDARD LOOP CONSTRUCTION AND FM SIZING CONDITIONS

FOR ALTERNATE LOOP CONSTRUCTION (STAINLESS STEEL, SEA WATER, AND HIGH PRESSURE) SIZES MAY VARY

DRAWING SUBJECT TO CHANGE WITHOUT NOTICE

CAUTION:

ALL PLUMBING MUST BE SUPPORTED AND/OR ISOLATED SO THAT NO WEIGHT OR STRESS IS APPLIED TO ANY ENGINE COMPONENT

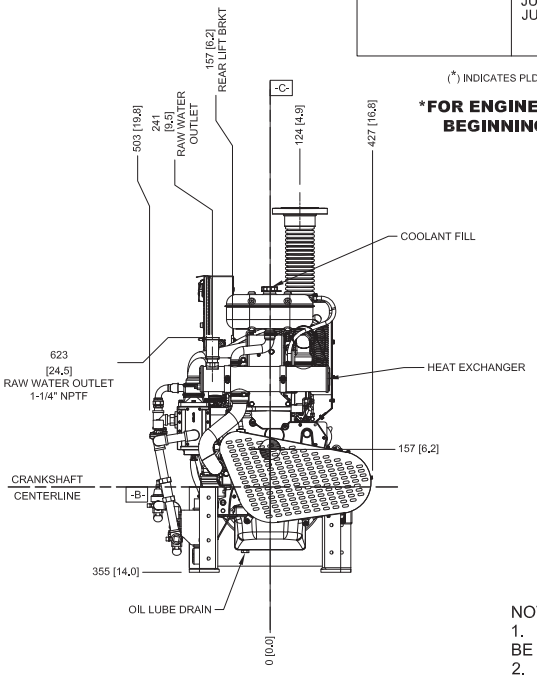
ATTENTION

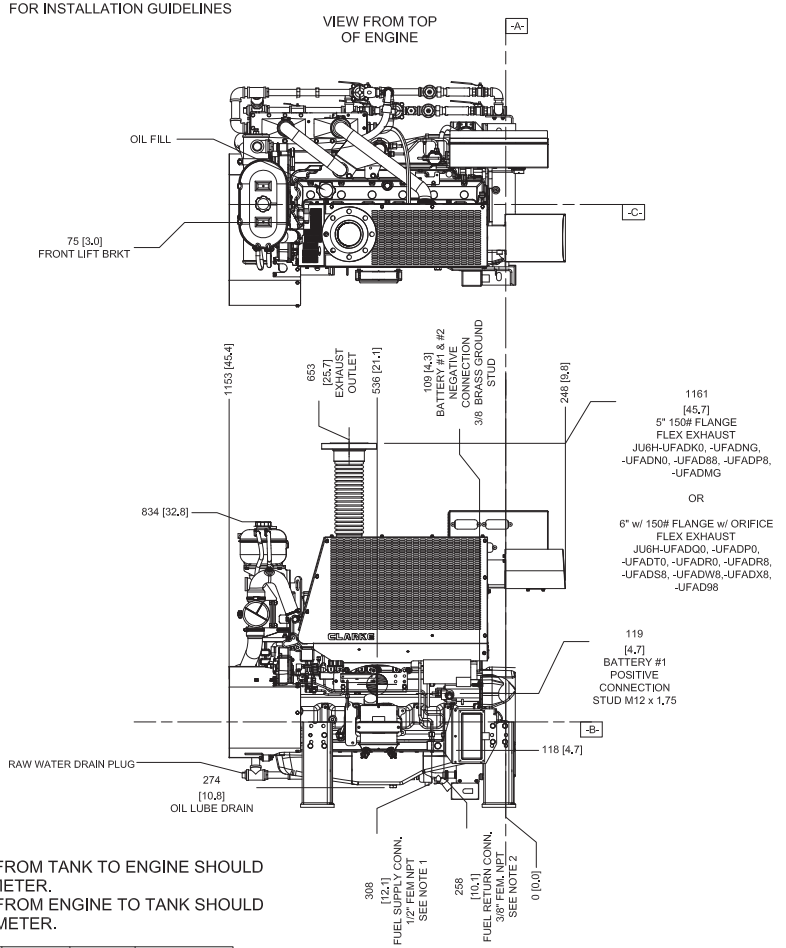
REFER TO THE SPECIFIC MODEL "INSTALLATION AND OPERATION DATA" FOR INSTALLATION GUIDELINES

"TRWA" (TURBOCHARGED w/ RAW WATER AFTERCOOLING) MODELS	JU6H-UFAD88, -UFADK0* JU6H-UFADMG, -UFADN0 JU6H-UFADNG, -UFADP8 (MODELS SHOWN)
	JU6H-UFAD98 -UFADP0 JU6H -UFADQ0, -UFADR0 JU6H-UFADR8, -UFADS8 JU6H-UFADT0, -UFADW8 JU6H-UFADX8 SEE PG. 3 FOR RAW WATER INLET DIMENSIONS

(*) INDICATES PLD ENINGE MODEL ONLY

***FOR ENGINES BUILT IN USA BEGINNING APRIL 2015**





NOTES:
1. FUEL SUPPLY PIPING FROM TANK TO ENGINE SHOULD BE 1/2"MINIMUM PIPE DIAMETER.
2. FUEL RETURN PIPING FROM ENGINE TO TANK SHOULD BE 3/8" MINIMUM PIPE DIAMETER.

REV	DESCRIPTION	ECN#	DWN	APVD	DATE
M	ADDED FLYWHEEL INFORMATION	4071	JGV		04AUG15
N	REVISED ENGINE FOOT MOUNTING HOLE LOCATIONS PAGE 2	4275	CMM		01OCT15
P	ADDED GROUND STUD LOCATION	4359	DKP		11OCT15
Q	ADDED RAW WATER INLET DIMENSION TO PAGE 2. UPDATED COOLING LOOP GEOMETRY ON PAGE 3	4741	MJM	JCA	03FEB16
R	PAGE 3 DATUM A & B WERE INCORRECTLY POSITIONED	4788	RDR		11NOV16
S	ADDED DIMS TO ENGINE LIFTING BRACKETS	5061	MDM		21JUN17
T	ADDED GLAND PLATE DETAIL	5236	ECK		29NOV17
U	REMOVED OBSOLETE MODELS JU6H-UFAD58, UFADS0, UFADM8 UPDATED TOLERANCE, LOGO, & DIMENSION PRECISION	5393	NMM		24APR18

GENERAL TOLERANCES
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS [INCHES] AND MAY VARY ± 9.5 [0.38]

CONTROLLED DRAWING

DRWN	MWLEMING
DATE	2/25/2009
ENGR	KJKUNKLER
MATERIAL	
ASSEMBLY	

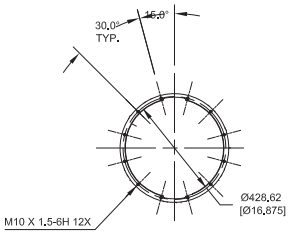
CLARKE®

NAME: INSTALLATION DRAWING, FIRE PUMP ENGINE JU6H TIER 3 MODELS

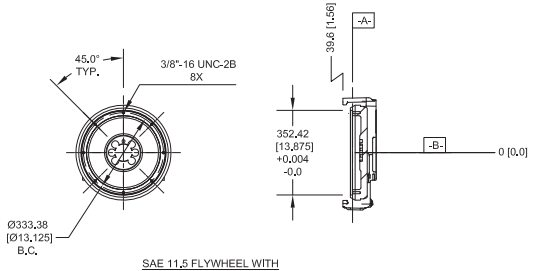
PART NO. D628 REV U

SCALE NTS | UNITS MM [INCH] | PAGE 1 OF 3

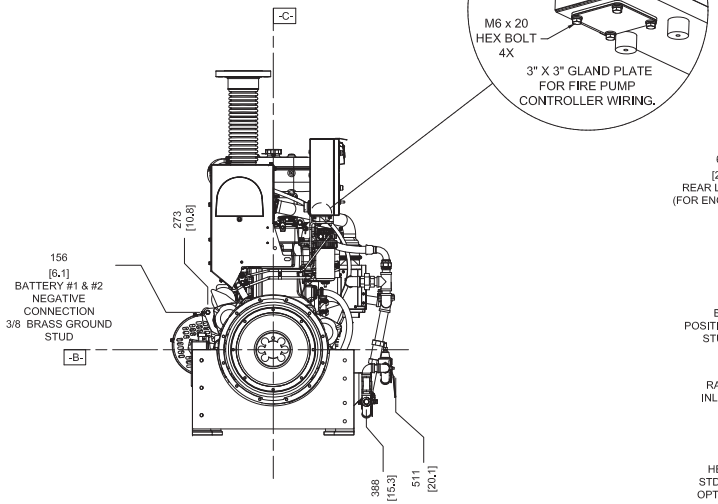
DETAIL DATUM -A-

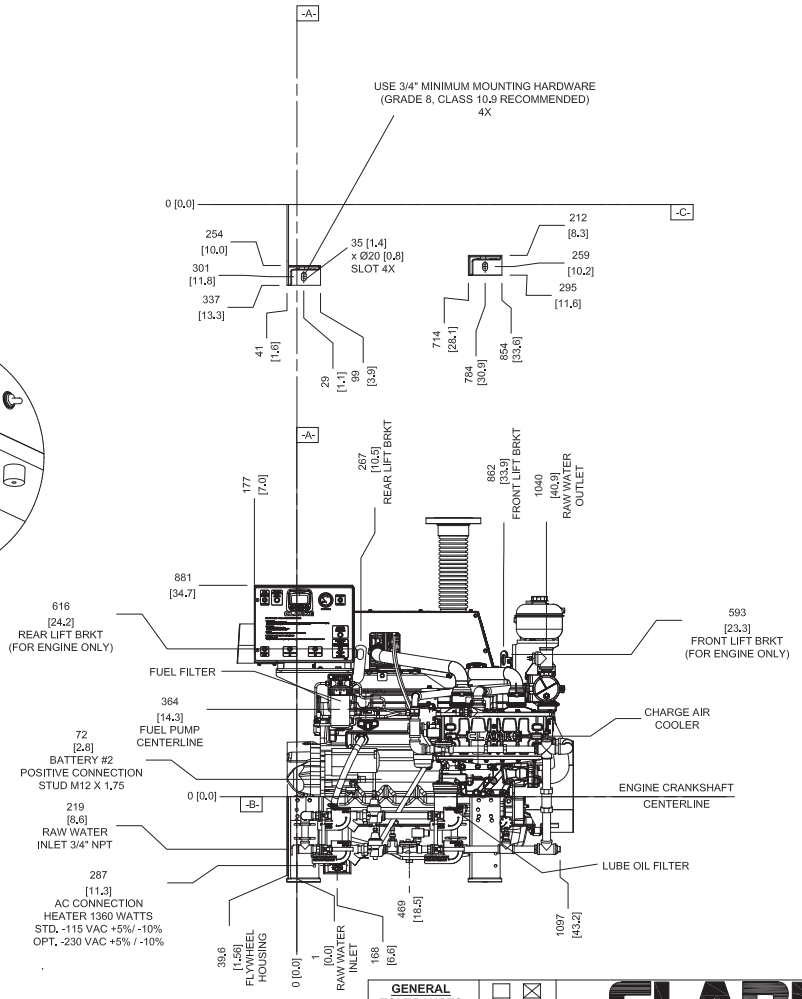


SAE #3
FLYWHEEL HOUSING



SAE 11.5 FLYWHEEL WITH
129 TEETH AND 8/10 PITCH RING GEAR





***FOR ENGINES BUILT IN USA**
BEGINNING APRIL 2015

FOR ENGINE SPECIFIC OPTIONS
SEE www.CLARKEFIRE.com

DRAWING SUBJECT
TO CHANGE
WITHOUT NOTICE

GENERAL TOLERANCES
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS [INCHES] AND MAY VARY ± 9.5 [0.38]

YES ☒ NO ☐ CONTROLLED DRAWING

DRAWN	MWLEMING
DATE	2/25/2009
ENGR	KJKUNKLER
MATERIAL	
ASSEMBLY	

CLARKE®

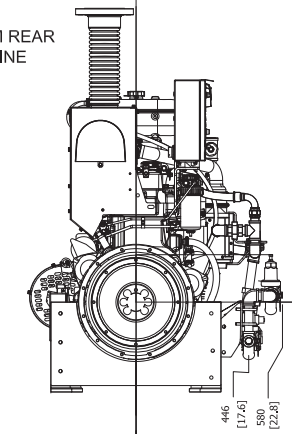
NAME: INSTALLATION DRAWING, FIRE PUMP ENGINE JU6H TIER 3 MODELS

PART NO.: D628 REV: U

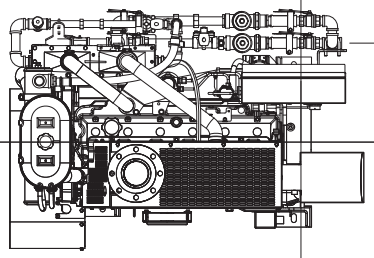
SCALE: NTS UNITS: MM [INCH] PAGE: 2 OF: 3

DO NOT SCALE

VIEW FROM REAR OF ENGINE



VIEW FROM TOP OF ENGINE



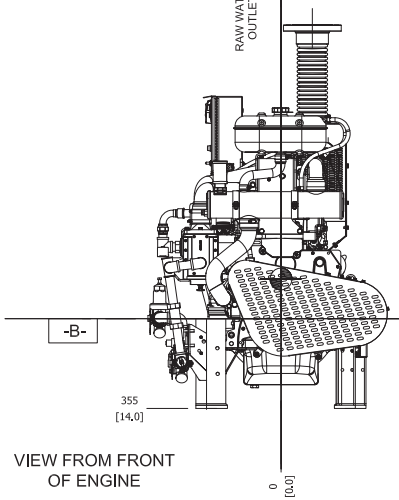
TRWA 1" LOOP w/ 1 1/4" REGULATORS MODELS	JU6H-UFAD98 -UFADP0 JU6H -UFADQ0, -UFADR0 JU6H-UFADR8, -UFADS8 JU6H-UFADT0, -UFADW8 JU6H-UFADX8

FOR ALL OTHER MODELS SEE PAGE 2

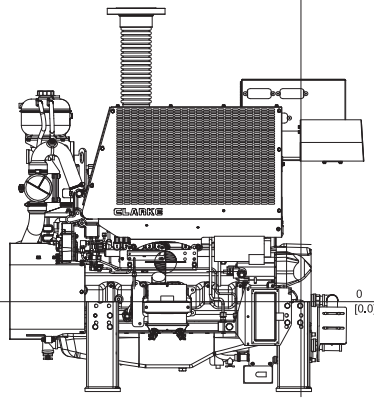
DATUMS

- -A- - MOUNTING FACE OF FLYWHEEL
- -B- - ENGINE CRANKSHAFT HORIZONTAL CENTERLINE
- -C- - ENGINE CRANKSHAFT VERTICAL CENTERLINE
- - CENTER OF GRAVITY OF ENGINE
- - CLOCKWISE ROTATION WHEN VIEWED FROM FRONT OF ENGINE

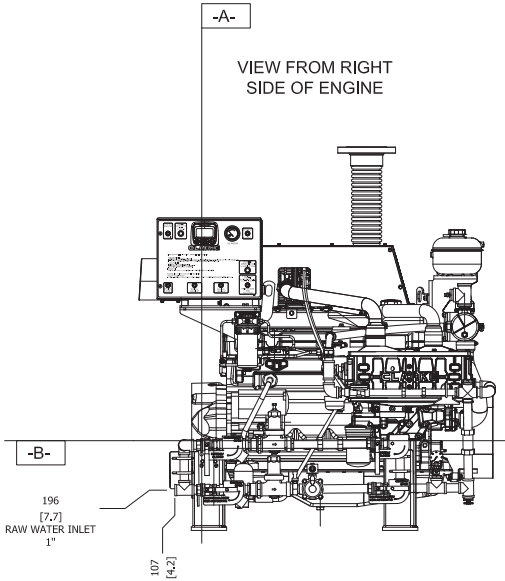
VIEW FROM FRONT OF ENGINE



VIEW FROM LEFT SIDE OF ENGINE



VIEW FROM RIGHT SIDE OF ENGINE



GENERAL TOLERANCES

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS [INCHES] AND MAY VARY ± 0,5 [0.38]

CONTROLLED DRAWING

CLARKE®

DRWN	MWLEMING
DATE	2/25/2009
ENGR	KJKUNKLER
MATERIAL	
ASSEMBLY	

NAME: INSTALLATION DRAWING, FIRE PUMP ENGINE JU6H TIER 3 MODELS

PART NO. D628 REV U

SCALE NTS | UNITS MM [INCH] | PAGE 3 OF 3

CLARKE®

JU6H-UFADR8

FIRE PUMP DRIVER

NOISE DATA

Mechanical Engine Noise *

RPM	BHP	OVERALL dB(A)	Octave Band 31.5 Hz dB(A)	63 Hz dB(A)	125 Hz dB(A)	250 Hz dB(A)	500 Hz dB(A)	1k Hz dB(A)	2k Hz dB(A)	4k Hz dB(A)	8k Hz dB(A)	16k Hz dB(A)
1760	250	107.92	65.38	66.98	83.55	87.34	94.03	98.84	102.89	100.24	97.33	94.77

Raw Exhaust Engine Noise **

RPM	BHP	OVERALL dB(A)	Octave Band 31.5 Hz dB(A)	63 Hz dB(A)	125 Hz dB(A)	250 Hz dB(A)	500 Hz dB(A)	1k Hz dB(A)	2k Hz dB(A)	4k Hz dB(A)	8k Hz dB(A)	16k Hz dB(A)
1760	250	110.20	0.00	99.90	104.30	99.00	101.20	100.80	103.50	100.70	90.40	84.00

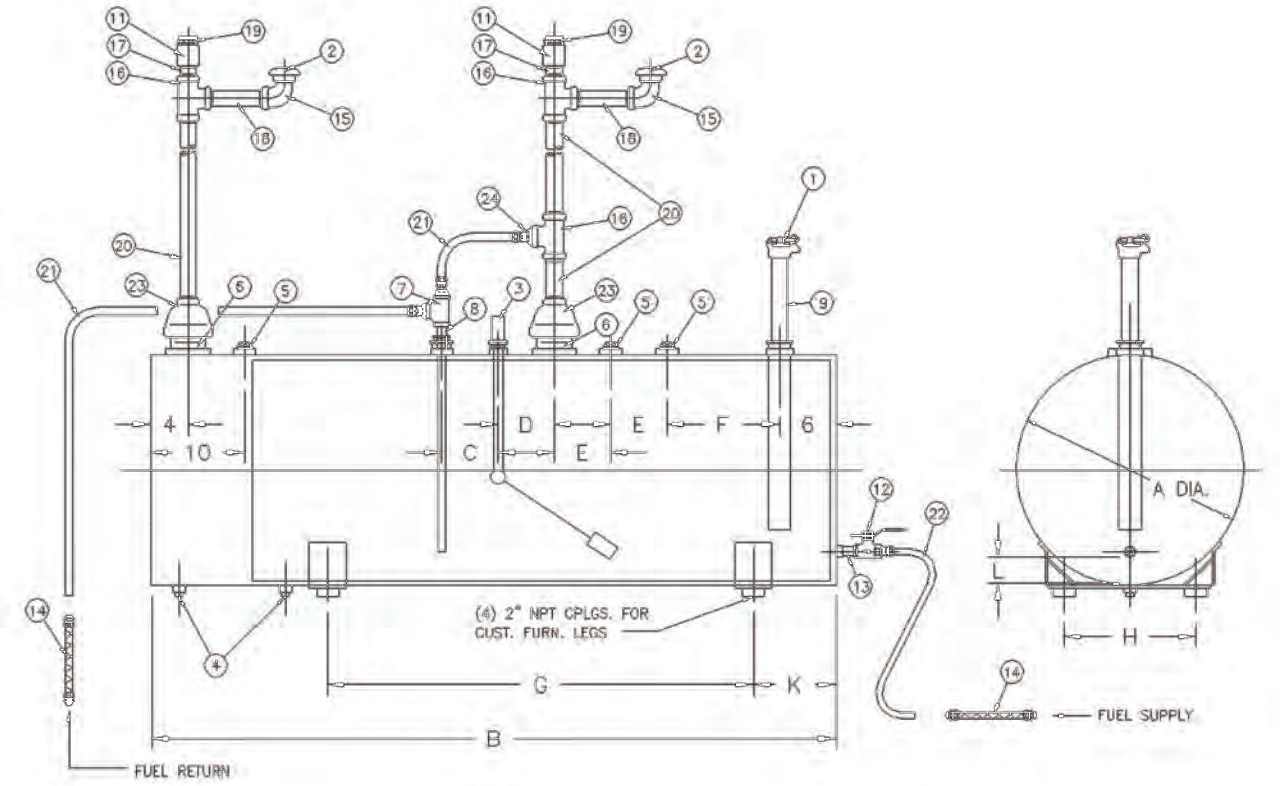
** Values above are provided at 3.3ft (1m) from engine block and do not include the raw exhaust noise.*

*** Values above are provided at 23ft (7m), 90° horizontal, from a vertical exhaust outlet and does not include noise created mechanically by the engine.*

The above data reflects nominal values for a typical engine of this model, speed and power in a free-field environment, tested at a no-load condition.

Installation specifics such as background noise level and amplification of noise levels from reflecting off of surrounding objects, will affect the overall noise levels observed. As a result of this, Clarke makes no guarantees to the above levels in an actual installation.

General Arrangement



A	B	C	D	E	F	G	H	K	L	Z
31.00	72.00	6.00	6.00	6.00	13.00	44.00	16.00	8.50	3.50	3" NPT

DIESEL FUEL TANK NOTES:

1. Tanks are constructed and labeled in accordance with UL-142.
2. Fittings shown areconsistent with N.F.P.A. 30 and UL-142.
3. Tank to be pitched toward drain 1/4" per foot with outlet on the same elevation as engine fuel pump. Means of elevating Tank (by others) may be required.
4. Usable tank volume is total capacity less 5% for expansion.

ILLUSTRATION NOTES:

1. All dimensions are in inches and may vary ±.25" (6.35 mm).
2. Components shown are shipped loose for field assembly.
3. Illustration is for component identification only. Actuel installation must meet local codes and all applicable standards.
4. Refer to section 916 page 259 for details of Pentair furnished components.

Fuel Tank Information	
Nominal Tank Size	187.0 US.gal
Usable Volume	165.0 US.gal
Tank Type	Double Wall
Fuel Tank Sizing	FM Global Data sheet 3-7
Fuel Tank Includes leak detector and 3" emergency vent	
Weight	565.0 lb

Components Furnished By Pentair

Item No.	Qty	Description
1	1	2" NPT Lockable Fuel Cap
2	2	2" NPT Screened Tank Vent"
3	1	Fuel Gauge 1 1/2" NPT
4	2	1" NPT Drain Plug
5	3	2" NPT Pipe Plug
6	1	4" NPT Close Nipple
7	1	1/2" NPT Tee
8	1	1/2" NPT Close Nipple
9	1	2" Fuel Fill Black Pipe
10	1	"Z"x"Z"x2" NPT Tee
11	2	"Z" NPT Pipe Coupling
12	1	3/4" NPT Lockable Fuel Value
13	1	3/4" NPT Close Nipple
14	2	Fuel Hoses For Supply & Return (Furnished By Engine Mfr.)
15	2	2" NPT Street Elbow
16	2	"Z"x"Z"x2" NPT Tee
17	2	"Z" NPT Closed Nipple
18	2	2" NPT X 6" Long Nipple
19	2	"Z" NPT Emergency Vent
23	1	4"x"Z" NPT Reducer
24	1	2"x1/2" NPT Reducer

Components Furnished By Others

Item No.	Qty	Description
20	3	"Z" Size Piping For Vent
21	1	1/2" Tubing And Fittings or 1/2" Black Pipe
22	1	3/4" Tubing And Fittings or 3/4" Black Pipe

Quote Information

Customer	
Customer Quote	
Job Name	
Market	-

PENTAIR

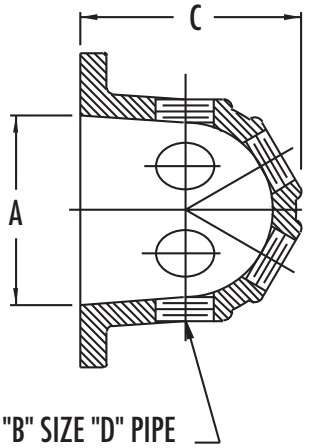
Quote Item	
Quote Date	

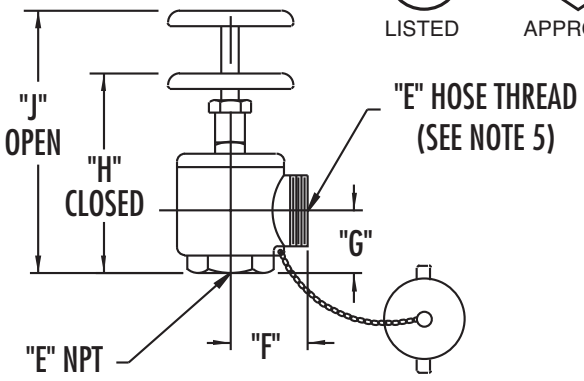
AURORA® FIRE PUMPS

OPTION 75 - TEST MANIFOLD
OPTION 76 - HOSE VALVES
OPTION 77 - BALL DRIP VALVE

Supersedes Section 916 Page 203
Dated May 2004

UL LISTED FM APPROVED





VALVE SIZE "E"	"F"	"G"	"H"	"J"
1-1/2	2.25 (57)	2.00 (51)	6.50 (165)	7.50 (191)
2-1/2	3.5 (89)	2.75 (70)	9.50 (241)	11.00 (297)

OPTION 75 - TEST MANIFOLD

STD. 125# ASA FLANGES | OPT. 250# ASA FLANGES

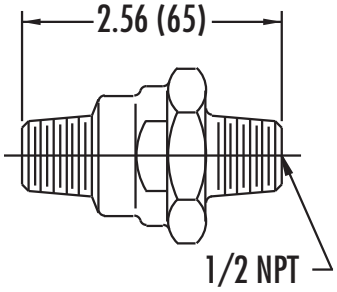
OPTION 76 - HOSE VALVE(S)

WITH CAPS AND CHAINS | WITHOUT CAPS AND CHAINS

PUMP RATING G.P.M.	50	100 150 200	250 300	400 450 500	750	1000	1250 1500 2000	2500	3000	3500	4000 4500	5000
"A" MANIFOLD SUPPLY SIZE	1.5"	2.5"	3"	4"	6"	6"	8"	10"	10"	12"	12"	12"
"B"	1	1	1	2	3	4	6	8	12	12	16	20
"C"	1.00 (25)	1.13 (29)	1.31 (33)	8.50 (216)	10.62 (270)	10.62 (270)	11.75 (298)	12.50 (318)	25.63 (651)	31.63 (803)	31.63 (803)	43.75 (1111)
"D"	1-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2

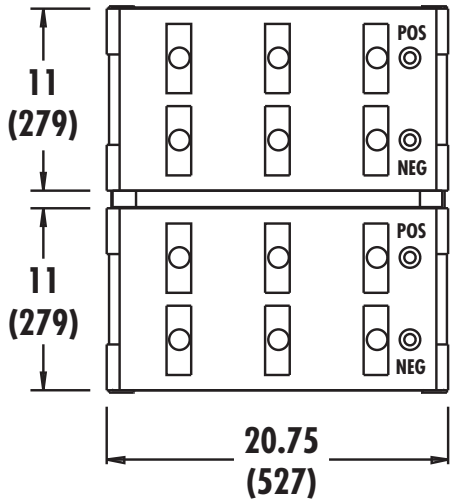
NOTES:

1. **Dimensions are in inches (mm) and may vary ±1/4 (6).**
2. **Components shown are shipped loose for field installation and assembly.**
3. **Manifold supply size "A" and the number of hose valves ("B") meets or exceeds the minimums specified by N.F.P.A. 20 for the pump ratings indicated.**
4. **Manifolds for 3000 through 5000 GPM ratings consist of multiple sections and may require support (by others).**
5. **1-1/2" Hose valves furnished with 1-1/2" National Standard Fire Hose Thread: 1.9900 (50.55) O.D. (max.), 6 threads per inch. 2-1/2" Hose valves are furnished with 2-1/2" National Standard Fire Hose Thread: 3.0686 (77.94) O.D. (max.), 7-1/2 threads per inch. Refer to factory for other thread conventions or adaptors.**



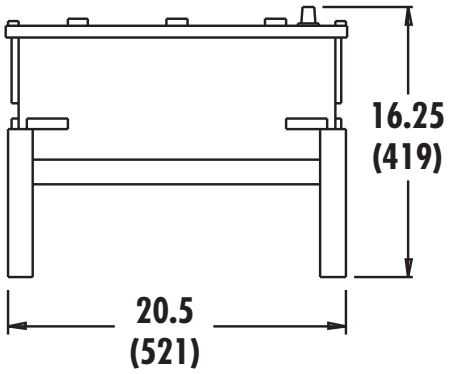
OPTION 77 - BALL DRIP VALVE

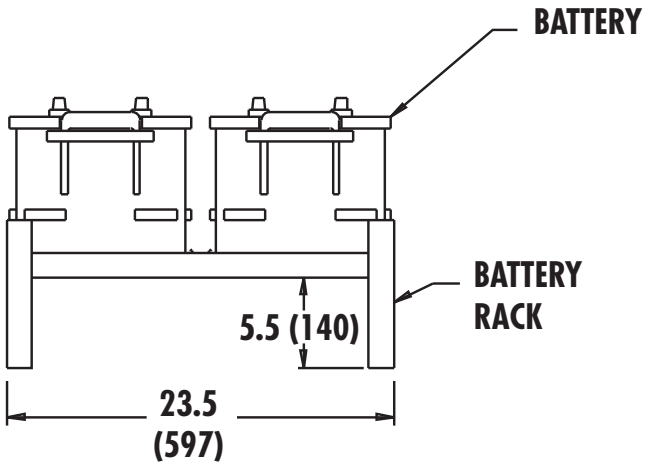
Designed to drain a branch line leading to an outside test manifold where danger of freezing exists. Opens at zero flow.



NOTES:

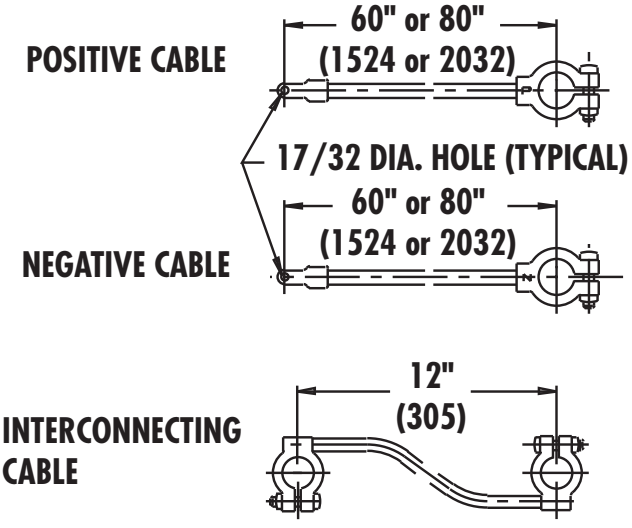
1. Dimensions are in inches (mm) and may vary ± 1/4" (6).
2. Batteries are 12 volt, lead-acid type D-8D, approximately 95 lbs. each, dry.
3. Batteries are shipped dry. Electrolyte (approx.19 quarts per battery) must be procured locally.
4. Refer to Section 916 page 252 for exact number of batteries & cables to be furnished based on the diesel engine manufacturer and model used.
5. Battery racks are fabricated steel, approximately 20 lbs. each.
6. Each rack holds 2 batteries. Racks are not to be stacked.





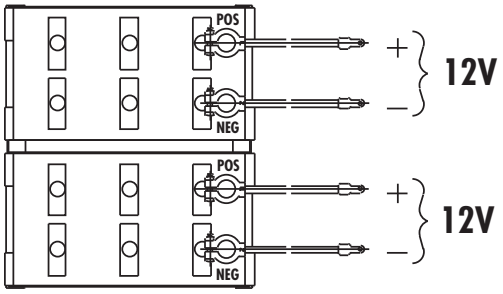
NOTES:

1. All cables are SAE J55BA type SGT with tensile attachment of 700-800 lbs.
2. Positive & negative cables 60" (1524) long are 2/0 gauge; positive & negative cables 80" (2032) long are 3/0 gauge.
3. Terminal clamps have steel reinforced inserts.
4. Not all cable types are required for every engine. Refer to Section 916 page 252 for cable applicability.



AURORA® MODEL 481 & 485 PUMPS

DIESEL BATTERY CABLE DIAGRAMS

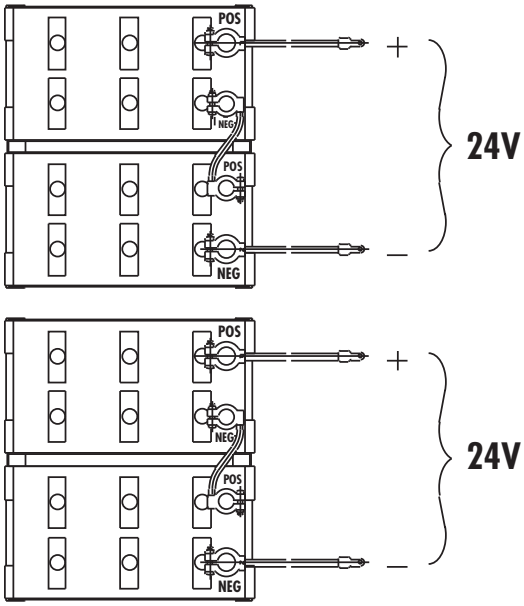


☐ **12 VOLT SYSTEM**

REQUIRED COMPONENTS	ENGINE APPLICABILITY
(1) BATTERY RACK (2) BATTERIES (2) POSITIVE CABLES (2) NEGATIVE CABLES	CUMMINS: ALL "CFP" MODELS CLARKE: ALL "JU4H" MODELS ALL "JU64" MODELS ALL "JW6H" MODELS EDWARDS: ALL MODELS

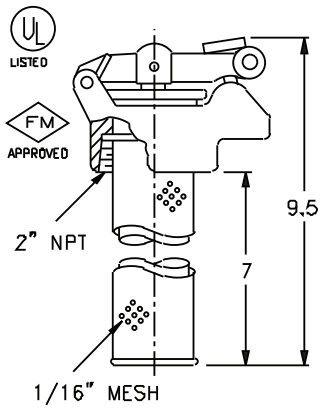
NOTES:

1. Clarke "VMFP," "JU4H" & "JU6H" Engines require cable sets of different lengths. On these engine models, a 2/0 guage postive and negative cable set 60" (1524 mm) long, and a 3/0 guage positive and negativecable set 80" (2032 mm) long are furnished.
2. Refer to Section 916, Page 251 for details of batteries, racks and cables.

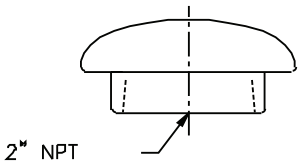


☐ **24 VOLT SYSTEM**

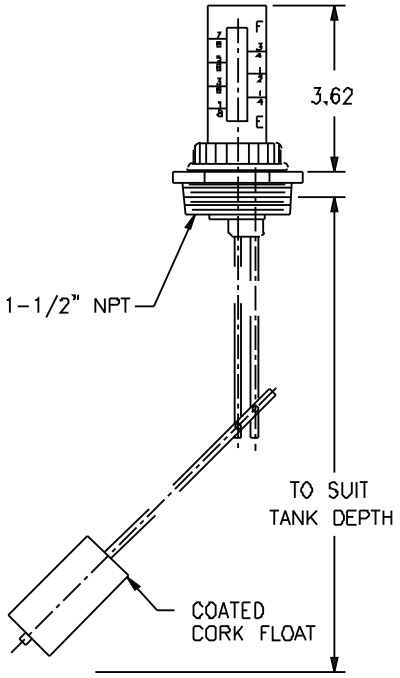
REQUIRED COMPONENTS	ENGINE APPLICABILITY
(2) BATTERY RACKS (4) BATTERIES (2) POSITIVE CABLES (2) NEGATIVE CABLES (2) INTERCONNECTING CABLES	CLARKE: ALL "JX6H" MODELS CATERPILLAR: ALL MODELS



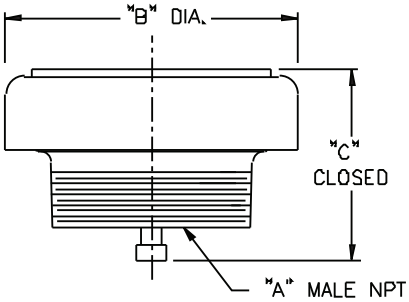
1. LOCKABLE FUEL CAP



2. SCREENED TANK VENT

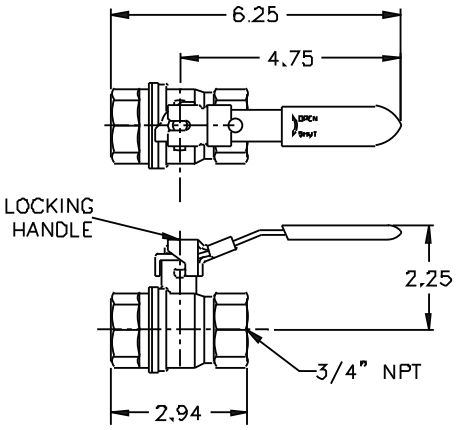


3. FUEL GAUGE

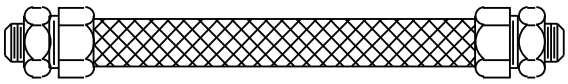


19. EMERGENCY VENT

A	B	C
2"	2.50	3.00
3"	4.35	3.25
4"	5.72	3.25



12. LOCKABLE FUEL VALVE

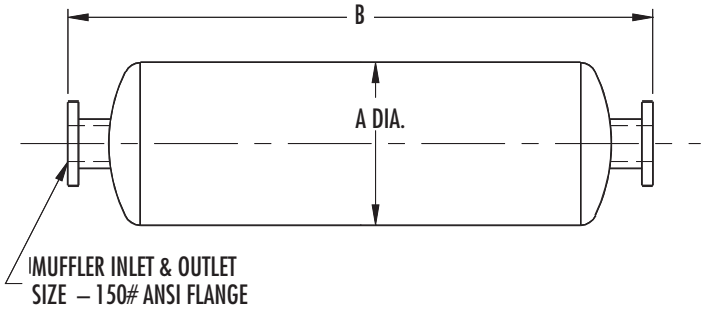


14. FLAME RESISTANT FLEXIBLE FUEL HOSE
(2) FURNISHED BY ENGINE MANUFACTURER
FOR SUPPLY AND RETURN LINES

NOTES
1. All dimensions are in inches and may vary ± 1/4".
2. Components shown are shipped loose for field assembly.
3. Illustration is for component identification only. Actual installation must meet local codes and all applicable standards.
4. Refer to Section 916 pages 255 through 258 for the location and applicability of each component shown above

AURORA® FIRE PUMPS

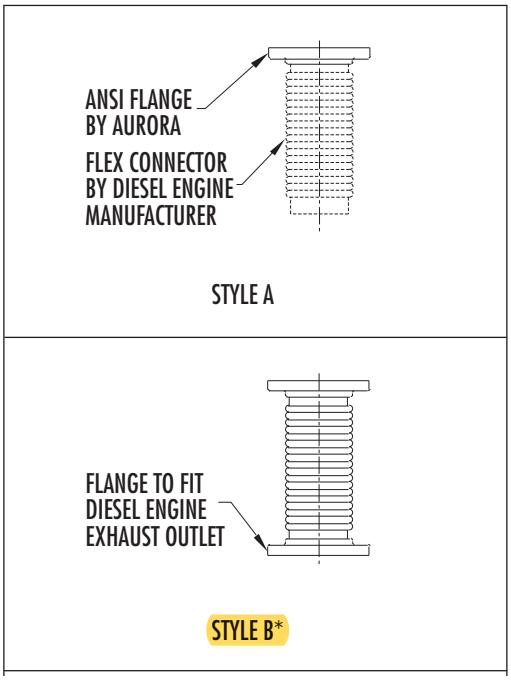
DIESEL ENGINE MUFFLERS



ENGINE MODEL	MUFFLER INLET & OUTLET	COMMERCIAL GRADE			RESIDENTIAL GRADE			CRITICAL GRADE		
		A	B	WGT	A	B	WGT	A	B	WGT
CATERPILLAR										
3406C	6" FLANGED	12	42	35	12	54	43	16	73	131
3412C*, 3508C, C18*	8" FLANGED	18	49	110	18	61	124	20	75	220
CLARKE FIRE PROTECTION										
JU4H-UF10, -UF12, -UF14, -UF20, -UF22, -UF24, -UFAB26, -UFAEA0, -UFAEE8, -UFAEF2, -UFADJ2, -UFADJ8	3" NPT	8	36	19	8	42	21	10	42	42
JU4R-UF09, -UF11, -UF13, -UF19, -UF21, -UF23, -UFAEA9, -UFAEE7, -UFAEF1										
JU4H-UF30, -UF32, -UF34, -UF40, -UF42, -UF 50, -UF52, -UF54, -UF58, -UFADJG, -UFADP0, -UFADR0, -UFADW8, -UFADY8, -UFAD5G	4" FLANGED	10	36	24	10	46	29	12	55	68
JU4R-UF40, -UF49, UF51 -UF53										
JU6H-UF30, -UF32, -UF34, -UF 50, -UF52, -UF54, -UF58, -UF60, -UF62, -UF62, -UF68, -UF84, -UFAAPG, -UFAAQ8, -UFAARG, -UFAAS0,-UFAB76, -UFABL0, -UFABL8, -UFD0, -UFD2, -UFG8, -UFM0, -UFM2, -UFM8, -UFAD58, -UFAD88, -UFADM0, -UFADM8, -UFADN0, -UFADNG, -UFADP8	5" FLANGED	10	42	27	10	54	34	14	61	92
DP6H SERIES										
JW6H-UF30, -UF40, UF48										
DS0H SERIES*	5" FLANGED	10	42	27	10	54	34	14	61	92
DR8H SERIES*										
JW6H-UF50, -UF58, -UF60, -UF8, -UFAAM8, -UFAA80, -UFADD0, -UFADB0, -UFADF0, -UFADJ0, -FAD70, -UFAD80	6" FLANGED	12	42	35	12	54	43	16	73	131
JU6H-UFAD98, -UFADP0, -UFADQ0, -UFADR0, -UFADR8, -UFADS0, -UFADS8, -FADT0, -UFADW8 -UFADX8										
DQ6H SERIES										
DT2H SERIES*										
JX6H SERIES	8" FLANGED	18	49	110	18	61	124	20	75	220
CUMMINS										
CFP5E, CFP59, CFP7E Series	4" NPT, FLANGED	10	36	24	10	46	29	12	55	68
CFP83 Series	4" NPT, FLANGED	10	36	24	10	46	29	12	55	68
CFP9E Series	5" NPT, FLANGED	10	42	27	10	54	34	14	61	92
CFP11E Series	5" NPT, FLANGED	10	42	27	10	54	34	14	61	92
CFP15E Series	6" FLANGED	12	42	35	12	54	43	16	73	131
CFP23E Series	8" NPT, FLANGED	18	49	110	18	61	124	20	75	220
CFP30E Series	10" NPT, FLANGED	22	64	205	22	75	220	28	99	360
DEUTZ										
DFP4-2011 Series	3" NPT	8	36	19	8	42	21	10	42	42
DFP4-2012 Series	4" FLANGED	10	36	24	10	46	29	12	55	68
DFP6 Series	6" FLANGED	12	42	35	12	54	43	16	73	131

AURORA® FIRE PUMPS
EXHAUST FLEX CONNECTORS

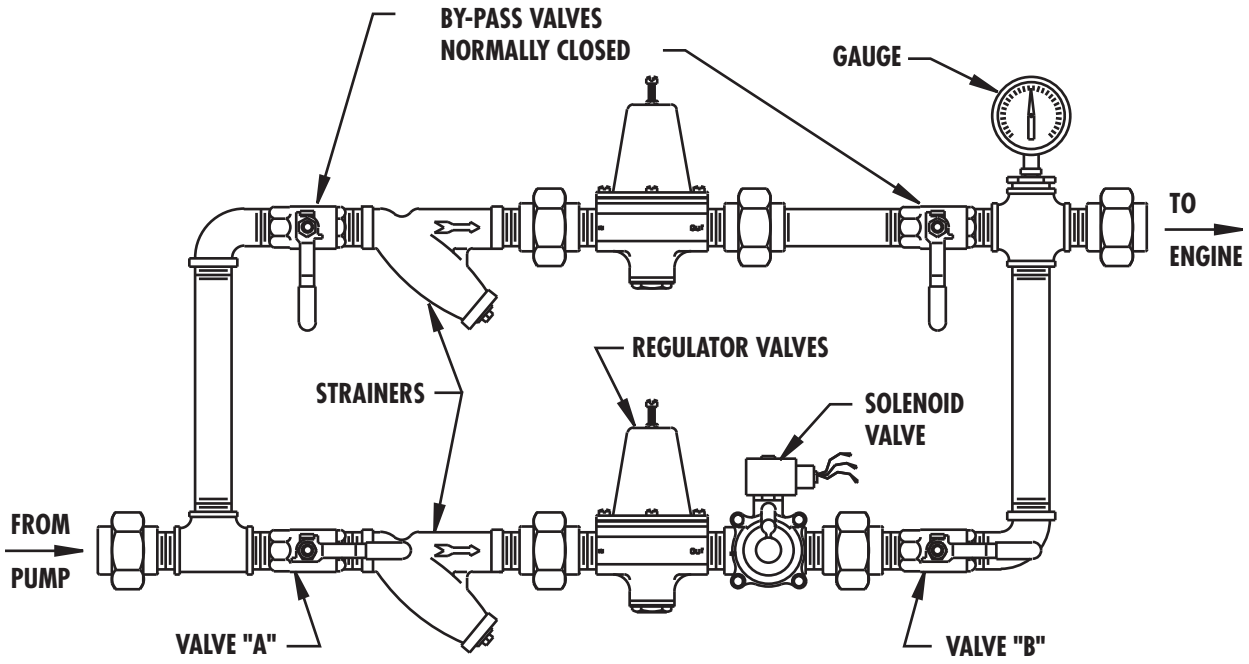
ENGINE MODEL	MUFFLER CONNECTION SIZE	FLEX CONNECTOR STYLE
CATERPILLAR		
3406C	6" FLANGED	B
3412C*, 3508C, C18*	8" FLANGED	B
CLARKE FIRE PROTECTION		
JU4H-UF10, -UF12, -UF14, -UF20, -UF22, -UF24, -UFAB26, -UFAEA0, -UFAEE8, -UFAEF2, -UFADJ2, -UFADJ8	3" NPT	A
JU4R-UF09, -UF11, -UF13, -UF19, -UF21, -UF23, -UFAEA9, -UFAEE7, -UFAEF1		
JU4H-UF30, -UF32, -UF34, -UF40, -UF42, -UF 50, -UF52, -UF54, -UF58, -UFADJG, -UFADP0, -UFADR0, -UFADW8, -UFADY8, -UFAD5G	4" FLANGED	A
JU4R-UF40, -UF49, UF51 -UF53		
JU6H-UF30, -UF32, -UF34, -UF 50, -UF52, -UF54, -UF58, -UF60, -UF62, -UF62, -UF68, -UF84, -UFAAPG, -UFAAQ8, -UFAARG, -UFAAS0,-UFAB76, -UFABL0, -UFABL8, -UFD0, -UFD2, -UFG8, -UFM0, -UFM2, -UFM8, -UFAD58, -UFAD88, -UFADM0, -UFADM8, -UFADN0, -UFADNG, -UFADP8	5" FLANGED	B
DP6H SERIES		
JW6H-UF30, -UF40, UF48		
DS0H SERIES*	5" FLANGE	B
DR8H SERIES*		
JW6H-UF50, -UF58, -UF60, -UF8, -UFAAM8, -UFAA80, -UFADD0, -UFADB0, -UFADF0, -UFADJ0, -FAD70, -UFAD80	6" FLANGED	B
JU6H-UFAD98, -UFADP0, -UFADQ0, -UFADR0, -UFADR8, -UFADS0, -UFADS8, -FADT0, -UFADW8 -UFADX8		
DQ6H SERIES		
DT2H SERIES*		
JX6H SERIES	8" FLANGED	B
CUMMINS		
CFP5E, CFP59, CFP7E Series	3" NPT, FLANGED, CUFF	A, B
CFP83 Series	4" NPT, FLANGED, CUFF	A, B
CFP9E Series	4" NPT, FLANGED, CUFF	A, B
CFP11E Series	5" NPT, FLANGED, CUFF	A,B
CFP15E Series	6" FLANGED	B
CFP23E Series	6" FLANGED	B
CFP30E Series	6" FLANGED	B
DEUTZ		
DFP4-2011 Series	3" NPT	A
DFP4-2012 Series	4" FLANGED	B
DFP6 Series	6" FLANGED	B



*FLANGED FLEX CONNECTOR PROVIDED BY DIESEL ENGINE MANUFACTURER. NO ADDITIONAL FLEX CONNECTOR OR ADAPTOR FITTING IS REQUIRED OR PROVIDED BY AURORA.

AURORA® MODEL 481 & 485

DIESEL ENGINE DRIVEN FIRE PUMP
COOLING WATER PIPING DATA



This instructional data explains the installation and operation of the cooling system for UL listed, FM approved Fire Pump engines equipped with heat exchangers.

Engines equipped with heat exchangers use an engine mounted water pump to circulate jacket water around the tubes of the heat exchanger to maintain proper jacket water temperatures. Cooling water, supplied by the Fire Pump, is piped through the tubes and discharged to waste.

REQUIREMENTS

The loop portion of the cooling water supply piping, shown above, incorporates all components required by NFPA and is sized to provide the required volume of water at the proper pressure for the heat exchangers of the engine models listed in Table A.

Model 481 & 485 pumps are shipped from the plant with the loop piped between the pump and engine. The pipe and loop sizes are determined by the engine model.

COMPONENTS

1. A flushing type strainer is used to protect the regulator valve, solenoid valve and the tubes of the heat exchanger from foreign material.

2. The regulator valve is used to control the volume and pressure of the cooling water.

3. The solenoid valve opens automatically when the engine is started and closes automatically on engine shutdown to prevent the waste of cooling water. (One red wire must be connected to terminal #1 of the engine junction box, the other red wire to terminal #11 of the engine junction box, and the green wire grounded to the engine block. Refer to applicable wiring diagrams.)

4. The valves in the BYPASS line of the loop are normally CLOSED. They should ONLY be opened to provide cooling water to the engine if the regulator valve or solenoid valve require repair.

5. Valves "A" and "B" are normally OPEN. They should ONLY be closed if repair is required to the regulator valve or solenoid valve.

6. The gauge indicates back pressure on the cooling water discharge. The recommended back pressure to assure adequate flow is 15-20 PSI and should not exceed the allowable pressure shown in Table A.

7. Since cooling loop components are subject to bumps and movement during shipping. all components must be checked for pipe strain and leakage prior to initial startup.

INSTALLATION -COOLING WATER OUTLET

The cooling water outlet piping from the engine heat exchanger must be at least the size listed in Table A. The piping must be short, have no valves and discharge into an open waste cone. If deviations from the requirement of discharge to an open waste cone are permitted by the authority having jurisdiction, the proposed plumbing must be reviewed to assure that the back pressure created will not reduce the cooling water flow to below that required for the engine.

AURORA® MODEL 481 & 495

DIESEL ENGINE DRIVEN FIRE PUMP
COOLING WATER PIPING DATA

If the outlet piping from two or more engines is connected to a common manifold, the manifold piping should be sized such that the velocity resulting from the combined flow is the same as that in the outlet piping between the manifold and heat exchanger.

Adequate pipe supports must be provided for the loop and outlet piping to minimize vibration and prevent excessive strain at the heat exchanger, pump and engine connections.

Engine coolant should be added in accordance with the engine manufacturer's recommendations.

OPERATION

The regulator valve is adjusted during operational tests at the plant and set between 15 and 20 PSI back pressure. If additional adjusting is necessary, see the following procedure:

With the pump operating at the rated duty, the adjustment is made after the engine block temperature has risen to the level required to open the engine thermostat. The thermostat opens at approximately 170°F. The temperature will stabilize and then decrease slightly. At this point, the regulator is adjusted between 15 and 20 PSI by turning the regulator screw clockwise to increase the pressure and counterclockwise to reduce the pressure. The regulator screw is then locked into place with the locknut provided.

MAINTENANCE

1. Strainers must be inspected frequently and kept clean.

2. If cooling water temperature changes, the regulator valve may require adjustment.

Project: 19-20 Industry

Customer: Active Fire

Engineer:

Pump Manufacturer: Aurora

Technical Data
Submittal Documents

Model GPD
Diesel Engine Driven Fire Pump Controller

Contents:

- **Data Sheets**
- **Dimensional Data**
- **Wiring Schematics**
- **Field Connections**

Note: The drawings included in this package are for controllers covered under our standard offering. Actual AS BUILT drawings may differ from what is shown in this package.

March 2017

c UL us FM APPROVED N.Y.C. APPROVED CE OPTIONAL SEISMIC COMPLIANT

Technical Data
Model GPD Diesel Fire Pump Controller

Standard, Listings, Approvals and Certifications	Built to NFPA 20 (latest edition)	
	Underwriters Laboratory (UL)	• UL218 - Fire Pump Controllers • CSA C22.2 No. 14 Industrial Control Equipment
	FM Global	Class 1321/1323
	New York City	Accepted for use in the City of New York by the Department of Buildings
	Seismic Certification	See page 5 for details
	Optional	
	☐ CE Mark	Various EN, IEC & CEE directives and standards
Enclosure	**Protection Rating** ☑ Standard: NEMA 2 (IP31) **Optional** ☐ NEMA 12 ☐ NEMA 3 ☐ NEMA 3R ☐ NEMA 4 ☐ NEMA 4X-304 sst painted ☐ NEMA 4X-304 sst brushed finish ☐ NEMA 4X-316 sst painted ☐ NEMA 4X-316 sst brushed finish ☐ IP54 ☐ IP55 ☐ IP65 ☐ IP66	
	Accessories • Bottom entry gland plate • Lifting Lugs • Keylock handle	**Paint Specifications** • Red RAL3002 • Powder coating • Glossy textured finish

Ambient Temperature Rating	**Standard** ☑ 5°C to 40°C / 41°F to 104°F **Optional** ☐ 5°C to 55°C / 41°F to 131°F

General	AC	☑ 120V / 1ph / 60hz ☐ 208V to 240V / 1ph / 50-60hz
	DC	☑ 12VDC ☐ 24VDC
	Grounding system	• Negative
	Battery chargers	• Two independent fully automatic • 10A continuous charge • 500mA trickle charge
Electrical Reading	• Battery 1 & Battery 2 voltage • Battery 1 & Battery 2 charging amperage • Charging mode	
Pressure Reading	• Continuous system pressure display • Cut-in and cut-out pressure setting	
Pressure and Event Recorder	• Pressure readings with date stamp • Event recording with date stamp • Under regular maintained operation, events are stored in memory for the life of the controller. • Data viewable on operator interface display screen • Downloadable by USB port to external memory device	

Model GPD Diesel Fire Pump Controller

Pressure sensing	• Pressure transducer and run test solenoid valve assembly for fresh water application • Pressure sensing connection 1/2” Female NPT • Drain connection 3/8” • Rated and calibrated for 0-500psi working pressure • Externally mounted with protective cover
Audible Alarm	4” alarm bell - 85 dB at 10ft. (3m)
Visual Indications	• Engine run • Main switch AUTO • Main switch in OFF • Main switch in HAND • Periodic test • Cranking Cycle • AC Power available • Pump room temperature (ºF or ºC)
Visual & Audible Alarms	Visual only • Pump on demand • Loss of continuity with contactor 1 • Battery 1 overvoltage • Overpressure • Loss of continuity with contactor 2 • Battery 2 overvoltage • Underpressure • Weekly test cut-in not reached • High raw water temperature • Service required • Engine ECM warning • Low raw water flow Visual and Audible • AC Failure • Weak battery 1 • Low fuel level • DC Failure • Weak battery 2 • High fuel level • Battery fail 1 • Engine fail when running • Engine ECM in alternate position • Battery fail 2 • Engine fail to start • Engine fuel injection malfunction • Charger fail 1 • Engine overspeed • Engine high temperature • Charger fail 2 • Low ambient temperature • Engine low temperature • Engine trouble • Water reservoir low • Engine ECM fault • Pump room trouble • Water reservoir high • Engine low oil pressure • Controller trouble • Fuel tank leak • Low suction pressure
Remote Alarm Contacts	DPDT-8A-250V.AC • Engine run • Common controller trouble • Charger #1 & Charger #2 failure • Pressure line failure • Common engine trouble • High engine temperature • Battery #1 & battery #2 failure • Overspeed • Fail to start • DC failure • Fail when running • Fuel injection malfunction** • Loss of continuity (starter) #1 and/or #2 • Low oil pressure • ECM selector switch in alternate position*** • Common pump room alarm (field re-assignable)* • Low fuel level • Low suction pressure • Water reservoir low • High fuel level • Low pump room temperature • Water reservoir empty • Fuel tank leak • High pump room temperature • AC Failure • H-O-A selector switch in OFF or HAND • Free (field programmable)*

*Except if option C13 is ordered. Tornatech reserves the right to use any of these four alarm points for special specific application requirements
**Applicable to electronic engines only.
*** Applicable to electronic engines only. Alarms when ECM selector switch on the engine is in alternate mode.

Model GPD Diesel Fire Pump Controller

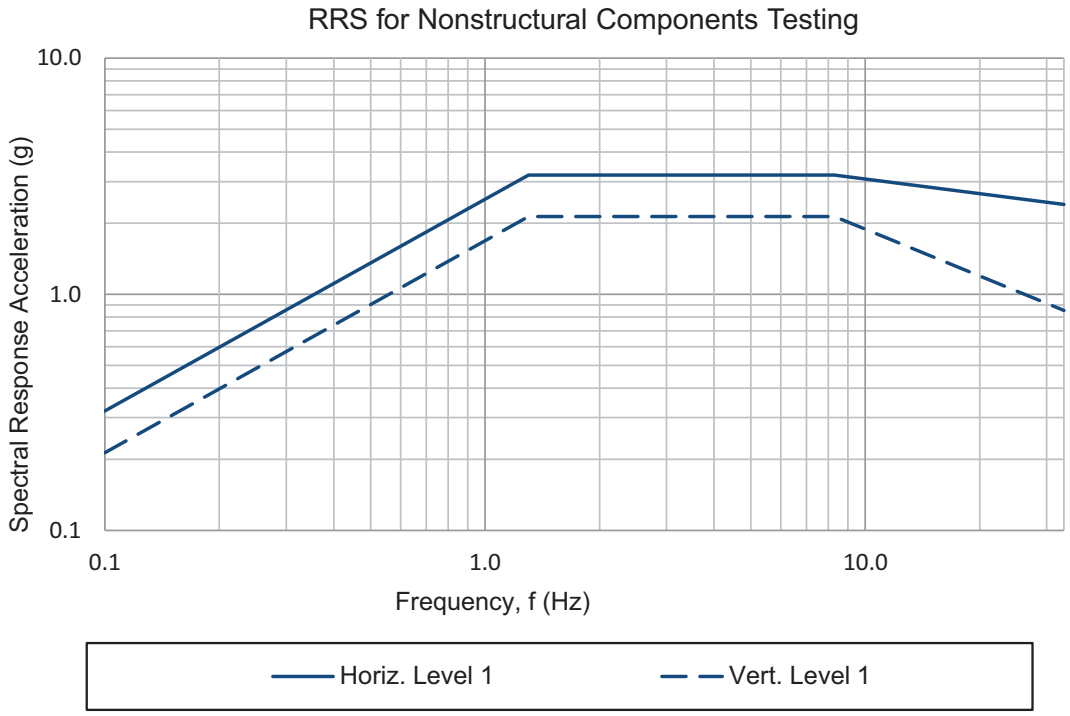
Terminals for Field Connections for External Devices	• Low fuel level • Remote AUTOMATIC start • Deluge valve start (re-assignable) • Fuel tank leak (re-assignable) • High fuel level (re-assignable)		
ViZiTouch V2 Operator Interface	• Embedded microcomputer with software PLC logic • 7.0” color touch screen (HMI technology) • Upgradable software • Multi-language		
Operation	**Selector Switch**	• Hand-Off-Auto • Behind lockable and breakable cover	
	Automatic Start	• Start on pressure drop • Remote start signal from automatic device	
	Manual Start	• Crank 1 and Crank 2 start pushbuttons • Run test pushbutton • Deluge valve start • Remote start from manual device	
	Crank Cycle	• 6 consecutive cycle attempts • 3 X 15s crank from battery 1 or 2 alternatively • 15s rest in between each crank attempt	
	Stopping	• Manual with Stop pushbutton • Automatic after expiration of minimum run timer ****	
	Timers	**Field Adjustable & Visual Countdown**	• Minimum run timer ****(off delay) • Sequential start timer (on delay) • Periodic test timer
	Actuation	**Visual Indication**	• Pressure • Non-pressure
	Mode		• Automatic • Non-automatic
Communication Protocol Capability	• Protocol: Modbus • Connection type: Shielded female connector RJ45 • Frame Format: TCP/IP • Addresses: See bulletin MOD-GPD		

Alarm and shutdown schedule		Automatic Start	Manual or Remote Start	Run Test or Periodic Test
	High Coolant	Alarm only	Alarm only	Shutdown
	Low Oil Pressure	Alarm only	Alarm only	Shutdown
	Overspeed	Shutdown	Shutdown	Shutdown

	Wall Mount		**Floor Mount**	
Starting Voltage	Approx. shipping dimensions in inches (mm)	Approx. Shipping Weight in Lbs (kg)	Approx. shipping dimensions in inches (mm)	Approx. Shipping Weight in Lbs (kg)
12V.DC	32" l x 29" w x 16" h (813 x 737 x 407)	85 (39)	32” l x 29” w x 26” h (813 x 737 x 661)	115 (52)
24V.DC				

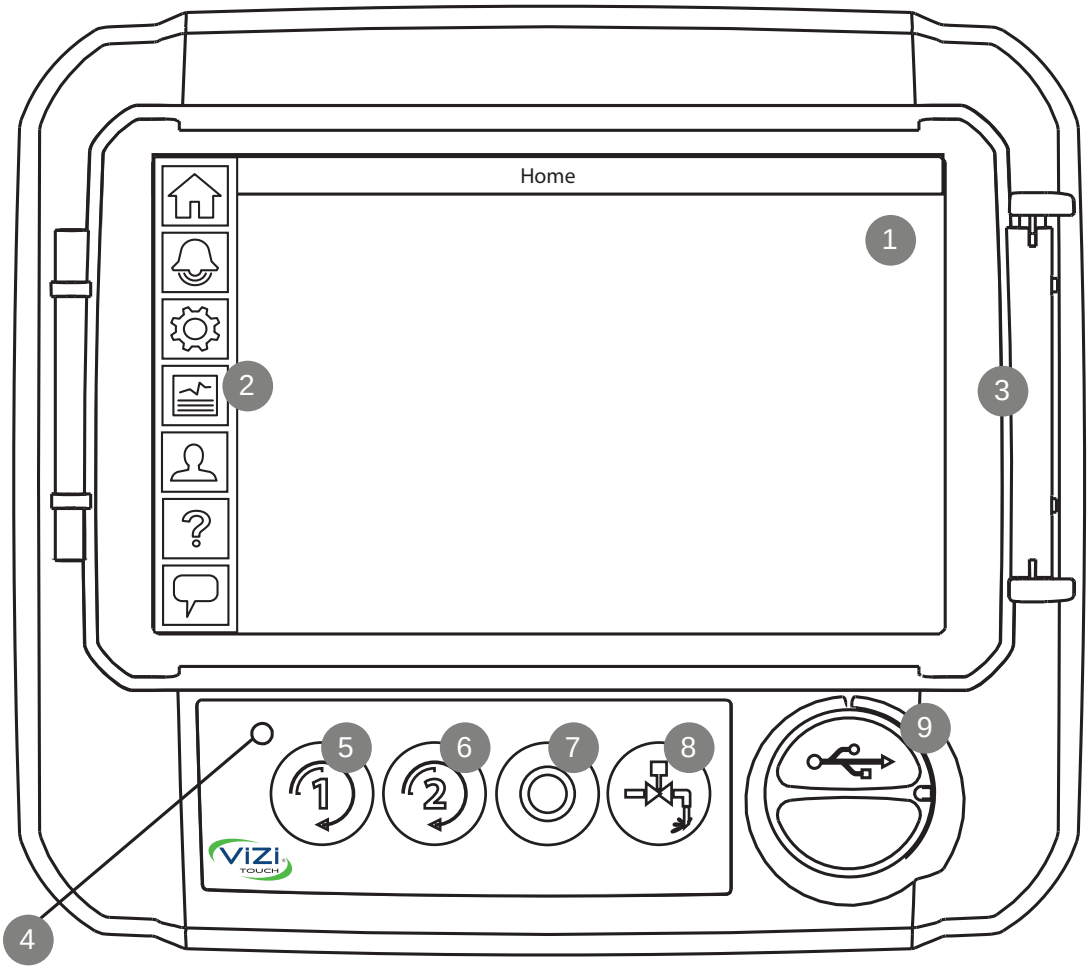
**** Automatic shutdown shall be approved by the AHJ.

Seismic Certification	Seismic Certification Company	TRU Compliance, LLC A Tobalski Watkins Affiliate					TWEI Project No.: 15014				
	Mounting details	Rigid wall mounting									
	Seismic Information	Building Code	Test Criteria	Seismic Parameters	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
		IBC 2015, CBC 2016	ICC-ES AC156	ASCE 7-10 Chapter 13	2.0	1.0	1.5	3.20	2.40	1.33	0.53
					3.2	0.0	1.5	3.20	1.28	2.13	0.85



Notes:
- Components are tested in accordance with ICC-ES AC156, IBC 2015 & CBC 2016.
- OSHPD Special Seismic Certification Preapproval (OSP)

ViZiTouch V2 Operator Interface



1 - Color touch screen
2 - Onscreen menu
- HOME page
- ALARM page
- CONFIGURATION page
- HISTORY page
- SERVICE page
- MANUAL page
- LANGUAGES page

3 - Screen protector
4 - Power LED (3 colors)
5 - CRANK 1 button
6 - CRANK 2 button
7 - STOP button
8 - RUN TEST button
9 - USB port

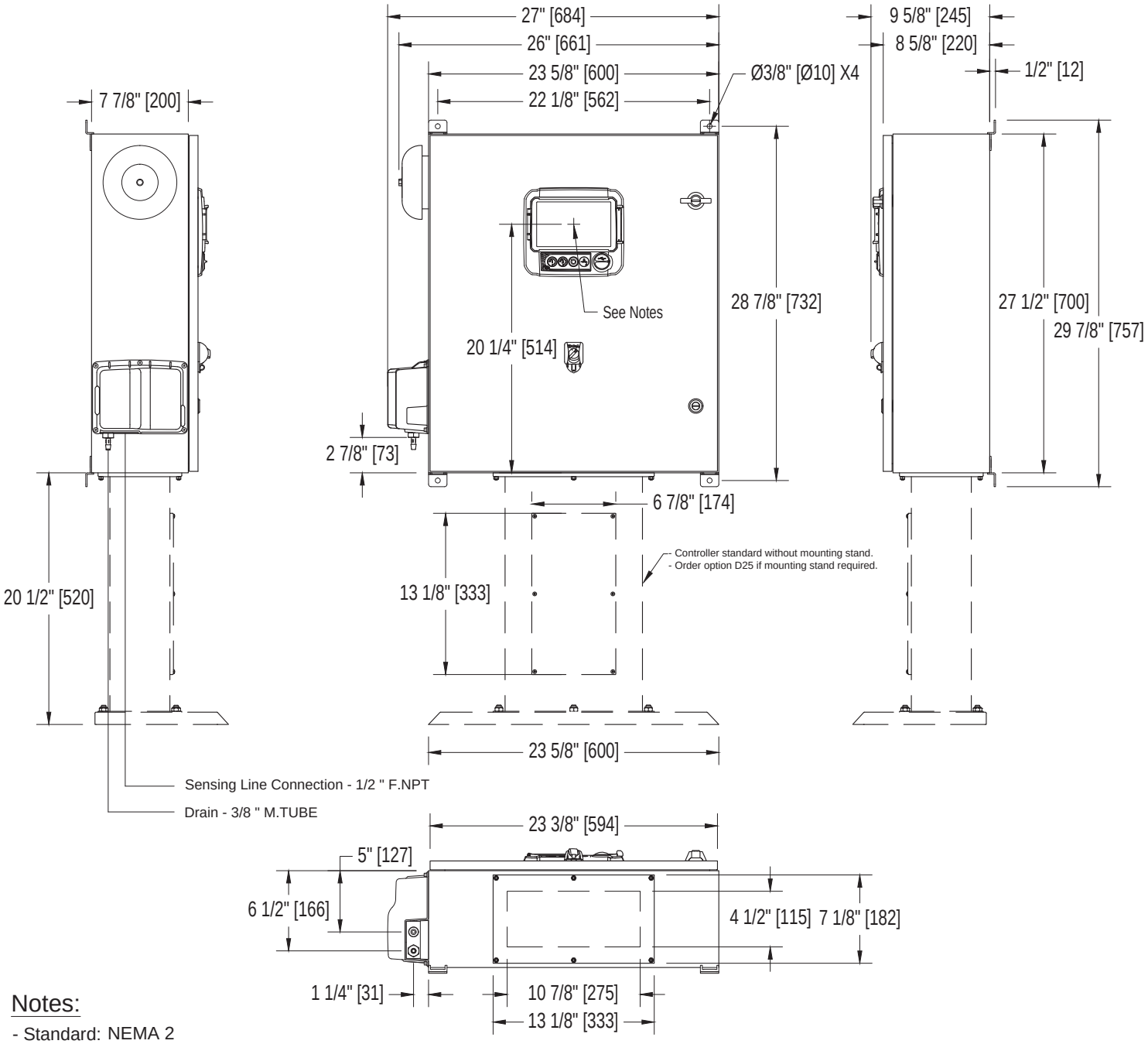
Diesel Engine Fire Pump Controller

12Vdc or 24Vdc Negative Ground

Model: GPD

Dimensions

Built to the latest edition of the NFPA 20 standard



Notes:

- Standard: NEMA 2
- Standard paint : textured red RAL 3002.
- All dimensions are in inches [millimeters].
- Center of ViZiTouch screen: 20-1/4" [514] from bottom (no feet).
- Bottom conduit entrance through removable gland plate recommended.
- Use watertight conduit and connector only.
- Protect equipment against drilling chips.
- Door swing equal to door width.
- Seismic mounting to be rigid wall only.

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.

Projection

REV.	DESCRIPTION	DD/MM/YY	Drawing number
			GPD-DI700 /E
0.	First issue	18/11/16	CDL

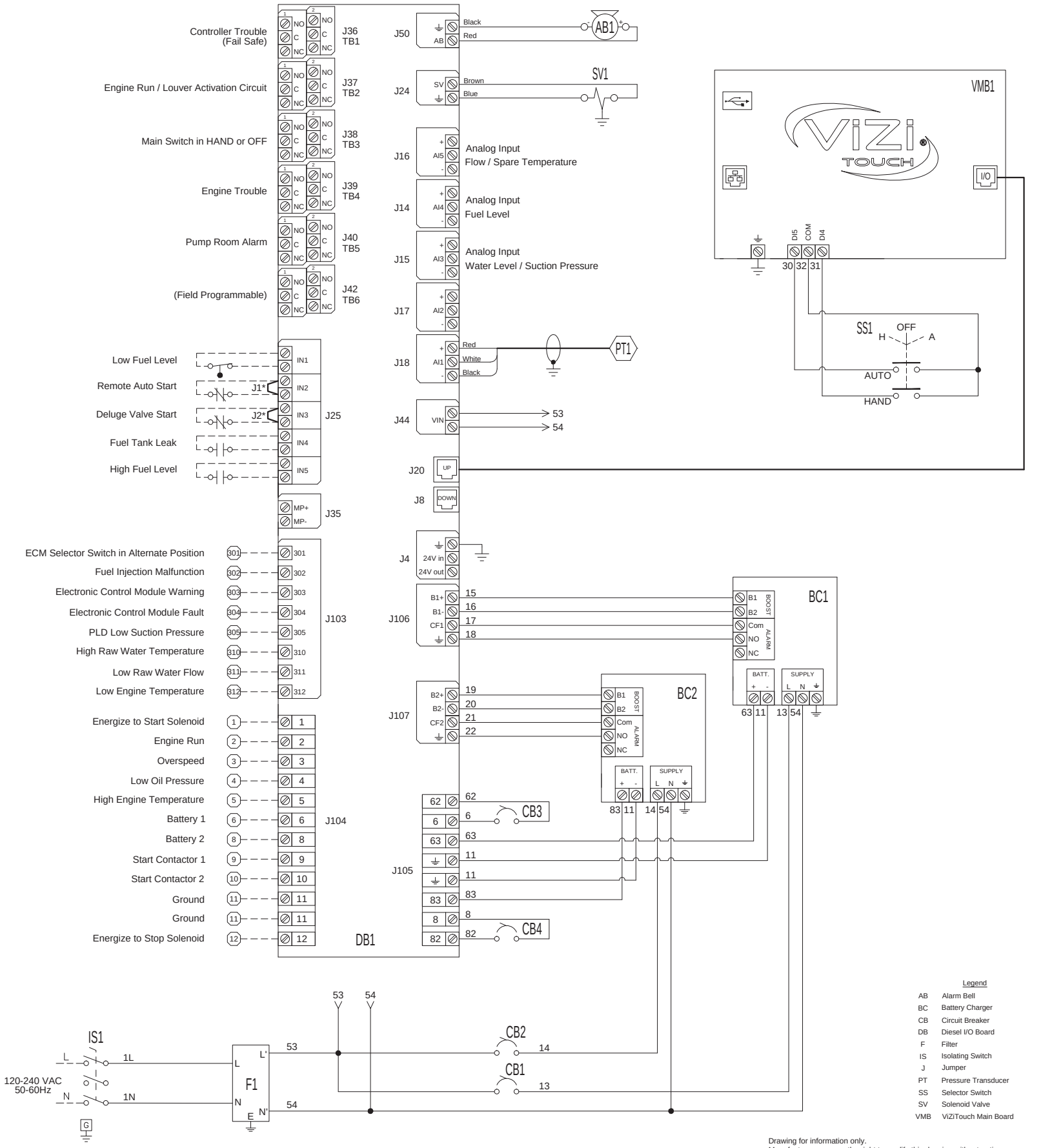
Diesel Engine Fire Pump Controller

12VDC or 24VDC Negative Ground

Wiring schematic

Model: GPD

Built to the latest edition of the NFPA 20 standard



Legend

AB	Alarm Bell
BC	Battery Charger
CB	Circuit Breaker
DB	Diesel I/O Board
F	Filter
IS	Isolating Switch
J	Jumper
PT	Pressure Transducer
SS	Selector Switch
SV	Solenoid Valve
VMB	ViZiTouch Main Board

* Remove jumper to use this feature

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.

SEISMIC COMPLIANT

NYC Dpt of Building Approved

REV.	DESCRIPTION	DD/MM/YY	Drawing number
			GPD-WS700 /E
1	Corrected SS1 inputs	16/01/17	
0	First issue	10/11/16	CDL

Diesel Engine Fire Pump Controller

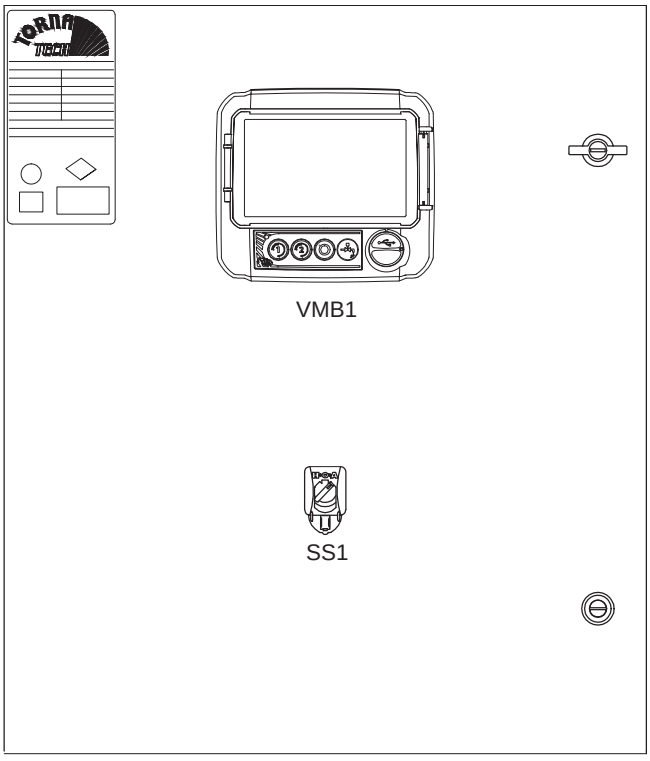
12VDC or 24VDC Negative Ground

Layout

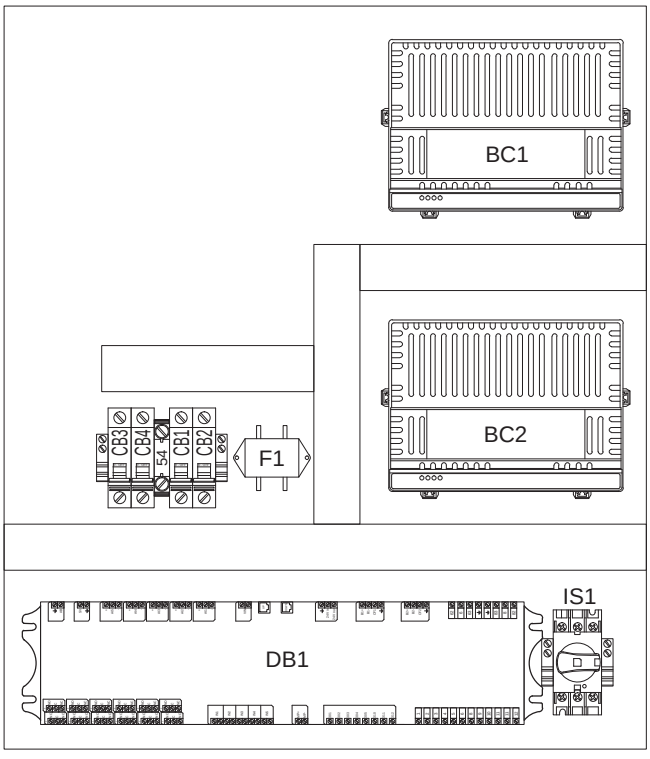
Model: GPD

Built to the latest edition of the NFPA 20 standard

Designation	Description
BC1-BC2	Battery Charger #1 and #2
CB1-2	Magnetic Breaker 1 Pole 10 A
CB3-4	Magnetic Breaker 1 Pole 16 A
DB1	I/O Diesel Board
F1	Filter
IS1	Isolating Switch
SS1	Lockable 3 Position Selector Switch
VMB1	ViZiTouch Main Board



Front Door Layout



Internal Layout

REV.	DESCRIPTION	DD/MM/YY
0	First issue	21/11/16 CDL

Drawing number

GPD-LY700 /E

Diesel Engine Fire Pump Controller
12VDC or 24VDC Negative Ground

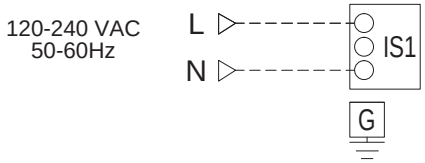
Model: GPD

Terminal Diagram

Built to the latest edition of the NFPA 20 standard

Power Supply

Terminals Wire Size:
14 - 6 AWG
3.9 Nm



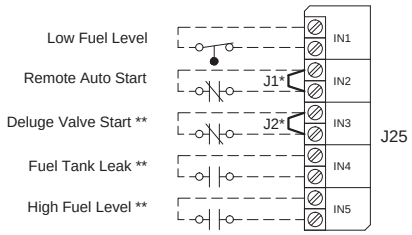
Engine Connections (DB1)

Engine Terminal Strip

1	Energize to Start Solenoid	1	
2	Engine Run	2	
3	Overspeed	3	
4	Low Oil Pressure	4	
5	High Engine Temperature	5	
6	Battery 1	6	J104
8	Battery 2	8	
9	Start Contactor 1	9	
10	Start Contactor 2	10	
11	Ground	11	
11	Ground	11	
12	Energize to Stop Solenoid	12	
301	ECM Selector Switch in Alternate Position	301	
302	Fuel Injection Malfunction	302	
303	Electronic Control Module Warning	303	
304	Electronic Control Module Fault	304	
305	PLD Low Suction Pressure	305	J103
310	High Raw Water Temperature	310	
311	Low Raw Water Flow	311	
312	Low Engine Temperature	312	

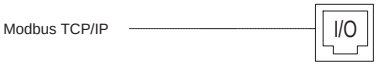
Field Connections (DB1)

Terminals Wire Size:
24 - 12 AWG
0.5 Nm



Network Connection (VMB1)

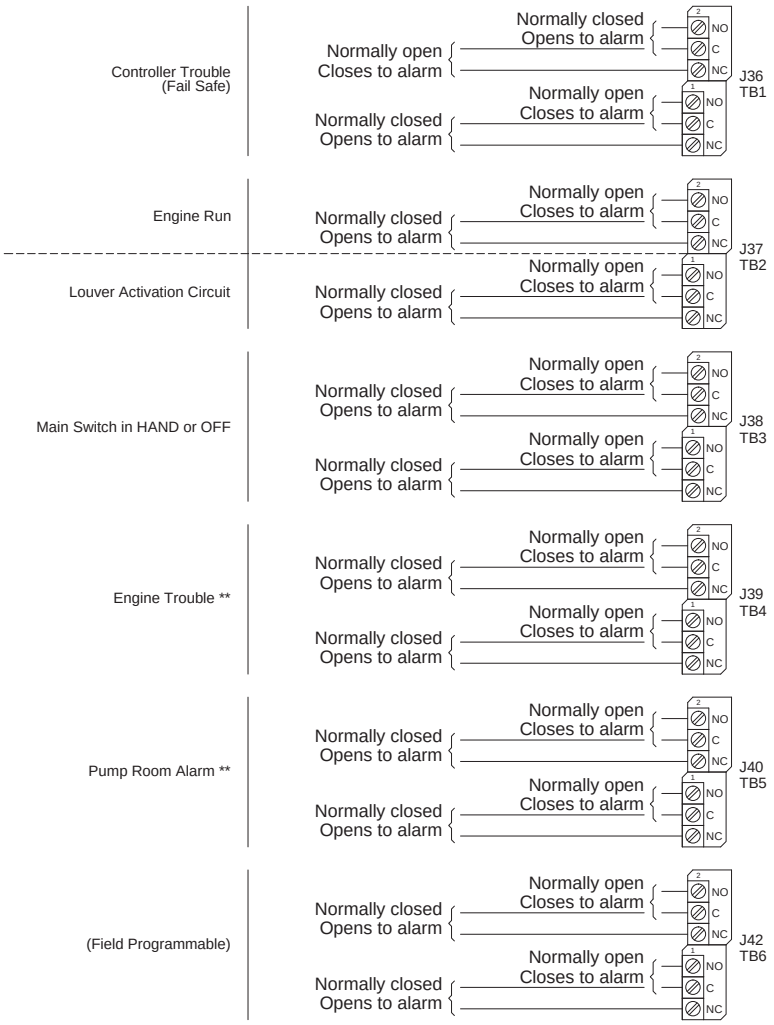
Shielded Female Connector RJ45



* Remove jumper to use this feature
** Re-assignable

Remote Alarm Terminals (DB1)

Terminals Wire Size:
24 - 12 AWG
0.5 Nm



All wiring between the controller and diesel engine shall be stranded (NFPA20)

Wiring between controller and engine (terminals 301, 302, 303, 304, 305, 310, 311, 312, 2 ,3 ,4 ,5) must be #14AWG as minimum.

Wiring between controller and engine (terminals 12 [rated at 10A or 22A for 20 seconds] 1, 9, 10 [rated at 10A]) must be stranded #10AWG as minimum.

Wiring between controller and engine (terminals 6, 8, 11 [rated at 30A]) must be stranded and sized according to distance.

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.

SEISMIC COMPLIANT
cULus
FM APPROVED
NYC Dpt of Building Approved

REV.	DESCRIPTION	DD/MM/YY	Drawing number
			GPD-TD700 /E
0	First issue	10/11/16	CDL

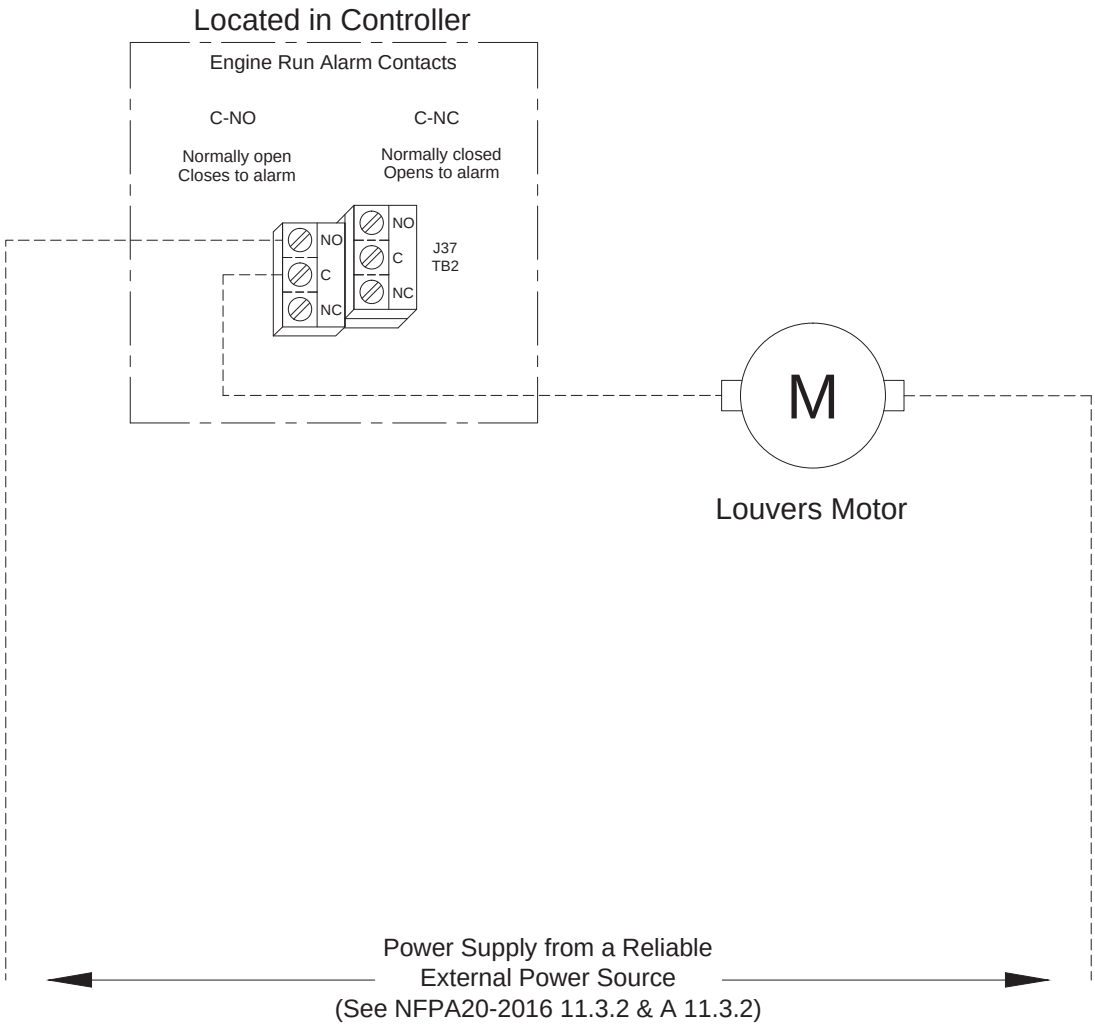
Diesel Engine Fire Pump Controller

12VDC or 24VDC Negative Ground

Louver Connection

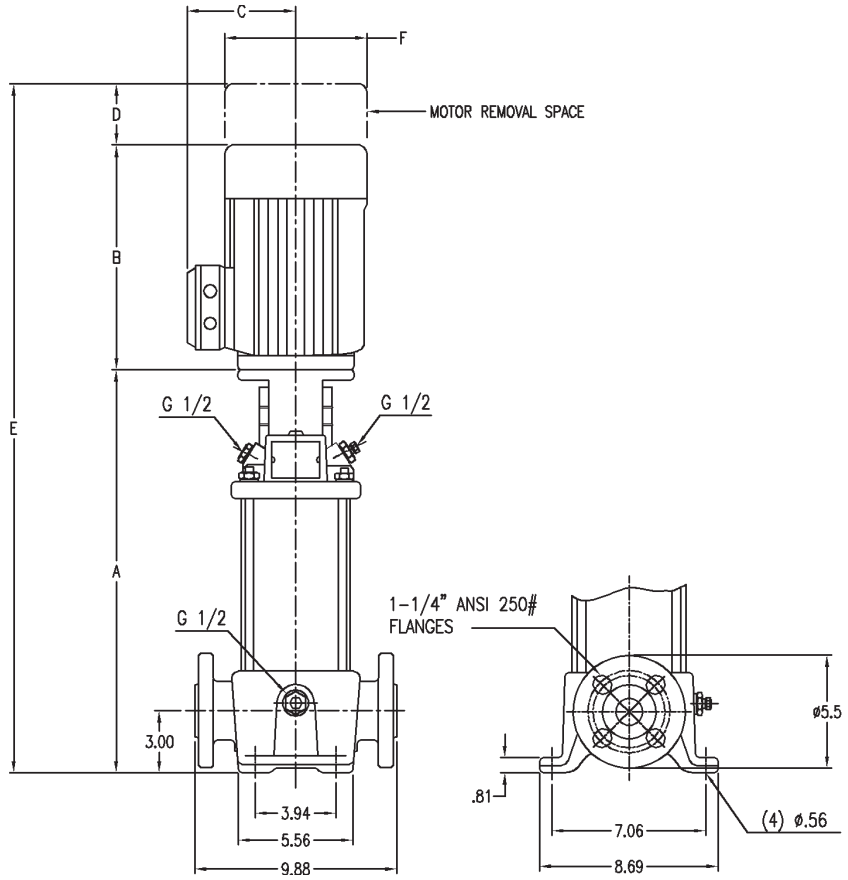
Model: GPD

Built to the latest edition of the NFPA 20 standard



REV.	DESCRIPTION	DD/MM/YY	Drawing number
			GPD-TD701 /E
0	First issue	10/11/16	

General Arrangement



A	B	C	D	E	F
22.30	15.40	8.90	2.60	40.30	8.90

NOTES:

All dimensions are in inches.

Dimensions may vary ± 1/4" (6mm) due to normal manufacturing tolerances

-

-

Pump Data	
Model	PVM3-17
Stages	17
Flow	15.00 USgpm
Head	369.3 ft
Rotation	Right Hand
Suc/Disch Size	0.00 in
Connection Suc/Disch	1.25" ANSI 250# flg w/ 1.25" NPT female

Motor Data	
Power	3.00 hp
Phase	1
Frequency	60 Hz
Voltage	115/208-230
Speed	3500
Frame Size	182TCZ
Efficiency	EPAct
Enclosure	TEFC

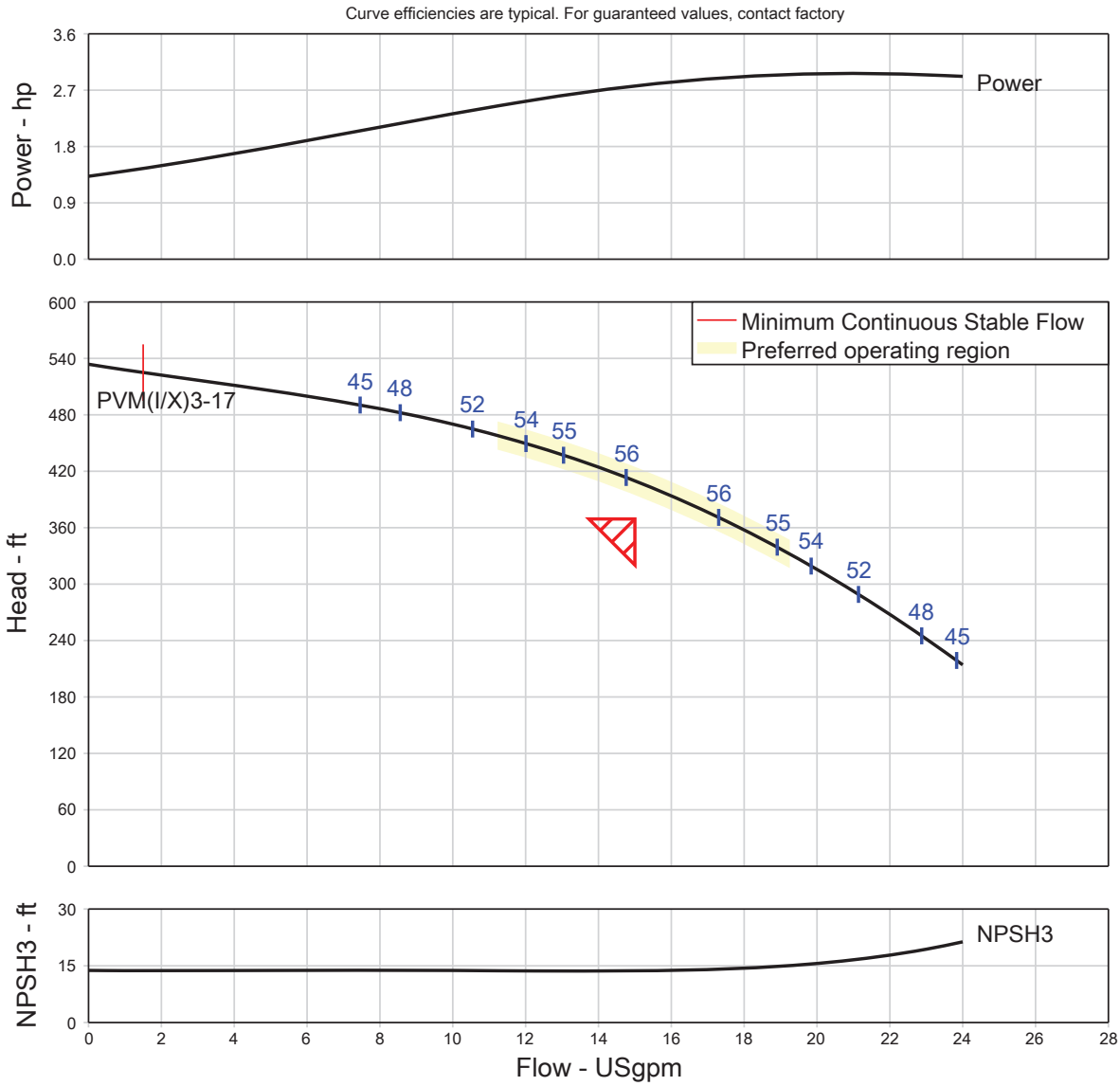
Pump Materials of Construction	
Pump Material	Cast Iron
Elastomer	-

Estimated Weights	
Pump	127.0 lb
Motor	

Additional Options

Quote Information	
Customer	
Customer Quote	
Job Name	
Market	-

PENTAIR	Quote Item	
	Quote Date	



Item number	: 002	Size	: PVM(X)3-17
Service	:	Stages	: 17
Quantity	: 1	Speed	: 3500 rpm
Quote number	:	Based on curve number	: PVM(X)3-17
Date last saved	: 27 Jan 2020 9:54 AM	Efficiency	: 56.08 %
Flow, rated	: 15.00 USgpm	Power, rated	: 2.77 hp
Head, rated	: 369.3 ft	NPSH required	: 13.66 ft
Fluid density	: 0.999 / 0.999 SG	Viscosity	: 1.00 cP
		Cq/Ch/Ce/Cn [ANSI/HI 1.1-1.5-1994]	: 1.00 / 1.00 / 1.00 / 1.00

CALLAGHAN PUMP & CONTROLS, INC.
106 HOBART ST · HACKENSACK, NJ 07601

PHONE: 201-621-0505 · FAX:

TORNATECH

Project: 19-20 Industry (3HP 1/60/230V)

Customer: Active Fire

Engineer:

Pump Manufacturer: Aurora

Technical Data
Submittal Document

Model JP2

Across the Line Start
Jockey Pump Controller

Contents:

Note: The drawings included in this package are for controllers covered under our standard offering. Actual AS BUILT drawings may differ from what is shown in this package.

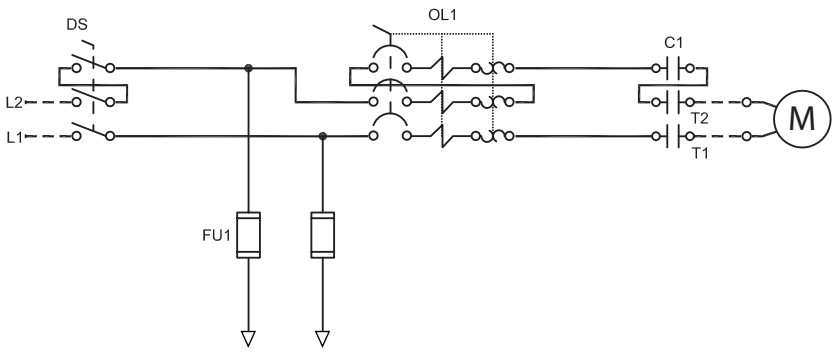
c UL us N.Y.C. APPROVED CE OPTIONAL SEISMIC COMPLIANT

February 2019

TORNATECH

Technical Data

Model JP2 Jockey Pump Controller



N.Y.C. APPROVED

OPTIONAL

SEISMIC COMPLIANT

Listing	Underwriters Laboratory (UL)	UL508A - Industrial Pump Controllers
	CSA	CSA C22.2 No. 14 Industrial Control Equipment
	New York City	Accepted for use in the City of New York by the Department of Buildings
	Seismic Certification	See page 4 for details
	Optional	
	☐ CE Mark	Various EN, IEC & CEE directives and standards
Enclosure	**Protection Rating** ☑ Standard: NEMA 2 (IP31) **Optional** ☐ NEMA 12 ☐ NEMA 3 ☐ NEMA 3R ☐ NEMA 4 ☐ NEMA 4X-304 sst painted ☐ NEMA 4X-304 sst brushed finish ☐ NEMA 4X-316 sst painted ☐ NEMA 4X-316 sst brushed finish	
	Accessories • Wall mounting lugs (x4)	**Paint Specifications** • Red RAL3002 • Powder coating • Glossy textured finish

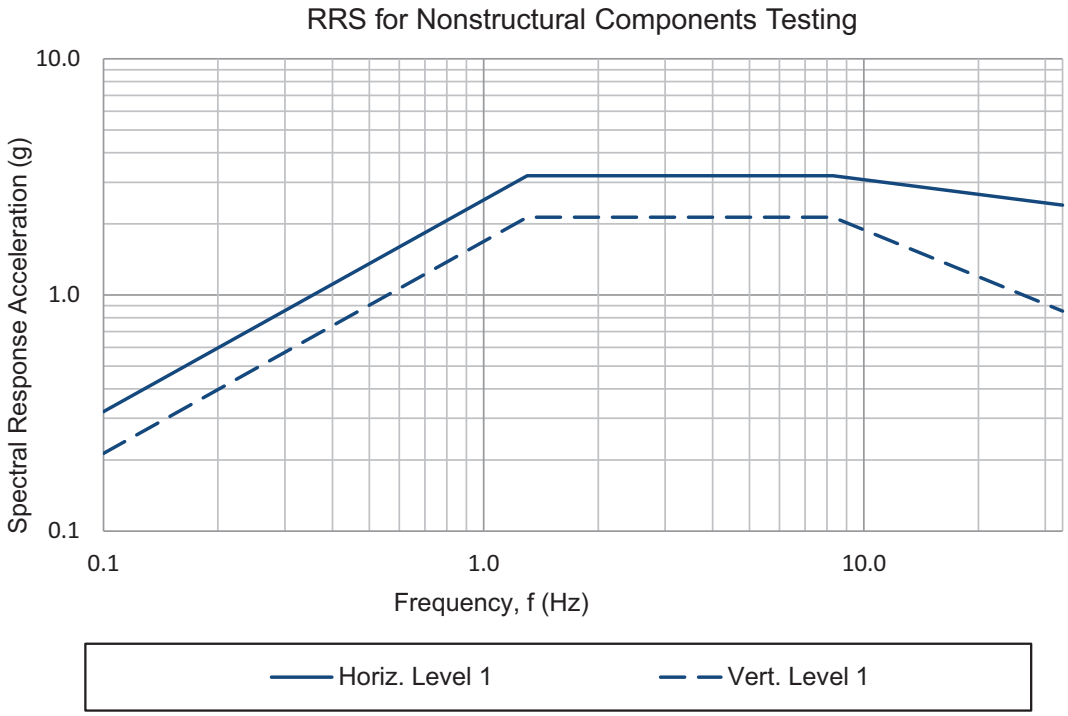
Shortcircuit Withstand Rating	**200V to 240V 1ph**
	HP
☑ **Standard 5kA**	ALL JPx
☐ **Optional 42kA**	7.5HP Max.
☐ **Optional 65kA**	10HP Max.
☐ **Optional 100kA**	1HP Max.

Fuseless Motor Starter	• Main disconnect - padlockable - rotary type handle - door interlocked • Thermo-magnetic motor protector • Contactor		
Control Circuit	• 24V.AC		
***iPD*+ Operator Interface**	• Solid state controls • All adjustments on door front • Navigation pushbuttons		
Pressure Sensing	• Pressure transducer for fresh water application 316 stainless steel construction • Rated for 0-600psi working pressure • Pressure sensing line connection ¼" Male NPT		

Visual Indications	• Manual motor start/run LED
	• Automatic motor start/run LED
	• Motor overload
	• Pressure reading
	  • Start pressure
	  • Stop pressure
	  • System pressure
	• System pressure diagnostic LED's
	  • Green: system pressure at or above stop pressure
	  • Yellow: system pressure between start and stop pressure
	  • Red: system pressure at or below start pressure
	• AUTO mode
	• OFF mode		

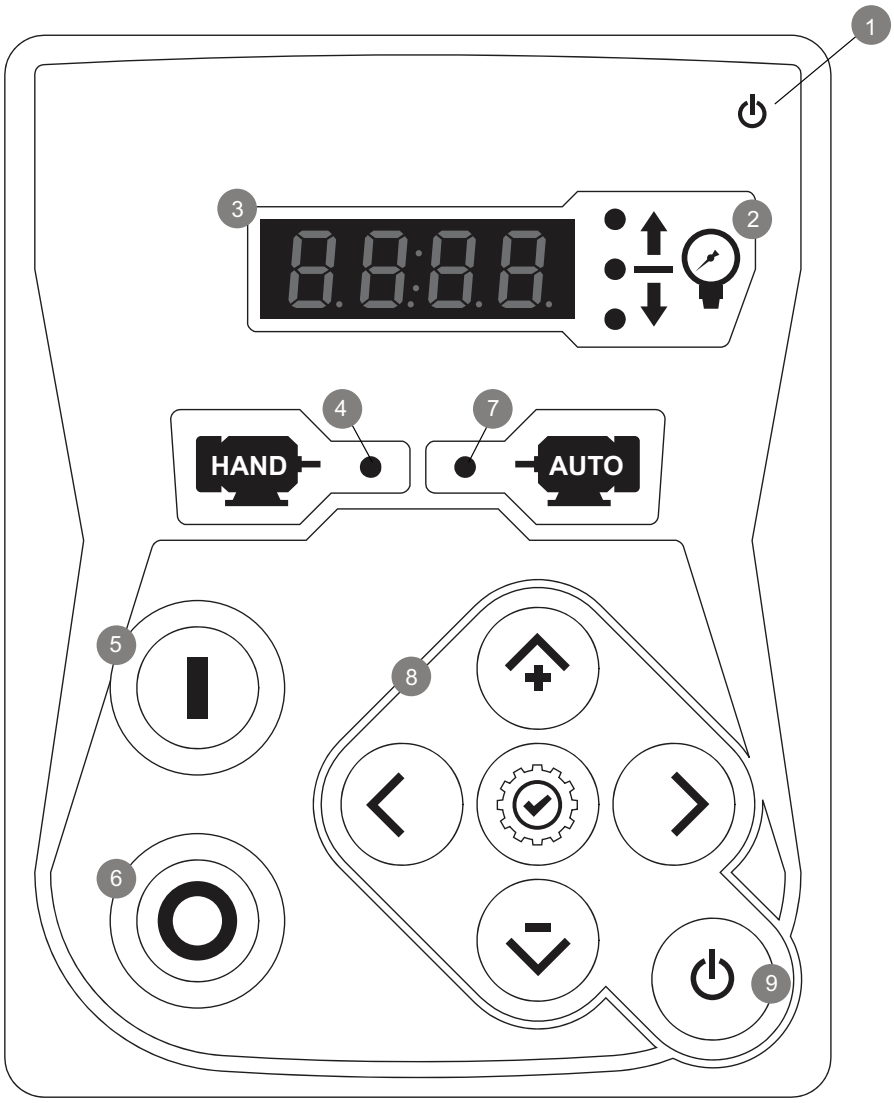
Timers	• Minimum run timer (off delay) • Delay start timer (on delay) • Visual countdown		
Counters	• Pump start counter • Elapsed timer meter (hours / non-resettable)		
Operators	• OFF-AUTO pushbutton • Start and Stop pushbutton		
Operation	Automatic Start	Start on pressure drop	
	Manual Start	Start pushbutton	
	Stopping	Stop pushbutton	
	Timers	Field adjustable & visual countdown	• Minimum run timer (off delay) • Delay start timer (on delay)

Seismic Certification	Seismic Certification Company	TRU Compliance, LLC A Tobalski Watkins Affiliate						TWEI Project No.: 15014			
	Mounting details	Rigid wall mounting									
	Seismic Information	Building Code	Test Criteria	Seismic Parameters	S_{DS}	z/h	I_P	A_{FLX-H}	A_{RIG-H}	A_{FLX-V}	A_{RIG-V}
		IBC 2015, CBC 2016	ICC-ES AC156	ASCE 7-10 Chapter 13	2.0	1.0	1.5	3.20	2.40	1.33	0.53
					3.2	0.0	1.5	3.20	1.28	2.13	0.85



Notes:
- Components are tested in accordance with ICC-ES AC156, IBC 2015 & CBC 2016.
- OSHPD Special Seismic Certification Preapproval (OSP)

iPD+ Operator Interface



1 - Power on LED
2 - System status LED
3 - Digital display
4 - Hand start LED
5 - START pushbutton
6 - STOP pushbutton
7 - Auto start LED
8 - Navigation keypad
9 - ON - OFF pushbutton

Jockey Pump Controller

Across the Line / 1 Phase

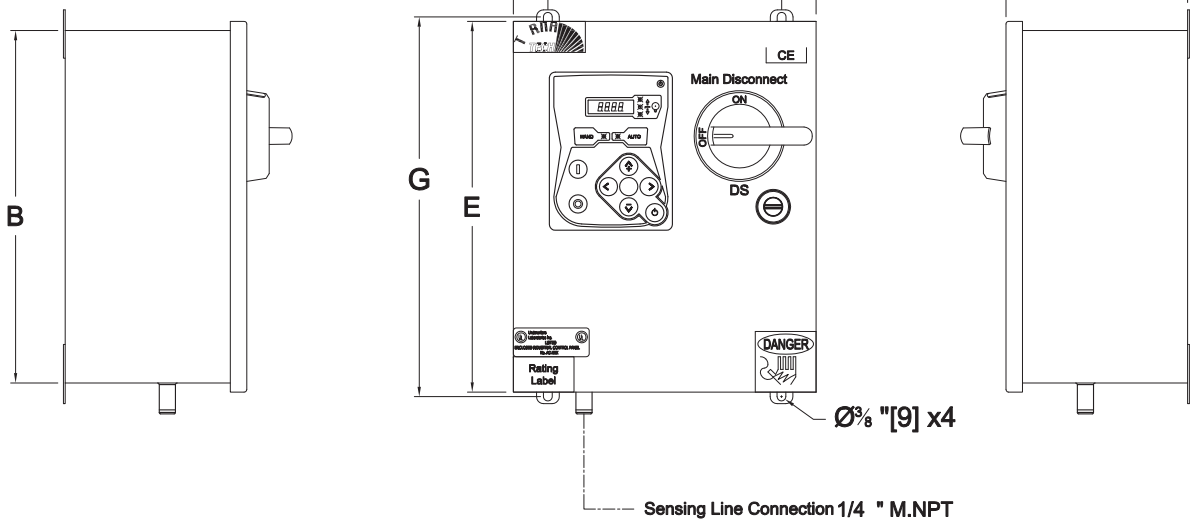
Dimensions

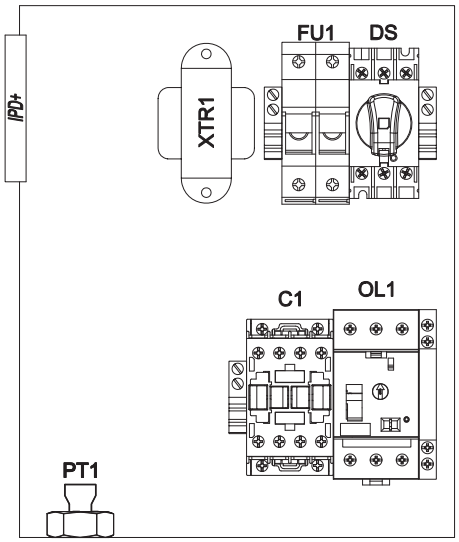
Model:JP2

Built to the latest edition of the UL 508A & CSA C22.2 No.14 standard

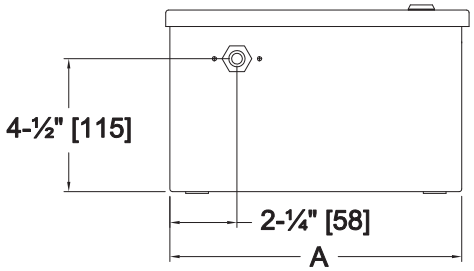
PER QUOTE DRAWING No.		
REV.	DESCRIPTION	DD/MM/YY
5	Modified Tornatech & Seismic Logo	14/04/16
6	Modified J19 Outputs ID	10/06/16
7	Revised logo	18/06/18

Drawing No. JP2-DI500/E





Standard Internal Layout



Dimensions*			
Maximum Motor HP @ 220-240V	Enclosure Dimensions	Door Dimensions	Anchor Dimensions
	A X B X C	D X E	F X G
5HP	10"X12"X6-½"	10-⅝"X12-⅝"	8"X12-¾"
10HP	16"X16"X7-½"	16-½"X16-½"	14"X16-¾"

Notes:
- Standard NEMA: NEMA 2
- Standard Paint: Textured Red RAL 3002.
- All Dimensions are in Inches [Millimeters]
- Use Watertight Conduit and Connector Only.
- Protect Equipment Against Drilling Chips.
- Door Swing Equal to Door Width

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.
*Dimensions may change depending on option required. Consult Factory for exact dimensions.

Projection

Jockey Pump Controller

Across the Line / 1 Phase

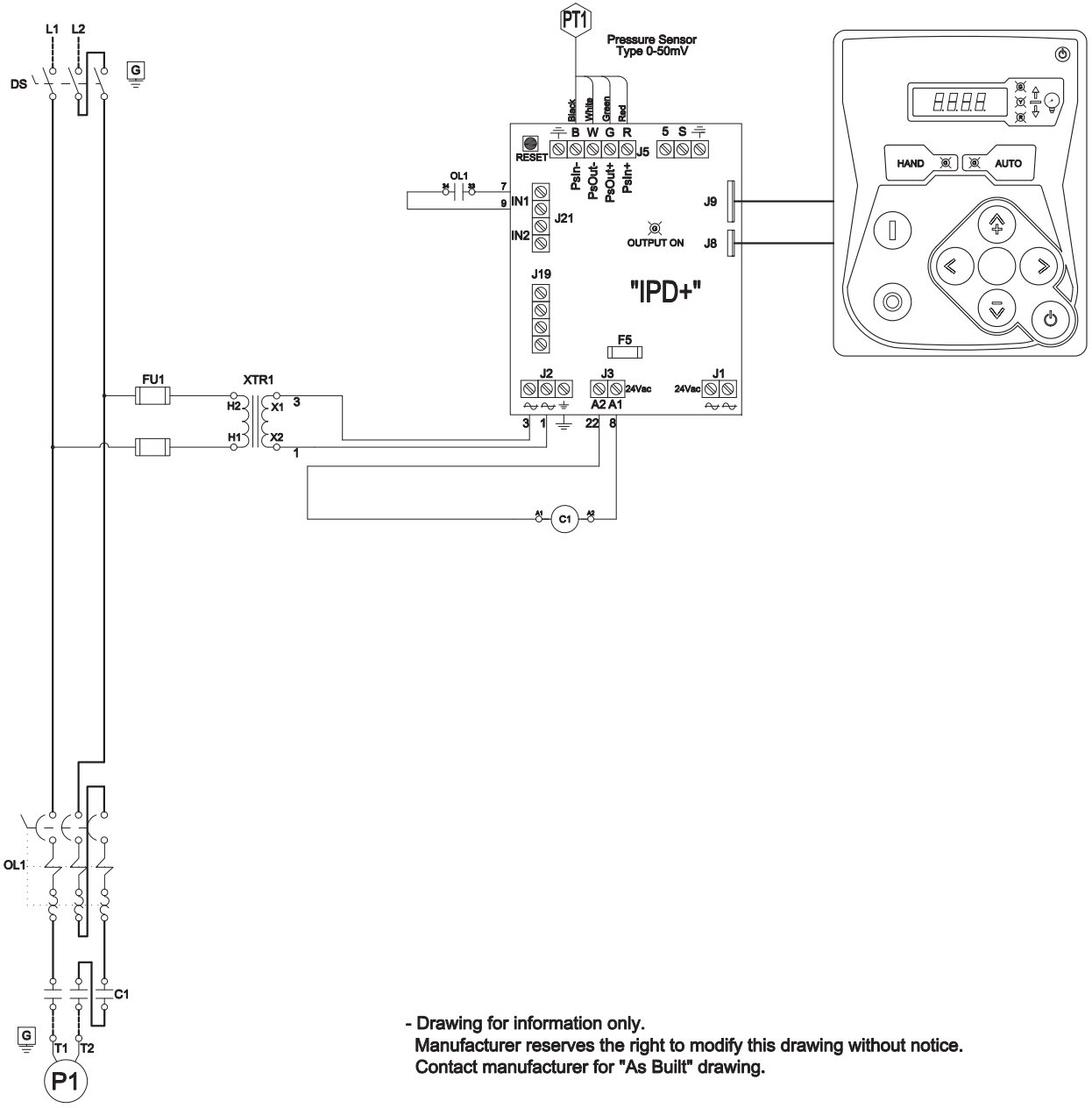
Wiring schematic

Model:JP2

Built to the latest edition of the UL 508A & CSA C22.2 No.14 standard

PER QUOTE DRAWING No.		
REV.	DESCRIPTION	DD/MM/YY
5	Modified Tornatech & Seismic Logo	14/04/16
6	Modified J19 Outputs ID	10/06/16
7	Revised logo	18/06/18

Drawing No.: JP2-WS500/E



- Drawing for information only.
  Manufacturer reserves the right to modify this drawing without notice.
  Contact manufacturer for "As Built" drawing.

Jockey Pump Controller

Across the Line / 1 Phase

Line and Motor Terminal Size

Model:JP2

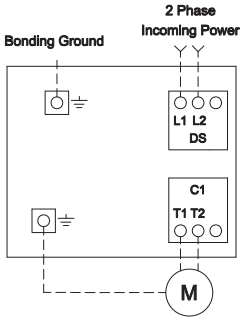
Built to the latest edition of the UL 508A & CSA C22.2 No.14 standard

PER QUOTE DRAWING No.

REV.	DESCRIPTION	DD/MM/YY
5	Modified Tornatech & Seismic Logo	14/04/16
6	Modified J19 Outputs ID	10/06/16
7	Revised logo	18/06/18

Drawing No.: JP2-TD500/E

Power Connections and Motor Connections



Line Terminals (L1,L2,GND)			
Maximum Motor Horsepower @ 220-240V	Wire Size Copper Only	Torque	Wire Size Ground Copper Only
5HP	#14 AWG - #6 AWG	2 Nm	#14 AWG - #2 AWG
10HP	#12 AWG - #1 AWG	6 Nm	#6 AWG - #2 AWG

Motor Terminals (T1,T2,GND)			
Maximum Motor Horsepower @ 220-240V	Wire Size Copper Only	Torque	Wire Size Ground Copper Only
3HP	#14 AWG - #8 AWG	1.8 Nm	#14 AWG - #2 AWG
5HP	#14 AWG - #6 AWG	2.5 Nm	#14 AWG - #2 AWG
10HP	#10 AWG - #4 AWG	5 Nm	#12 AWG - #2 AWG

Star Warehouse Expansion
Commodities List

311.2 Moderate-hazard storage, Group S-1.

Storage Group S-1 occupancies are buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

- Aerosol products, Levels 2 and 3
- Aircraft hangar (storage and repair)
- Bags: cloth, burlap and paper
- Bamboos and rattan
- Baskets
- Belting: canvas and leather
- Books and paper in rolls or packs
- Boots and shoes
- Buttons, including cloth covered, pearl or bone
- Cardboard and cardboard boxes
- Clothing, woolen wearing apparel
- Cordage
- Dry boat storage (indoor)
- Furniture
- Furs
- Glues, mucilage, pastes and size
- Grains
- Horns and combs, other than celluloid
- Leather
- Linoleum
- Lumber
- Motor vehicle repair garages complying with the maximum allowable quantities of hazardous materials listed in Table 307.1(1) (see Section 406.8)
- Photo engravings
- Resilient flooring
- Self-service storage facility (mini-storage)
- Silks
- Soaps
- Sugar
- Tires, bulk storage of
- Tobacco, cigars, cigarettes and snuff
- Upholstery and mattresses
- Wax candles

311.3 Low-hazard storage, Group S-2.
Storage Group S-2 occupancies include, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic *trim*, such as knobs, handles or film wrapping. Group

S-2 storage uses shall include, but not be limited to, storage of the following:

- Asbestos
- Beverages up to and including 16-percent alcohol in metal, glass or ceramic containers
- Cement in bags
- Chalk and crayons
- Dairy products in nonwaxed coated paper containers
- Dry cell batteries
- Electrical coils
- Electrical motors
- Empty cans
- Food products
- Foods in noncombustible containers
- Fresh fruits and vegetables in nonplastic trays or containers
- Frozen foods
- Glass
- Glass bottles, empty or filled with noncombustible liquids
- Gypsum board
- Inert pigments
- Ivory
- Meats
- Metal cabinets
- Metal desks with plastic tops and *trim*
- Metal parts
- Metals
- Mirrors
- Oil-filled and other types of distribution transformers
- Parking garages, open or enclosed
- Porcelain and pottery
- Stoves
- Talc and soapstones
- Washers and dryers

APPENDIX G

Transportation Study

Transportation Study

STAR WAREHOUSE EXPANSION

TOWN OF CORNWALL
ORANGE COUNTY, NEW YORK

Prepared by:

Tim Miller Associates, Inc.
10 North Street
Cold Spring, NY 10516
(845) 265-4400

Client Draft
Submitted: June 28, 2022

Transportation Study
TABLE OF CONTENTS

LIST OF TABLES

ATTACHMENT

1.0 Regional Road Network

The Star Warehouse Expansion project site is approximately 36.9 acre parcel located on the west side of NYS Route 32 in the Town of Cornwall, New York. The site is currently occupied with 185,835 feet of warehousing. The site location is shown in Attachment A Figure 1. In compliance with SEQR, this study examines Existing Conditions, and cumulative impacts of this and other area projects.

The major north-south road closest to the project site is NYS Route 32. NYS Route 32 is classified by New York State Department of Transportation (NYSDOT) as a urban minor arterial and has one eleven foot travel lane in each direction. The speed limit on NYS Route 32 is 55 miles per hour in the area of the project site.

Interstate 87 (The Thruway) parallels NYS Route 32 with interchanges at Interstate 84 in Newburgh and Route 17 (Soon to be Interstate 86) Harriman interchange. The Thruway provides for regional north south travel in this section parallel to NYS Route 32

2.0 Local Setting

The project site is located in a suburban setting with mixed commercial and residential uses. Attachment A Figure 1 illustrates the transportation network in the project vicinity.

This study investigates the following unsignalized intersection of Industry Drive and NYS Route 32.

3.0 Existing Conditions

The project site has a single primary access point onto NYS Route 32, from Industry Drive. Industry Drive is a private road, approximately 30 feet in width, which provides access to the site (20 Industry Drive) and an adjoining warehouse property to the south at 18 Industry Drive. The subject property has a second access drive to Creamery Hill Road to the north, which also accesses NYS Route 32. The Creamery Hill driveway is typically not used by employees, visitors or deliveries to and from the site.

Existing Peak Hour Volumes

Traffic counts were collected at the single studied intersection, NYS Route 32 and Industry Drive. Hourly volume data was obtained on April 6, 2022, 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. at NYS Route 32 and Industry Drive as shown in Attachment B. The traffic analyses is based upon traffic flow rates that are represented by the fifteen minute flow rates in the peak hours. Peak hour factors are adjustments to increase traffic flows to the 15 minute peaking characteristic of the location.

Attachment A Figure 2 shows existing peak hour turning movement volumes at the intersection of Industry Drive and NYS Route 32.

Effects of Covid-19 Pandemic

Traffic data from the New York State Department of Transportation's count station on NYS Route 32 pre COVID were compared to more recent data in the same section of roadway to determine the impact of the COVID-19 pandemic on 2022 traffic counts. This Covid-19 pandemic review is provided in Attachment C with background data in Attachment D. The review concluded that no adjustment was needed for the existing April 2022 traffic.

Accident Data

Region 8 Orange County data covering 2016 and 2017, the most recent data available, was examined for High Accident Locations (HAL) extending into Route 32 within one- half mile of the site (Stations 32 83011066 to 32 83011075) in either direction.

HAL locations include Priority Investigation Locations (PIL) Safety deficient Locations (SDL) and Priority Investigation Intersections (PII) locations. The systematic identification of locations with high accident exposure is outlined in New York State Department of Transportation's (NYSDOT) Safety Investigation Procedure Manual, June 2000. PIL locations represent the five percent worse locations based on a 99.9 percent confidence level. SDL locations represent the next ten percent of locations (NYSDOT Safety Data Integration Project Concept of Operations Report, May 9 2013).

The 2017 data showed no PIL, SDL, nor PII locations in this mile section of road.

The 2016 indicated a 0.4 mile SDL section north of the site 32 83011071 to 32 83011074 as shown in Table 1.

Table 1
Roadway Safety

Category	**Year 2016 ****
Fatalities	0
Injury	4
Property damage only	6
Accidents total	10
Accidents at intersections	2
Severity rating	0.12
Upper Control Limit	3.32
Exposure	3.65

* In this section CR 65, CR 79, Creamery Hill Road and Hess Road intersect NYS Route 32.
**** 2017 did not meet listing criteria.**

Given that the Exposure is slightly above the Upper Control Limit in 2016, the fact it was below the limit in 2017 is not unusual. The Severity Index in this case is relatively low in 2016.

Accident data from 2016 to 2021 was review for the three tenth miles sections at the Industry Drive intersection with NYS Route 32. Table 2 gives a summary of accidents from attachment C. The three tenth of a mile sections had on average one vehicle collision with another vehicle per year and none reported with trucks. Of 20 collisions reported over a five year period, 15 were with animals or off road objects.

Table 2
Collisions 2016 to 2021

Category	**Collisions Outside Operating Hours ***	**Collisions During Operating Hours ***
Total collisions	**10**	**10**
Collisions with animal **	3	3
Collisions with stationary object	5 ***	4
Collision with other vehicle (see below)	**2**	**3**
Collisions involving Trucks	**0**	**0**
Causes Vehicle collisions with other vehicles	Alcohol involved	Overtaking unsafe lane change
	Rear end snow/ice	Rear end driver inattention
		Rear end wet pavement following too close

* Hours of operation Monday to Friday 8:00 a.m. to 5:30 p.m. And Sunday 8:00 a.m. to 12:00 p.m.
Operating hours expanded 30 minutes to include time for employees to enter and leave the site.
** . (usually deer)
*** one avoiding other vehicles

NYS Route 32 Road Speed Study

The speed of vehicles traveling on NYS Route 32 is important for assessing the safety of future vehicles entering and exiting the project site. The speed limit on NYS Route 32 is 55 miles per hour in vicinity of the Industry Drive.

A speed survey was conducted on NYS Route 32 approaching Industry Drive. The 85th percentile speeds (the speed at which 85 out of every 100 vehicles are driven at or under) is typically considered as the design speed
.
Speed data was collected all day Tuesday, January 25th and Wednesday, January 26 2022. The southbound survey undercounted vehicles and the survey was redone Tuesday April 5

2022. The period from 9 a.m. to 4 p.m. was used to represent clear, daylight, uncongested periods for traffic. Table 3 indicates the number of observations and 85th percentile speeds. The speeds approaching Industry Drive are graphically shown for clear, daylight, uncongested conditions as 59 mile per hour northbound (Attachment F Figure 1) and 56 miles per hour southbound (Attachment F Figure 2) .

Table 3
85th Percentile Speeds

Direction Approaching Industry Drive	All Conditions		Clear Daylight Uncongested Conditions	
	Vehicles	85th Percentile Speed	Vehicles	85th Percentile Speed
Northbound One Day	4914	59 mph	1887	59 mph
Southbound Two Days	9002	55 mph	3631	56 mph
Source: Attachment G				

Industry Drive Sight Distance

Sight distance is typically defined as the distance a motorist can see objects or approaching vehicles before their line of sight is blocked by an obstruction. Stopping sight distance is defined as the distance needed for drivers to see an object on the roadway ahead and bring their vehicles to a complete stop before colliding with the object. Stopping sight distance is derived using vehicle speed and also accounts for the vertical geometry of the road (grades). While stopping sight distance is "*fundamental to intersection operation*"[1] ,"*To enhance traffic operation, intersection sight distance that exceed stopping sight distances are desirable along the major road*".[2] The speed data near the Industry Drive driveway, described above was used for the estimation of stopping sight distance and intersection sight distance.

> *"'The recommended stopping sight distances are based on passenger car operations and do not explicitly consider design for truck operations....Separate stopping sight distances for trucks and passenger cars, therefore, are not generally used in highway design"*
>
> *'There is one situation in which the goal should be to provide stopping sight distances greater than the design values in Table 3-1. Where horizontal sight restrictions occur on downgrades, particularly at the ends of long downgrades where truck speeds closely approach or exceed those of passenger cars, the greater height of eye of the truck driver is of little value." (AASHTO, 3-6 and 3-7[3]).*

The exception for a long downhill does not apply for the driveway at Industry Drive since the grades on NYS Route 32 are relatively level in the area of the driveway.

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[1] American Association of State and Highway Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, 7th Edition 2018, pages 9-35.
[2] Ibid.
[3] Ibid.

The project engineer (Pietrzak & Pfau, PLLC) surveyed the intersection sight distance at the Industry Drive shared driveway and found the distance to be 550 feet to the north and 585 feet to the south. These distances meet the stopping sight distance criteria for the "all conditions" 85th percentile speeds for both northbound and southbound traffic (Table 4). For clear, daylight uncongested conditions 85th percentile speeds are met (Table 4).

Vehicles waiting to make left turns into the site can be seen by following vehicles for 634 feet allowing for sufficient stopping sight distance for northbound vehicles. Left turning vehicles into the site can see approaching vehicles from the north 600 feet which is sufficient to meet stopping sight These sight distances are based upon surveys by the project engineer Pietrzak & Pfau, PLLC.

The stopping sight distance criteria are appropriate to the design of new intersections or driveways. Stopping sight distance less than the criteria can be left in place for projects on existing roads (See ASSHTO Page 3-7[1]). In this instance, the accident history does not show that local crashes are related to the driveway, rather they are primarily related to animal crossings and vehicles running off the road. An intersection driveway sign with auxiliary plate for trucks could provide additional warning to drivers on NYS Route 32, approaching the intersection. The addition of a sign should be considered as part of the Highway Work Permit process.

Table 4 Sight Distances				
Sight Distance	**Sight Distances for 85th Percentile Speeds (MPH)** [2]			
Direction of Travel	Southbound	Southbound	Northbound	Northbound
Condition	All	9 a.m. to 4 p.m.***	All	9 a.m. to 4 p.m.***
At Speeds	**55**	**56**	**59**	**59**
Stopping Sight Distance				
AASHTO (Tables 3-1, 9,7, and calculated values) [3]				
Passenger car	**495****	**510****	**555****	**555****
Intersection Sight Distance				
NYSDOT [4]				
Passenger Cars				
Right turn [1]			**565****	**565****
Left turn [1]	*610**	*620**		
Combination Trucks				
Right turn [1]			*915**	*915**
Left turn [1]	*930**	*950**		
^ *Does not meet sight distance.*				
** **Meets sight distance.**				
*** Umcongested daylight clear weather conditions.				
[1] Interim values between five mile per hour increments calculated values based on AASHTO ^** time gaps for passenger cars and combination trucks Tables 9-6 and 9-8				
[2] Design values, are calculated values raised to nearest 5 mile per hour increment				
[3] American Association of State and Highway Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, (current edition 7th Edition 2018).				
[4] New York State Department of Transportation (NYSDOT) Highway Design Manual Attachment 5C Intersection Sight Distance charts Table 53-c and Jan 15 2015 same as AASHTO ** Tables 9-7 and 9-9.				

Existing Parking and Loading

The Town Zoning Code was reviewed for required parking and loading areas (Section 158-16 C(4).

> Sufficient loading berths to provide adequately for the proposed use shall be provided. The Planning Board shall, in consultation with the applicant, determine the appropriate number of loading berths specific to such use (Source Cornwall Town code 158-16 C (4)).

Table 5 indicates existing loading areas.

Table 5 Existing Loading Areas	
Category	**Existing**
Large for tractor Trailers	**11**
* From Pietrzak and Pfau Engineering and Surveying PLLC, *Warehouse Expansion Existing Conditions,* 4-7-2022.	

The number of loading areas required is based on discussions between the Planning Board and Applicant.

Table 6 indicates existing paved parking. Many of these spaces are currently unlined.

Table 6 Existing Parking	
Category	**Existing**
Paved Parking	88
* From Pietrzak and Pfau Engineering and Surveying PLLC, *Warehouse Expansion Existing Conditions,* 4-7-2022.	

4.0 Future No-Build Traffic Conditions

Typically a project's traffic impact is determined by comparing future traffic conditions without the project's traffic (the 2024 No-Build Condition) to traffic conditions with project-generated traffic (the 2024 Build Condition).

No-Build traffic conditions are ascertained based on a number of factors: (1) improvements in the local road network that are planned or underway; (2) traffic from general population growth in the local area and, (3) traffic from identified development projects in the project site vicinity excluding the Star Warehouse project. The two future conditions, No Build Condition and Build Condition, provides for identification of both the cumulative impact and the specific impacts of the Project, as required by SEQR.

The Orange Country Transportation Council Federal Fiscal years 2020-2024 Transportation Improvement Program did not list any proposed projects on NYS Route 32 in the Town of Cornwall.

Maintenance projects such as guardrail replacement, pavement reconditioning, bridge repairs may also occur as part multi-county or specific projects and would not directly impact level of service analysis. As a result, roadway improvements were not included into the future No-Build Condition or Build Condition traffic analysis.

Background growth of 0.5 percent annually over three years was added to the No-Build and Build volumes to account for local growth and other projects not included in the list of No-Build projects. It is not unusual for many areas to experience stagnant or declining traffic volume growth in New York State. This growth is consistent with growth factor used for the Storm King Art Center[4].

The Town of Cornwall was contacted with regard to proposed projects before the Town Planning Board. Kristen O'Donnell**,** Principal Planner with Lanc & Tully indicated two projects in the Town of Cornwall. The two projects are the Storm King Art Center expansion and the Treetop Warehouse. Ms. O'Donnell contacted the Village of Woodbury to confirm they had no pending projects of traffic concern to the south of the site.

The Storm King Art Center is not open during the morning commuter rush hours[5] so no additional traffic from this development was assigned. The traffic on NYS Route 32 at Industry Drive as a result of Storm King Art Center was based on their traffic evaluation. The difference between their Build and No-Build Conditions for 2023[6] was estimated and an annual growth factor of two percent for an additional ten years was projected[7] This results in an increase of six trips southbound and one trip northbound on NYS Route 32 at the site driveway.

The second No Build Project, Treetop Warehouse, at 2615 US Route 9W Cornwall is shown in Table 7 and 8. The proposed Treetop Warehouse project site is located approximately 5.5 miles northwest of the subject site, on Route 9W. Distribution was estimated based on the location and roadway network.

The No-Build traffic for the intersection of Industry Drive and NYS Route 32 is shown in Attachment A Figure 3.

Table 7
Other Project ** Trip Generation Rates

Land Use {ITE Code}	Trip Rates *			
	Weekday			
	A.M. Peak Hour		P.M. Peak Hour	
	IN (Trips/ Unit ***)	OUT (Trips/ Unit ***)	IN (Trips/ Units ***)	OUT (Trips/ Units ***)
Treetop Warehouse 2,053,593 square feet (150)	0.102	0.030	0.037	0.096

* Hourly Trip Generation Rates from Institute of Transportation Engineers Trip Generation Manual 11th edition, 2021.

** See text discussion of Storm King Art Center.

*** Trips per in 1000 square feet.

[4] Storm King Art Center Master Plan Traffic Evaluation. VBH, Albany, June 2020, page 7.
[5] Ibid. page 9.
[6] Bid Figures 6 and 10.
[7] Ibid page 16.

Table 8 Other Project Trip Generation Summary						
	Trips Generated					
	A.M. Peak Hour			P.M. Peak Hour		
Land Uses	IN (Trips)	OUT (Trips)	Total Trips	IN (Trips)	OUT (Trips)	Total Trips
Treetop Warehouse 2,053,593 square feet (150) *	209	62	271	76	197	273
Storm King Art Center **	0	0	0	1	6	7
• See table 7.						
** Trips on US Route 32 south of Angola Road from Storm King Art Center Master Plan Traffic Evaluation. VBH, Albany, June 2020,						

5.0 Future Build Traffic Conditions

Project Trip Generation and Distribution

The Applicant, proposes a 50,000 square foot expansion of the existing warehouse building, which has 185,835 square feet of space. Industry Drive is used by the 185,835 square foot existing Star warehouse and by the adjacent warehouse with approximately 131,500 square feet of space. The total warehouse space currently utilizing Industry Drive is 317,335 square feet. Table 9 shows the trip generation rates during the peak hour. The actual trip rate is based on the total square footage of all the buildings using Industry Drive and traffic using Industry Drive, as counted in April 2022. The actual counted trips rates more closely match the rates for typical "Warehouse" as opposed to "Light Industrial use".

The Light Industrial use rates were included to provide a sensitivity analysis, as requested by the Town of Cornwall. As shown in Table 9, the trip generation rates for Light Industrial uses are higher than for Warehouse uses. These rates were used to both generate traffic for the site, and to analyze the future level of service at the studied location. The use of Light Industrial rates provides a "worst case" traffic generation scenario, as further described below.

Star Warehouse Project Trip Rate Summary Table 9				
	Trip Rate			
	A.M. Peak Hour		P.M. Peak Hour	
Land Uses {ITE Code}	IN (Trips/ Unit **)	OUT (Trips/ Unit **)	IN (Trips/ Units **)	OUT (Trips/ Units **)
Existing 317,335 square feet Warehouse (150) *	0.149	0.045	0.057	0.147
Proposed 367,335 square feet Warehouse (150) *	0.142	0.042	0.054	0.138
50,000 square feet Light Industrial (110) *	0.665	0.091	0.068	0.421
Actual rate based on existing 317,335 square feet and traffic counts April 2022 ***	0.072	0.032	0.057	0.151
* Hourly Trip Generation Rates from Institute of Transportation Engineers Trip Generation Manual 11th edition, 2021.				
** Trips per in 1000 square feet.				
*** 131,500 adjacent site plus 185,835 square foot existing Star Warehouse.				

Table 10 shows the trip generation during the peak hours for the existing and proposed warehouse space using rates from the Trip Generation Manual, (Table 9).

Table 10 Star Warehouse Expansion Project Trip Generation Summary						
	Trips Generated					
	A.M. Peak Hour			P.M. Peak Hour		
Land Uses {ITE Code}	IN (Trips)	OUT (Trips)	Total Trips	IN (Trips)	OUT (Trips)	Total Trips
317,335 square feet Warehouse (150)	47	14	61	18	46	64
367,335 square feet Warehouse (150)	55	17	72	21	54	75
50,000 square feet Warehouse Expansion Trips	**8**	**3**	**11**	**3**	**8**	**11**
Trips generated are based on rates of 317,335 square feet for both existing and 367,335 square feet as proposed. Use of the same rate generates slightly higher number of trips for the expansion.						

Table 11 shows the difference between trip generation as a 50,000 square foot Warehouse expansion compared to a 50,000 square feet of a stand alone Light Industrial use.

Table 11
Star Warehouse Expansion Project Trip Generation Sensitivity

Land Uses {ITE Code}	Trips Generated					
	A.M. Peak Hour			P.M. Peak Hour		
	IN (Trips)	OUT (Trips)	Total Trips	IN (Trips)	OUT (Trips)	Total Trips
Sensitivity Analysis						
50,000 square feet Light Industrial (110) *	**33**	**5**	**38**	**3**	**21**	**24**
Build Condition						
50,000 Square feet Warehouse (150) **	**8**	**3**	**10**	**3**	**8**	**11**

* See Table 9 rates. No adjustment was made for trips internal to Industry Drive between the Light Industrial and Warehouse uses in Industry Drive. Values used are higher than treatment as stand alone Warehouse use.

** See Table 10 for trip generation.

Traffic Distribution

Figure 4 shows the anticipated traffic distribution of Project traffic, based on a Light Industrial use or Warehouse land use codes. The trip distribution is based upon the existing distribution of traffic on Industry Drive at NYS Route 32. The Light Industrial use analysis was requested by the Town of Cornwall and shows the degree of sensitivity to site traffic increases.

Figure 5 show the site generated traffic associated with the proposed Warehouse development. Figure 6 - Build Traffic shows the site generated Warehouse trips (Figure 5) added to the No-Build volumes (Figure 3*).*

The light industrial use sensitivity traffic volumes are shown in Figure 7. Figure 8 shows the Light Industrial sensitivity volumes (Figure 7) added to the No Build volumes in Figure 3.

Future Parking and Loading

Future Loading

The number of loading areas required is based on discussions between the Planning Board and Applicant, according to the Town Code (158-16B (38). Table 12 indicates existing and proposed loading areas.

Table 12 Loading Areas		
Category	**Existing**	**Additional Proposed**
Large for tractor Trailers	**11**	**4**
* Source: * From Pietrzak and Pfau Engineering and Surveying PLLC, *Warehouse Expansion Existing Conditions,* 4-7-2022.		

Future Parking

The number of existing and proposed parking spaces are outlined below in Table 13. The required number of proposed parking spaces are based on the newly proposed warehouse square footage and not on employees. The requirement of 236 spaces, based on the total warehouse square footage equates to 472 employees (one space per two employees {158-16 B (38)}). This number of employees is far greater than anticipated for the facility and a rate far exceeding use based on existing parking spaces.

Table 13 Parking Areas				
Category	**Existing**	**Proposed**	**Required as Proposed**	
Paved Parking	88 (47%*)	110** (47%*)	**59 (25%*)**	Minimum 25% of total 1000s of square feet 158-16 A (7)(c)
Land Banked	0	130***		Require approval under 158-16 A (7)(b)
Subtotal	**88**	**240**	**236 (100%)**	Based on square footage from 158-16 B (38)
Sources: Pietrzak and Pfau Engineering and Surveying PLLC, *Warehouse Expansion Plans Banked Parking Plans* , 4-7-2022. Pietrzak and Pfau Engineering and Surveying PLLC, *Warehouse Expansion Existing Conditions,* 4-7-2022.				
* Percentage of parking spaces per 1000 square feet.				
** 22 paved spaces being added.				
*** All added.				

The Parking Generation Manual (Institute of Transportation Engineers 5th Edition, January 2019) provides estimates for parking based upon Warehouse studies (ITE Code 150). The Parking Generation Manual indicates an average parking rate of 0.39 spaces per 1000 square feet and 0.47 spaces per 1000 square feet at the upper 95% confidence level. These rates equate to 93 spaces on average and 111 for the 95th percentile. The 110 proposed spaces are sufficient to meet average parking spaces required and one less than the 95th percentile of spaces needed. The proposed parking meets the existing rate of parking per 1000 square feet and is nearly double the minimum rate allowable. The proposed parking spaces are sufficient to handle typical current rate of parking availability and with the banked parking more than doubled the current parking availability rate.

6.0 Level of Service Conditions

Existing Conditions Level of Service

Level of service is a grade descriptor A to F, of how well intersection movements work using delay as the primary operating characteristic. As delays increase so does driver frustration. Volume to capacity ratio is also used as determinate of level of service. Level of service criteria is described in Attachment H.

The level of service was determined for Industry Drive at NYS Route 32 for the Existing condition. The level of service analyses for this location is provided in Attachment I.

All of the studied intersection lane groups operate with additional available capacity and operate at the most efficient levels of service A to B during the a.m. peak hour and level of service A to C in the p.m. peak hour. Level of service is summarized in Table 14.

No-Build Level of Service

In the No-Build condition, the level of service at the studied intersection can be expected to remain at efficient levels of service A to C with no change in level of service from the Existing Condition (see Table 14).

Build Condition and Sensitivity Analysis at Industry Drive and US Route 32

The Project site is projected to add 10 trips in the a.m. peak hour and 11 trips in the p.m. peak hour. The sensitivity analysis using light industrial for the expansion would add 38 trips in the a.m. peak hour and 24 trips in the p.m. peak hour.

The level of service will remain unchanged from the Existing Condition through both the Build condition (proposed Warehouse use) and Sensitivity Build Condition (treating the 50,000 square feet as light industrial). See Table 14

Table 14
Level of Service Summary All Conditions
Unsignalized Intersection of Industry Drive and NYS Route 32

Intersection Road	Lane Group Approach Direction - Movement	Levels of Service (Delay in Seconds per vehicle) Volume to Capacity Ratio					
		A.M. Weekday Peak Hour			P.M. Weekday Peak Hour		
		Existing	No Build	Build	Existing	No Build	Build
As Proposed							
NYS Route 32	NB - L	A (8.4) 0.01	A (8.4) 0.01	A (8.5) 0.01	A (8.7) 0.01	A (9.0) 0.01	A (9.0) 0.01
Industry Drive	EB - L, R	B (12.9) 0.02	B (13.6) 0.03	B (13.7) 0.03	C (16.6) 0.16	C (18.7) 0.18	C (19.4) 0.21
Sensitivity analysis using Light Industrial Use instead of Proposed Warehouse (Build Condition)							
NYS Route 32	NB - L			A (8.5) 0.02			A (9.0) 0.01
Industry Drive	EB - L, R			B (14.1) 0.04			C (20.4) 0.26

NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound., NWB = Northwest bound

L = left, R= right, T = through, (e.g. SWB - L = Southwest bound left).
Volume to Capacity ratios rounded to hundredths

7.0 Mitigation

The proposed project will result in the reconstruction of the site access including the removal of an existing island. A replacement sign will be placed further from the travel lanes and out of the state right-of-way. These site access changes are subject to New York State Department of Transportation Highway Permit Approval. These improvements are intended to improve safety. As part of the proposed expansion, Industry Drive would be resurfaced in its existing footprint. The existing guiderail that runs along Industry Drive near Woodbury Creek will be replaced.

New wayfaring signs are proposed primarily to help new truck drivers, new employees, and package mail delivery drivers and will include direction to 19 Industry Drive not only at the entrance but at the two junctions as vehicles traverse Industry Drive.

Parking and Loading is more than adequate to meet zoning requirements. The land banking of 130 spaces provides assurance that the facility parking needs can be met in the future. The newly proposed parking and loading areas will be delineated with pavement markings as part of the construction process. Land banking of spaces is an environmental mitigation to reduce impervious pavement when applicable. Land banking can be permitted under 158-16 A (7)(c) of the Cornwall Town Code.

The emergency access at the northwest corner of the property connecting to Star Road will be improved. This emergency access is currently an unpaved road with no controls. The drive will be paved and will be gated and locked to prevent unauthorized use. A standard Town of Cornwall emergency service lock box will be used at the emergency access.

A number of accidents near the site involved vehicles running off the road, and the cause of those accidents is unknown. The Applicant will work with NYSDOT for the removal of any vegetation in the NYS Route 32 right-of-way near the site entrance, which may improve safety.

The applicant will work with the NYSDOT regarding any necessary driveway warning signs and associated TRUCK or other auxiliary plates as part of the Highway Work Permit.

Attachment A

Volume Figures

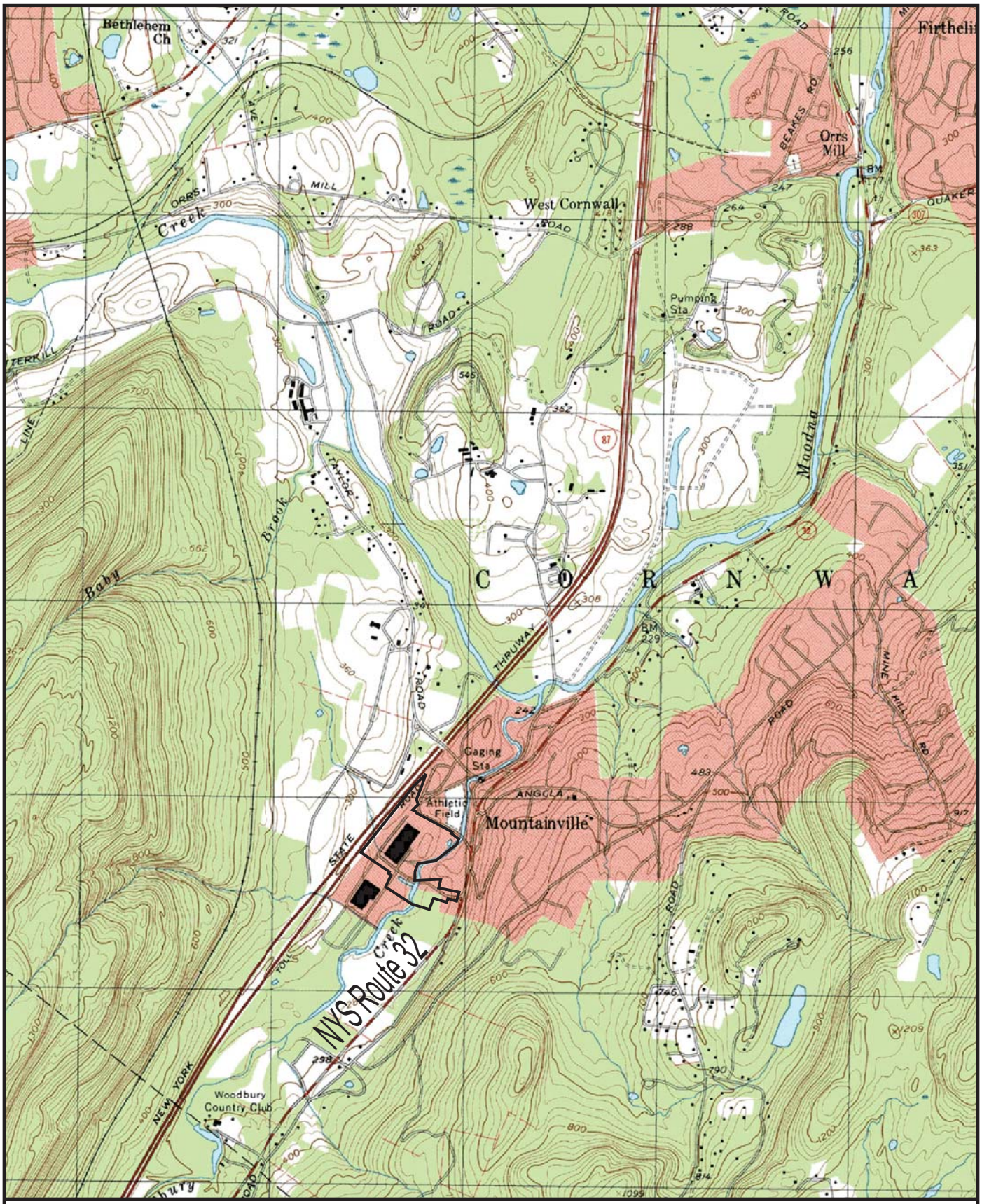


Figure 1: Location Map

Star Warehouse Property

Town of Cornwall, Orange County, New York

Base Map: USGS, Cornwall Quadrangle, 1994

Approx. Scale: 1 inch = 2,270 feet

File 20018 05-19-2022
TMA:\20018\Traffic Fig 1.cdr *Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418*

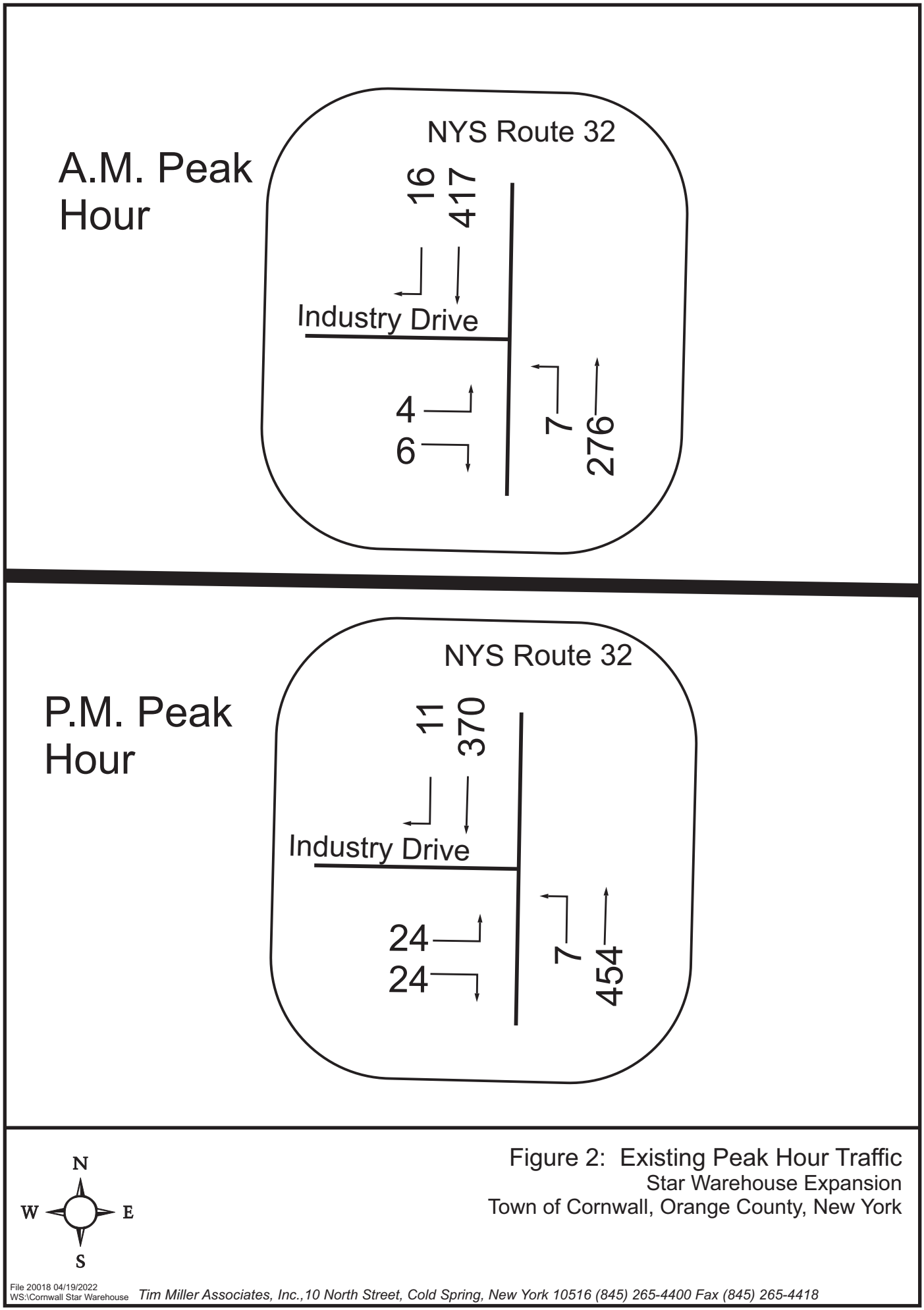


Figure 2: Existing Peak Hour Traffic
Star Warehouse Expansion
Town of Cornwall, Orange County, New York

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

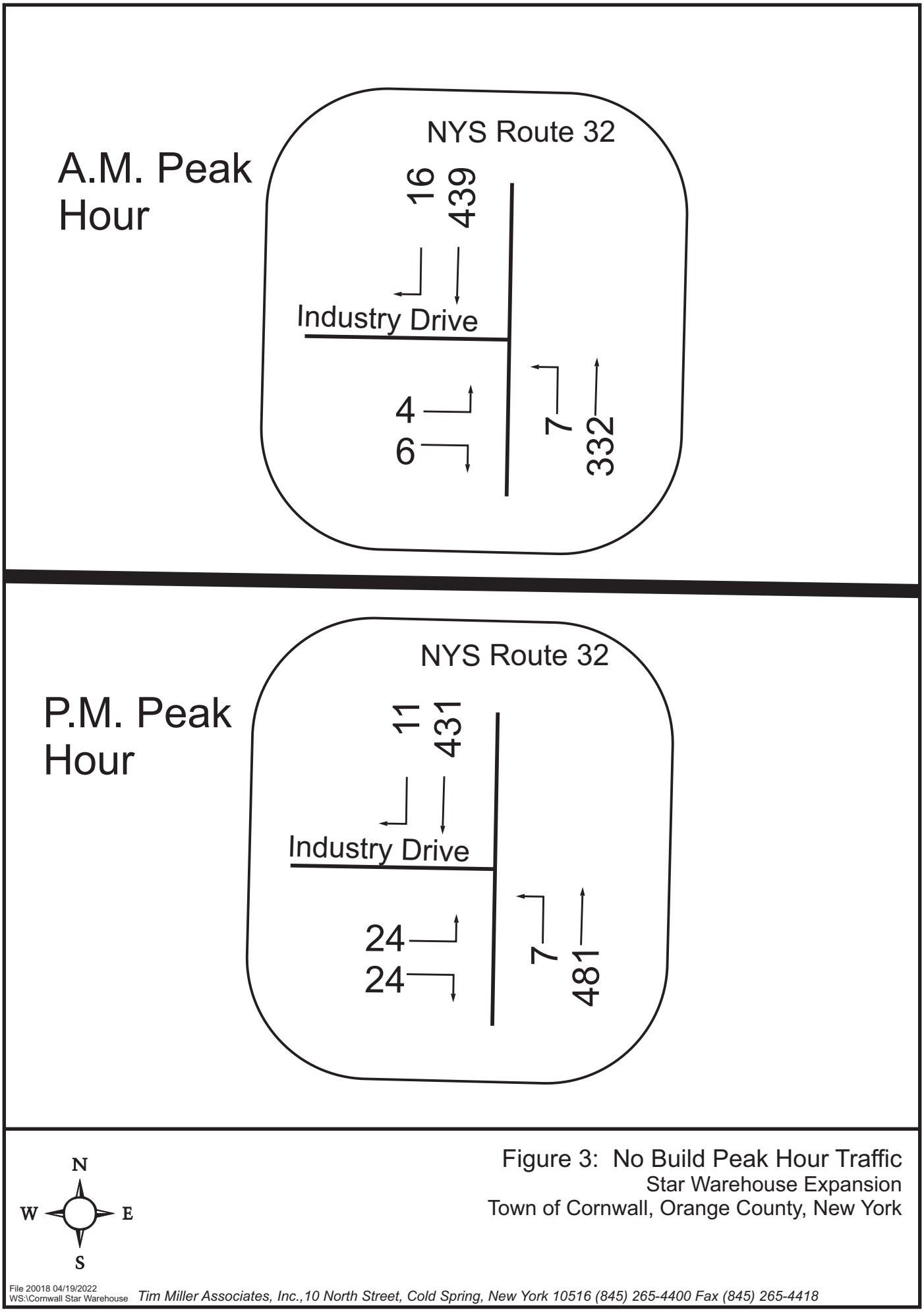
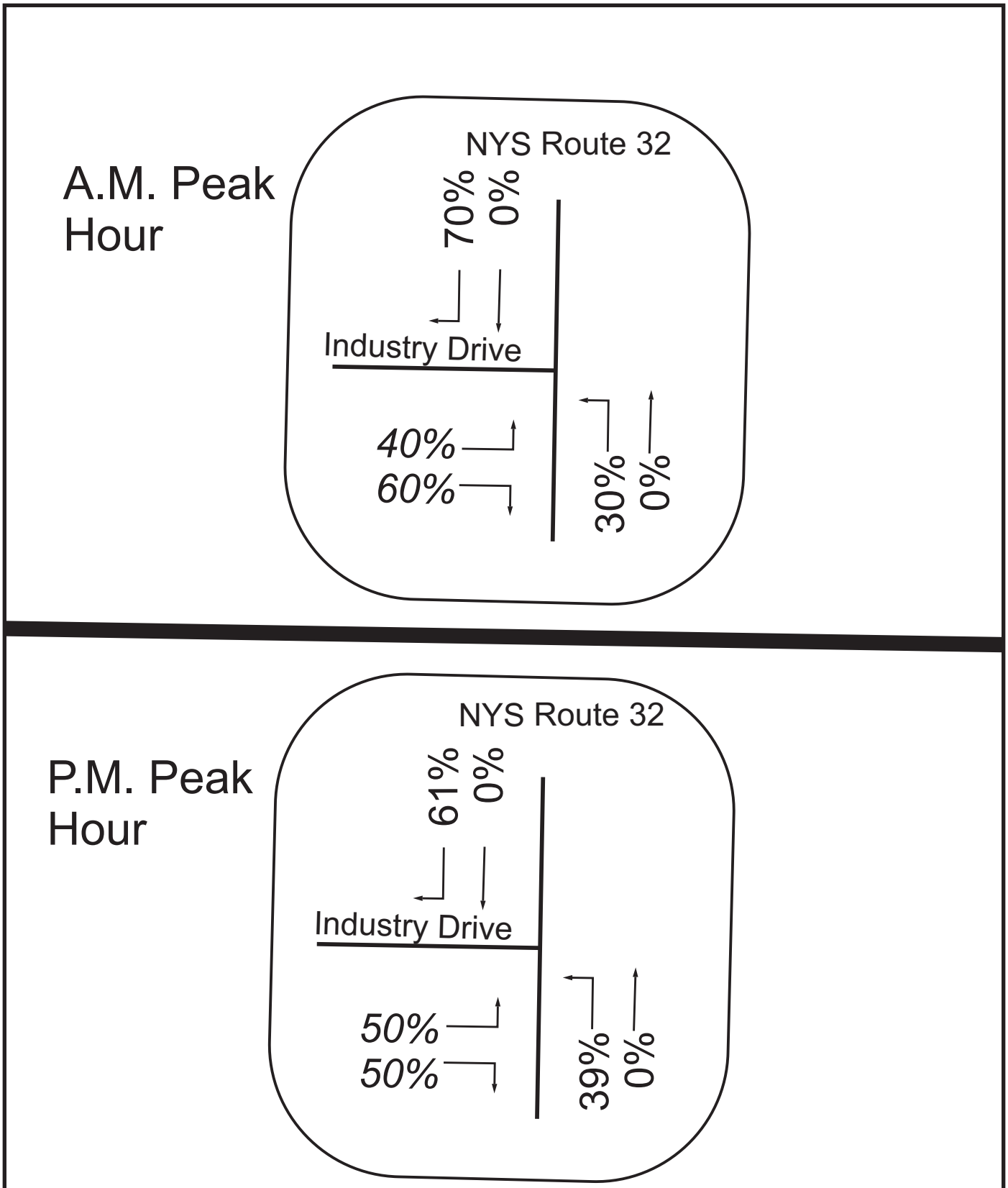


Figure 3: No Build Peak Hour Traffic
Star Warehouse Expansion
Town of Cornwall, Orange County, New York

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418



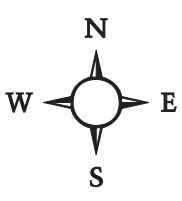


Figure 4: Distribution Site Peak Hour Traffic
Star Warehouse Expansion
Town of Cornwall, Orange County, New York

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

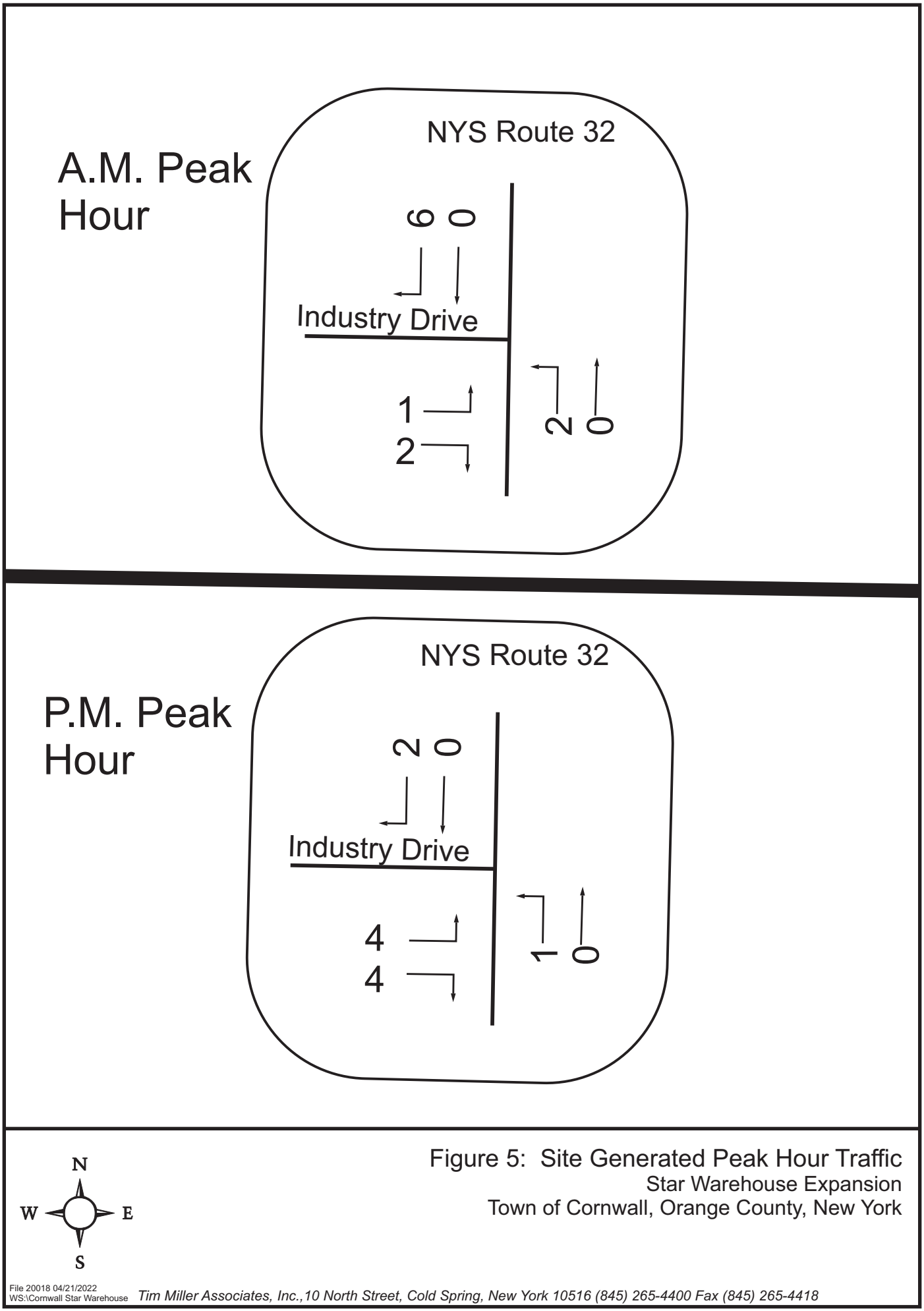


Figure 5: Site Generated Peak Hour Traffic
Star Warehouse Expansion
Town of Cornwall, Orange County, New York

File 20018 04/21/2022
WS:\Cornwall Star Warehouse
Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

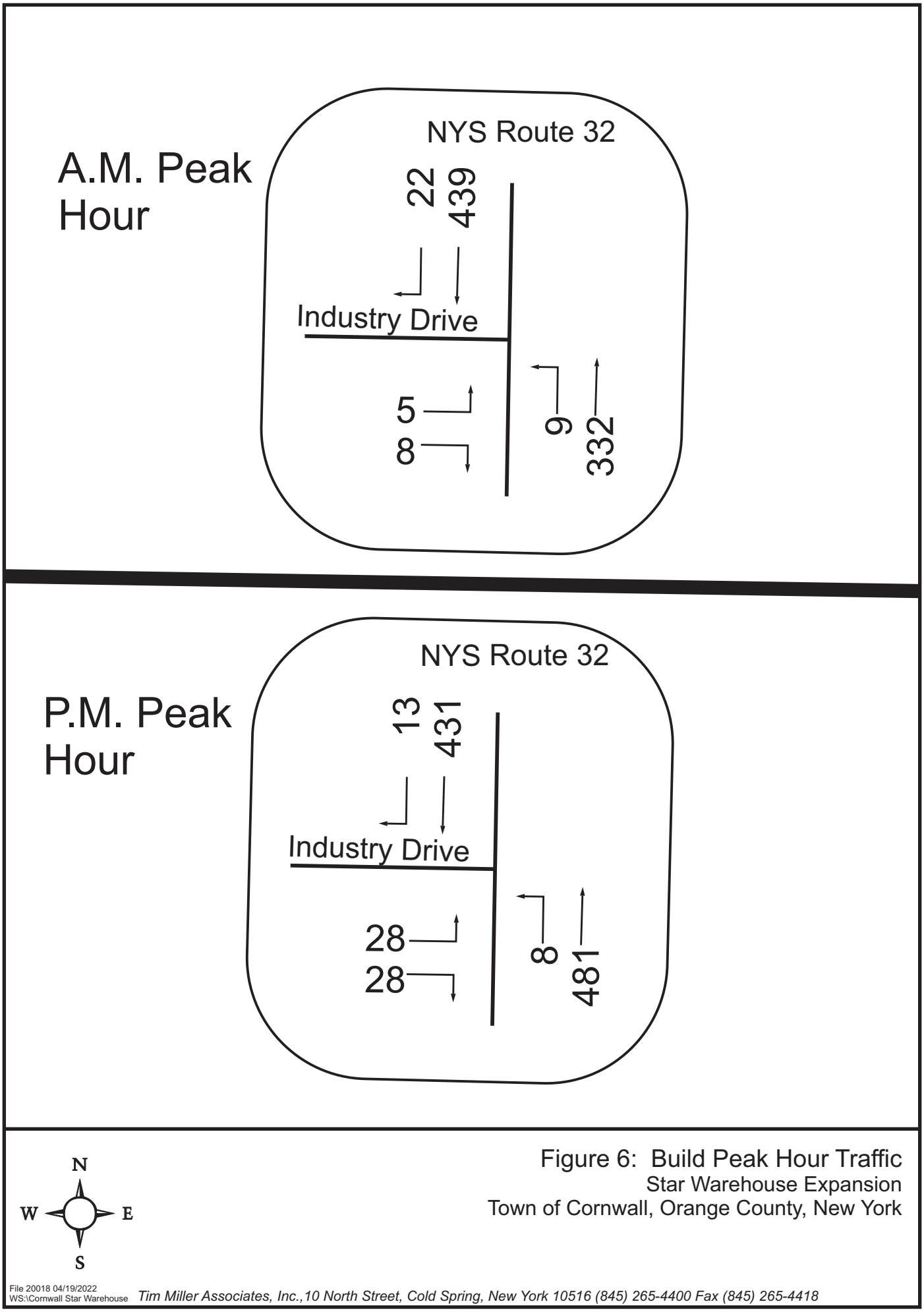


Figure 6: Build Peak Hour Traffic
Star Warehouse Expansion
Town of Cornwall, Orange County, New York

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

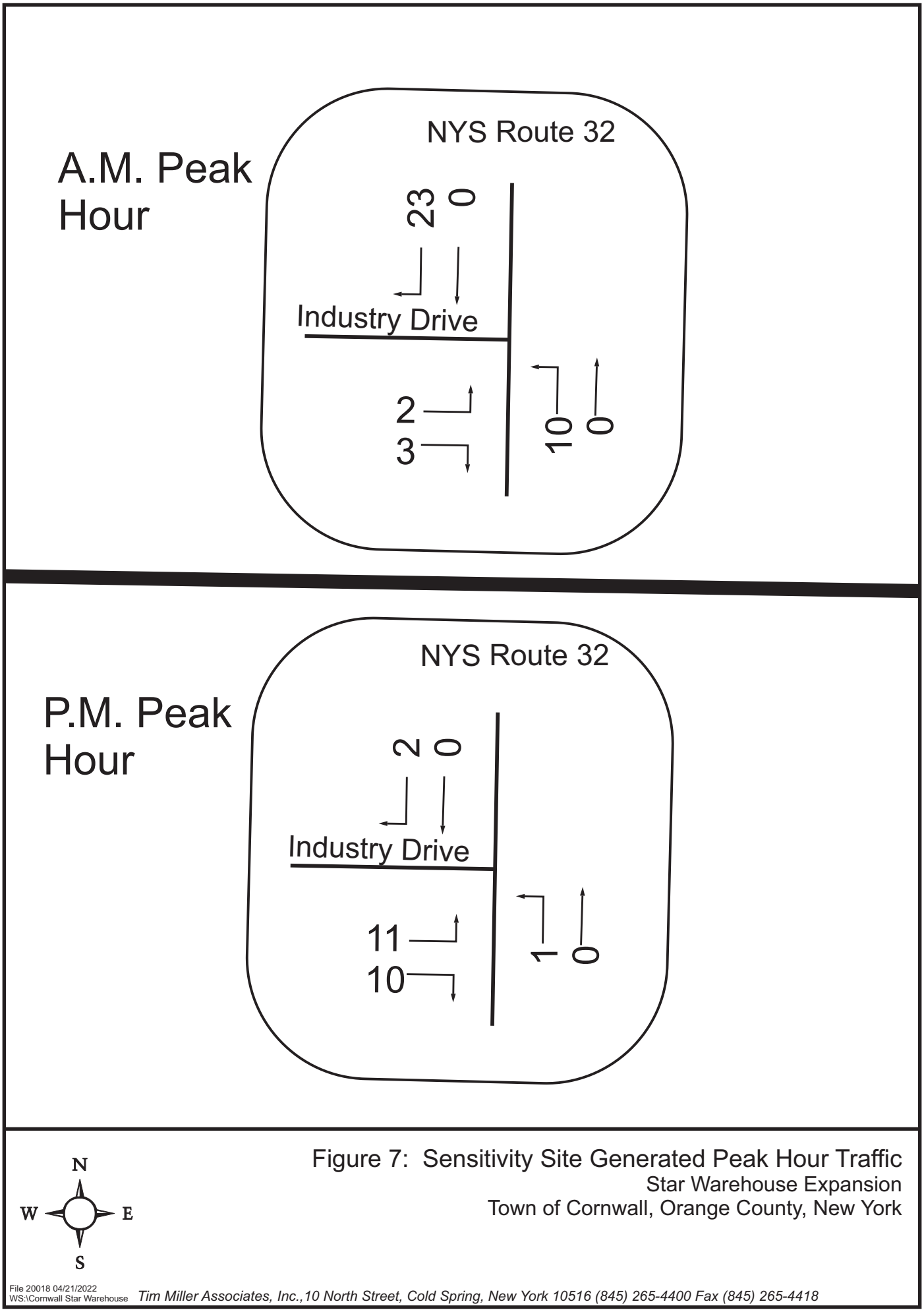


Figure 7: Sensitivity Site Generated Peak Hour Traffic
Star Warehouse Expansion
Town of Cornwall, Orange County, New York

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

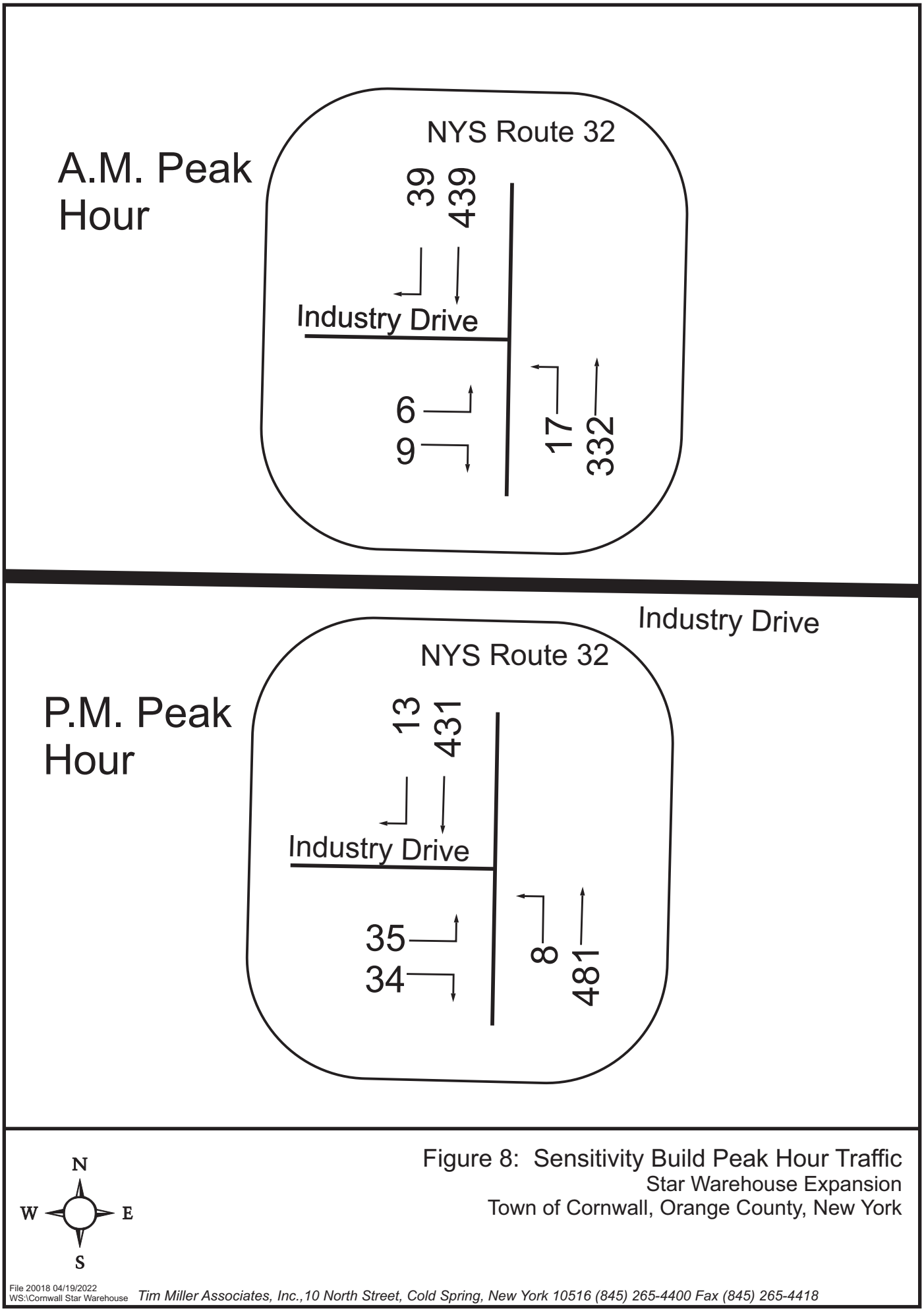


Figure 8: Sensitivity Build Peak Hour Traffic
Star Warehouse Expansion
Town of Cornwall, Orange County, New York

Tim Miller Associates, Inc.,10 North Street, Cold Spring, New York 10516 (845) 265-4400 Fax (845) 265-4418

Attachment B

Access Traffic Count Data

WEEKDAY PEAK 15 MINUTE COUNTS

PROJECT	Star Warehouse Expansion	TIM MILLER ASSOCIATES, INC.
LOCATION	Route 32 and Industry Drive	
DATE	Tuesday, April 5, 2022	
TIME	7:00 AM to 9:00 AM	

15 Minute Traffic

START TIME	END TIME	Route 32 Southbound thru 1	right 2	Total	Industry Drive eastbound left 3	right 4	Total	Route 32 Northbound left 5	thru 6	Total		Total	GRAND TOTAL
07:00 AM	07:15 AM	58	4	62	0	0	0	2	57	59			**121**
07:15 AM	07:30 AM	85	0	85	0	0	0	8	59	67			**152**
07:30 AM	**07:45 AM**	**120**	**2**	**122**	**1**	**2**	**3**	**3**	**74**	**77**			**202**
07:45 AM	**08:00 AM**	**123**	**5**	**128**	**0**	**2**	**2**	**1**	**63**	**64**			**194**
08:00 AM	**08:15 AM**	**83**	**4**	**87**	**1**	**0**	**1**	**1**	**66**	**67**			**155**
08:15 AM	**08:30 AM**	**91**	**5**	**96**	**2**	**2**	**4**	**2**	**73**	**75**			**175**
08:30 AM	08:45 AM	92	3	95	0	5	5	3	68	71			**171**
08:45 AM	09:00 AM	70	3	73	1	3	4	1	85	86			**163**
TOTAL		722	26	748	5	14	19	21	545	566			1333

WEEKDAY PEAK HOURLY APPROACH VOLUMES

PROJECT	Star Warehouse Expansion	TIM MILLER ASSOCIATES, INC.
LOCATION	Route 32 and Industry Drive	
DATE	Tuesday, April 5, 2022	
TIME	7:00 AM to 9:00 AM	

HOURLY SUMMARY

START TIME	END TIME	Route 32 Southbound thru 1	right 2	Total	Industry Drive eastbound left 3	right 4	Total	Route 32 Northbound left 5	thru 6	Total		Total	GRAND TOTAL
07:00 AM	08:00 AM	386	11	397	1	4	5	14	253	267			**669**
07:15 AM	08:15 AM	411	11	422	2	4	6	13	262	275			**703**
07:30 AM	**08:30 AM**	**417**	**16**	**433**	**4**	**6**	**10**	**7**	**276**	**283**			**726**
07:45 AM	08:45 AM	389	17	406	3	9	12	7	270	277			**695**
08:00 AM	09:00 AM	336	15	351	4	10	14	7	292	299			**664**
07:30 AM	**08:30 AM**	**417**	**16**	**433**	**4**	**6**	**10**	**7**	**276**	**283**			**726**
Peak 15 Minutes													**202**
Peak Hour Factor													**0.90**
Peak Hr. Trucks		**30**	**0**		**0**	**4**		**2**	**28**				
Percent Trucks		7%	0%		0%	67%		29%	10%				

WEEKDAY PEAK 15 MINUTE COUNTS

PROJECT	Star Warehouse Expansion	TIM MILLER ASSOCIATES, INC.
LOCATION	Route 32 and Industry Drive	
DATE	Tuesday, April 5, 2022	
TIME	4:30 PM to 6:30 PM	

15 Minute Traffic

START TIME	END TIME	Route 32 Southbound thru 1	right 2	Total	Industry Drive eastbound left 3	right 4	Total	Route 32 Northbound left 5	thru 6	Total		Total	GRAND TOTAL
04:30 PM	04:45 PM	97	1	98	0	0	0	0	95	95			**193**
04:45 PM	05:00 PM	74	2	76	3	3	6	1	92	93			**175**
05:00 PM	05:15 PM	84	5	89	7	7	14	3	90	93			**196**
05:15 PM	05:30 PM	102	1	103	2	2	4	3	154	157			**264**
05:30 PM	05:45 PM	101	1	102	4	4	8	1	107	108			**218**
05:45 PM	06:00 PM	83	8	91	0	0	0	0	112	112			**203**
06:00 PM	06:15 PM	84	1	85	18	18	36	3	81	84			**205**
06:15 PM	06:30 PM	66	3	69	3	3	6	0	67	67			**142**
TOTAL		691	22	713	37	37	74	11	798	809			1596

WEEKDAY PEAK HOURLY APPROACH VOLUMES

PROJECT	Star Warehouse Expansion	TIM MILLER ASSOCIATES, INC.
LOCATION	Route 32 and Industry Drive	
DATE	Tuesday, April 5, 2022	
TIME	4:30 PM to 6:30 PM	

HOURLY SUMMARY

START TIME	END TIME	Route 32 Southbound thru 1	Route 32 Southbound right 2	Route 32 Southbound Total	Industry Drive eastbound left 3	Industry Drive eastbound right 4	Industry Drive eastbound Total	Route 32 Northbound left 5	Route 32 Northbound thru 6	Route 32 Northbound Total		Total	GRAND TOTAL
04:30 PM	05:30 PM	357	9	366	12	12	24	7	431	438			**828**
04:45 PM	05:45 PM	361	9	370	16	16	32	8	443	451			**853**
05:00 PM	06:00 PM	370	15	385	13	13	26	7	463	470			**881**
05:15 PM	**06:15 PM**	**370**	**11**	**381**	**24**	**24**	**48**	**7**	**454**	**461**			**890**
05:30 PM	06:30 PM	334	13	347	25	25	50	4	367	371			**768**
05:15 PM	**06:15 PM**	**370**	**11**	**381**	**24**	**24**	**48**	**7**	**454**	**461**			**890**
Peak 15 Minutes													**264**
Peak Hour Factor													**0.84**
Peak Hr. Trucks		**10**	**0**		**1**	**2**		**2**	**7**				
Percent Trucks		3%	0%		4%	8%		29%	2%				

Attachment C

Pandemic Traffic Adjustment

Appendix C Existing Condition Volume Adjustment

Covid-19 Pandemic Volume Adjustment

General Effects

The arrival of the Covid-19 pandemic resulted in major changes to travel patterns especially commuter patterns as more people started working from home or were no longer working.

Long-term trends related to the pandemic, and its effects on remote working and resulting traffic conditions, are being studied by planning and transportation professionals nationwide. Upwork, a large human resource marketplace completed a survey of over 1000 hiring managers in December of 2020[1]. At that time 41.8 percent of the workforce was still working remotely. The survey findings indicate that by 2025 remote workers will be approximately 22 percent of the workforce (36.2 million), as compared to 12 percent of the workforce (19.4 million) prior to the pandemic. This is an 87 percent increase from pre-pandemic to post-pandemic conditions. These estimates will vary by region, locality and type of work but the trend is towards increased remote work opportunities. With such large shifts in work and commuting habits, it is likely that less commuter trips will occur during peak traffic periods in the near future.

Although working remotely or telecommuting can be done for certain jobs there are many jobs that require traveling to a workplace. Just as telecommuting increased during the pandemic, so has shopping online, and watching entertainment and events online. Some business sectors suffered the work trips less than others. Warehousing is every hands on work with few exceptions.

Traffic Pandemic Adjustment

The New York State Department of Transportation (NYSDOT) has recognized the changes in traffic patterns throughout New York. The NYSDOT provided guidance for traffic professionals in a memo dated August 11, 2020, “Traffic Data Collection Guidance During Covid-19 Pandemic”. This procedure takes into account the changing traffic patterns occurring with the pandemic and pandemic related restrictions.

In summary, the guidance recommends using pre-pandemic traffic data, where available, and adjusting that data with reasonable growth rates.

Table C-1 compares average weekday peak hour traffic counts collected by the NYSDOT on Route 32 from March 2016 to counts collected for this project in January 2022. The counts were collected at the same location, approximately 0.3 miles south of Industry Drive (Attachment D). The average weekday peak hour is based upon data collected between Monday 6 a.m. to Friday noon.

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1 https://www.businesswire.com/news/home/20201215005287/en/Upwork-Study-Finds-22-of-American-Workforce-Will-Be-Remote-by-2025

Appendix C Existing Condition Volume Adjustment

As shown in Table C-1, the average January 2022 weekday peak hour traffic has increased during the a.m. peak hour, as compared to 2016 volumes. In the p.m. peak hour, the volumes are approximately 7.8 percent lower than in 2016. The reasons for the observed increase in traffic in the a.m. peak hour period is unclear.

Table C-1
Route 32 Cornwall Traffic

Time	Traffic		
	March 2016	January 2022	Adjustment Factor
AM Peak Hour	537	639	0.84
PM Peak Hour	853	791	1.08

Peak hours used based on the peak hour of the count average volumes.

Commuter traffic on Route 32 between the Village of Cornwall and the Woodbury interchange of Interstate 87, Route 17/Interstate 81, Route 32 is affected by the traffic at the interchange and by the Woodbury Premium Outlet Center. The traffic network capacity in that area was greatly improved by the 2019 completion of the 150 million dollar capacity improvements at the interchange of Interstate 87, Route 17/Interstate 81 and Route 32. This increase in capacity may have resulted in changes to morning commuter's routes or selected travel times to NYS Route 32.

Since traffic is returning to more normal conditions the Town's traffic consulted requested further counts. These counts in April 2022 were compared to the January 2022 on Route 32 directly south of Industry Drive based on the peak hour turning movements at the site. Table C-2 shows the April 2022 traffic increases have more than closed the gap of pandemic traffic reduction in the p.m. peak hour between March 2016 and January 2022 in Table C-1.

Table C-2
Route 32 Cornwall Traffic 2022

Time	Traffic		
	January 2022	April 2022	Increase Factor
7:30 to 8:30 a.m.	623	706	1.13
5:15 to 6:15 p.m.	785	855	1.09

Peak hours used based on the peak hour of the count average volumes.

Results

Based upon the traffic data comparisons, no adjustments are recommended for April 2022 counts.

Attachment D

Adjustment Count Traffic Data

New York State Department of Transportation

Traffic Count Hourly Report

ROUTE #: **NY 32** ROAD NAME:
DIRECTION: Northbound FACTOR GROUP: 30
STATE DIR CODE: 6 WK OF YR: 13
DATE OF COUNT: 03/22/2016
NOTES LANE 1: NB travel lane

FROM: **CR 105 HIGHLAND RD**
REC. SERIAL #: CJ89
PLACEMENT: 0.3 mi S of Industry Dr
@ REF MARKER:
ADDL DATA: Class Speed
COUNT TYPE: AXLE PAIRS

TO: **CR 107 ORRS MILL NEWBURGH UR**
FUNC. CLASS: 16
NHS: no
JURIS: City
CC Stn:
BATCH ID: DOT-R08C13bTST5195

COUNTY: **Orange**
TOWN:
LION#:
BIN: 1022210
RR CROSSING:
HPMS SAMPLE: 1010383

COUNT TAKEN BY: ORG CODE: TST INITIALS: JF
PROCESSED BY: ORG CODE: DOT INITIALS: JS

DATE	DAY	12 TO 1 AM	1 TO 2 AM	2 TO 3 AM	3 TO 4 AM	4 TO 5 AM	5 TO 6 AM	6 TO 7 AM	7 TO 8 AM	8 TO 9 AM	9 TO 10 AM	10 TO 11 AM	11 TO 12 AM	12 TO 1 PM	1 TO 2 PM	2 TO 3 PM	3 TO 4 PM	4 TO 5 PM	5 TO 6 PM	6 TO 7 PM	7 TO 8 PM	8 TO 9 PM	9 TO 10 PM	10 TO 11 PM	11 TO 12 PM	DAILY TOTAL	DAILY HIGH COUNT	DAILY HIGH HOUR
1	T																											
2	W																											
3	T																											
4	F																											
5	S																											
6	S																											
7	M																											
8	T																											
9	W																											
10	T																											
11	F																											
12	S																											
13	S																											
14	M																											
15	T																											
16	W																											
17	T																											
18	F																											
19	S																											
20	S																											
21	M																											
22	T													**253**	**243**	**284**	**380**	**440**	**493**	**406**	**281**	**244**	**271**	**137**	**103**			
23	W	**44**	**38**	**19**	**10**	**21**	**49**	**102**	**202**	**285**	**258**	**248**	**241**	**255**	**256**	**297**	**376**	**416**	**471**	**418**	**273**	**225**	**214**	**151**	**78**	4947	471	17
24	T	**62**	**47**	**28**	**18**	**17**	**43**	**105**	**187**	**229**	**222**	**200**	**225**	**267**	**289**	**288**	**340**	**425**	**468**	**387**	**279**	**256**	**259**	**162**	**122**	4925	468	17
25	F	**67**	**51**	**26**	**18**	**16**	**45**	**90**	**160**	**232**																		
26	S																											
27	S																											
28	M																											
29	T																											
30	W																											
31	T																											

AVERAGE WEEKDAY HOURS (Axle Factored, Mon 6AM to Fri Noon)

																									ADT
58	**45**	**24**	**15**	**18**	**46**	**99**	**183**	**249**	**240**	**224**	**233**	**258**	**263**	**290**	**365**	**427**	**477**	**404**	**278**	**242**	**248**	**150**	**101**	**4937**

DAYS Counted	HOURS Counted	WEEKDAYS Counted	WEEKDAY Hours	AVERAGE WEEKDAY High Hour	AVERAGE WEEKDAY % of day	Axle Adj. Factor	Seasonal/Weekday Adjustment Factor
4	69	4	69	477	10%	1.000	1.006

ESTIMATED

AADT
4908

New York State Department of Transportation

Traffic Count Hourly Report

ROUTE #: **NY 32** ROAD NAME:
DIRECTION: Southbound FACTOR GROUP: 30
STATE DIR CODE: 7 WK OF YR: 13
DATE OF COUNT: 03/22/2016
NOTES LANE 1: Sb travel lane

COUNT TAKEN BY: ORG CODE: TST INITIALS: JF

FROM: **CR 105 HIGHLAND RD**
REC. SERIAL #: CJ89
PLACEMENT: 0.3 mi S of Industry Dr
@ REF MARKER:
ADDL DATA: Class Speed
COUNT TYPE: AXLE PAIRS

PROCESSED BY: ORG CODE: DOT INITIALS: JS

TO: **CR 107 ORRS MILL NEWBURGH UR**
FUNC. CLASS: 16
NHS: no
JURIS: City
CC Stn:
BATCH ID: DOT-R08C13bTST5195

COUNTY: **Orange**
TOWN:
LION#:
BIN: 1022210
RR CROSSING:
HPMS SAMPLE: 1010383

DATE	DAY	12 TO 1 AM	1 TO 2 AM	2 TO 3 AM	3 TO 4 AM	4 TO 5 AM	5 TO 6 AM	6 TO 7 AM	7 TO 8 AM	8 TO 9 AM	9 TO 10 AM	10 TO 11 AM	11 TO 12 AM	12 TO 1 PM	1 TO 2 PM	2 TO 3 PM	3 TO 4 PM	4 TO 5 PM	5 TO 6 PM	6 TO 7 PM	7 TO 8 PM	8 TO 9 PM	9 TO 10 PM	10 TO 11 PM	11 TO 12 PM	DAILY TOTAL	DAILY HIGH COUNT	DAILY HIGH HOUR
1	T																											
2	W																											
3	T																											
4	F																											
5	S																											
6	S																											
7	M																											
8	T																											
9	W																											
10	T																											
11	F																											
12	S																											
13	S																											
14	M																											
15	T																											
16	W																											
17	T																											
18	F																											
19	S																											
20	S																											
21	M																											
22	T													**290**	**256**	**293**	**274**	**351**	**385**	**267**	**207**	**167**	**132**	**98**	**61**			
23	W	**30**	**20**	**12**	**37**	**77**	**158**	**225**	**317**	**281**	**296**	**273**	**269**	**306**	**282**	**256**	**292**	**349**	**372**	**275**	**189**	**146**	**126**	**80**	**53**	4721	372	17
24	T	**30**	**15**	**10**	**25**	**81**	**124**	**205**	**284**	**263**	**243**	**276**	**277**	**293**	**295**	**265**	**298**	**302**	**371**	**231**	**205**	**141**	**123**	**98**	**37**	4492	371	17
25	F	**47**	**13**	**6**	**30**	**71**	**137**	**185**	**264**	**273**																		
26	S																											
27	S																											
28	M																											
29	T																											
30	W																											
31	T																											

AVERAGE WEEKDAY HOURS (Axle Factored, Mon 6AM to Fri Noon)

																									ADT
36	**16**	**9**	**31**	**76**	**140**	**205**	**288**	**272**	**270**	**274**	**273**	**296**	**278**	**271**	**288**	**334**	**376**	**258**	**200**	**151**	**127**	**92**	**50**	**4611**

DAYS Counted	HOURS Counted	WEEKDAYS Counted	WEEKDAY Hours	AVERAGE WEEKDAY High Hour	AVERAGE WEEKDAY % of day	Axle Adj. Factor	Seasonal/Weekday Adjustment Factor
4	69	4	69	376	8%	1.000	1.006

ESTIMATED

AADT
4583

REFERENCE: 1202201
SITE ID: 201450
LOCATION: Rt 32 s/o Industry Dr

Rt 32 s/o Industry Dr
Northbound

Start Time	SUNDAY 01/23/22	MONDAY 01/24/22	TUESDAY 01/25/22	WEDNESDAY 01/26/22	THURSDAY 01/27/22	FRIDAY 1/28/2022	Hour Starting	Average Weekday Traffic**
12:00 AM	*	8	9	6	9	13		
12:15 AM	*	7	11	8	13	9		
12:30 AM	*	2	14	18	6	12		
12:45 AM	*	17	9	12	11	16	12:00 AM	44
1:00 AM	*	6	3	5	3	8		40
1:15 AM	*	10	12	10	12	12		41
1:30 AM	*	3	8	1	5	7		34
1:45 AM	*	2	7	5	6	5	1:00 AM	27
2:00 AM	*	2	5	9	4	6		29
2:15 AM	*	3	6	6	3	5		22
2:30 AM	*	4	4	2	1	7		20
2:45 AM	*	1	0	3	6	5	2:00 AM	18
3:00 AM	*	5	4	2	4	3		15
3:15 AM	*	5	12	6	6	7		18
3:30 AM	*	5	5	7	9	8		22
3:45 AM	*	6	4	1	3	2	3:00 AM	21
4:00 AM	*	2	7	4	1	8		23
4:15 AM	*	8	10	9	12	6		24
4:30 AM	*	14	14	10	7	7		26
4:45 AM	*	11	11	14	15	7	4:00 AM	36
5:00 AM	*	16	8	8	19	8		41
5:15 AM	*	32	42	33	34	37		69
5:30 AM	*	19	15	23	17	14		76
5:45 AM	*	24	22	16	20	23	5:00 AM	85
6:00 AM	*	23	20	20	14	24		94
6:15 AM	*	38	35	33	39	22		89
6:30 AM	*	52	54	63	56	49		128
6:45 AM	*	50	59	51	48	53	6:00 AM	161
7:00 AM	*	56	56	68	49	63		199
7:15 AM	*	61	63	50	73	52		225
7:30 AM	*	71	77	76	68	63		241
7:45 AM	*	55	66	59	66	60	7:00 AM	250
8:00 AM	*	6	58	57	57	68		253
8:15 AM	*	2	74	75	62	64		263
8:30 AM	*	31	93	77	89	93		280
8:45 AM	*	54	86	73	94	84	8:00 AM	**301**
9:00 AM	*	101	57	93	100	64		320
9:15 AM	*	91	69	72	59	80		321
9:30 AM	*	58	77	83	63	66		305
9:45 AM	*	57	55	54	74	63	9:00 AM	282

REFERENCE: 1202201
SITE ID: 201450
LOCATION: Rt 32 s/o Industry Dr

Rt 32 s/o Industry Dr
Northbound

Start Time	SUNDAY 01/23/22	MONDAY 01/24/22	TUESDAY 01/25/22	WEDNESDAY 01/26/22	THURSDAY 01/27/22	FRIDAY 1/28/2022	Hour Starting	Average Weekday Traffic**
10:00 AM	*	60	69	57	52	57		263
10:15 AM	*	52	63	77	48	70		257
10:30 AM	*	60	65	63	64	60		248
10:45 AM	*	48	69	45	69	58	10:00 AM	241
11:00 AM	*	63	79	67	70	61		250
11:15 AM	*	58	59	74	49	57		248
11:30 AM	*	58	62	70	68	66		250
11:45 AM	*	58	63	78	84	87	11:00 AM	266
12:00 PM	*	69	65	68	57	63		260
12:15 PM	*	50	54	60	54	70		255
12:30 PM	*	83	64	66	75	69		262
12:45 PM	*	78	68	47	73	57	12:00 PM	258
1:00 PM	*	62	69	61	70	69		259
1:15 PM	24	82	74	74	74	*		280
1:30 PM	66	65	77	68	71	*		278
1:45 PM	79	74	82	65	71	*	1:00 PM	285
2:00 PM	63	83	75	68	74	*		294
2:15 PM	82	73	78	79	84	*		297
2:30 PM	72	105	84	73	68	*		309
2:45 PM	68	67	75	78	71	*	2:00 PM	309
3:00 PM	71	76	97	99	88	*		324
3:15 PM	89	99	101	98	117	*		349
3:30 PM	66	72	104	86	81	*		352
3:45 PM	52	88	78	85	88	*	3:00 PM	364
4:00 PM	65	85	80	97	93	*		363
4:15 PM	80	90	98	88	98	*		353
4:30 PM	60	92	92	95	106	*		363
4:45 PM	59	104	90	94	85	*	4:00 PM	372
5:00 PM	72	116	85	108	106	*		387
5:15 PM	89	122	139	131	132	*		424
5:30 PM	64	100	106	99	98	*		429
5:45 PM	53	87	87	103	119	*	5:00 PM	**435**
6:00 PM	60	100	98	108	89	*		430
6:15 PM	82	109	110	107	89	*		402
6:30 PM	66	78	95	84	102	*		391
6:45 PM	57	60	70	67	75	*	6:00 PM	360
7:00 PM	40	59	69	71	69	*		329
7:15 PM	71	88	92	109	109	*		324
7:30 PM	64	56	58	87	61	*		300
7:45 PM	48	52	66	66	45	*	7:00 PM	289

REFERENCE: 1202201
SITE ID: 201450
LOCATION: Rt 32 s/o Industry Dr

Rt 32 s/o Industry Dr
Northbound

Start Time	SUNDAY 01/23/22	MONDAY 01/24/22	TUESDAY 01/25/22	WEDNESDAY 01/26/22	THURSDAY 01/27/22	FRIDAY 1/28/2022	Hour Starting	Average Weekday Traffic**
8:00 PM	38	59	46	44	51	*		272
8:15 PM	73	61	74	56	64	*		237
8:30 PM	46	51	52	63	70	*		230
8:45 PM	45	41	48	53	50	*	8:00 PM	221
9:00 PM	37	28	32	47	35	*		206
9:15 PM	31	29	26	32	34	*		173
9:30 PM	26	32	30	42	32	*		148
9:45 PM	15	30	29	26	18	*	9:00 PM	126
10:00 PM	25	19	16	27	32	*		114
10:15 PM	24	25	18	24	20	*		105
10:30 PM	21	20	21	24	15	*		91
10:45 PM	17	12	14	14	14	*	10:00 PM	79
11:00 PM	15	29	28	22	23	*		81
11:15 PM	25	9	11	15	15	*		72
11:30 PM	18	11	10	9	13	*		62
11:45 PM	9	9	10	9	12	*	11:00 PM	59
		4564	4915	4949	4931			19419

* no data
** Monday 6 a.m. to Friday noon (NYSDOT)
Monday 8 a.m. to 10 a.m. excluded due to traffic issue
Sources: ATI 2022

REFERENCE: 1202201
SITE ID: 201450
LOCATION: Rt 32 s/o Industry Dr
COMMENTS:

Rt 32 s/o Industry Dr
Southbound

Start Time	SUNDAY 01/23/22	MONDAY 01/24/22	TUESDAY 01/25/22	WEDNESDAY 01/26/22	THURSDAY 01/27/22	FRIDAY 1/28/2022	Hour Starting	Average Weekday Traffic**
12:00 AM	*	3	10	4	3	4		
12:15 AM	*	5	3	6	5	4		
12:30 AM	*	3	2	8	3	6		
12:45 AM	*	5	8	1	4	5	12:00 AM	19
1:00 AM	*	8	6	4	1	4		18
1:15 AM	*	0	3	3	1	10		17
1:30 AM	*	2	0	1	1	6		15
1:45 AM	*	2	5	7	4	3	1:00 AM	15
2:00 AM	*	5	2	4	4	5		15
2:15 AM	*	6	1	2	5	7		14
2:30 AM	*	4	3	2	2	3		15
2:45 AM	*	5	5	16	9	5	2:00 AM	19
3:00 AM	*	7	10	2	5	9		22
3:15 AM	*	6	9	7	5	3		24
3:30 AM	*	3	4	3	6	10		27
3:45 AM	*	8	11	7	5	8	3:00 AM	26
4:00 AM	*	11	11	12	12	8		30
4:15 AM	*	25	25	20	23	27		48
4:30 AM	*	36	35	33	39	35		78
4:45 AM	*	21	29	20	24	19	4:00 AM	93
5:00 AM	*	23	26	21	23	26		106
5:15 AM	*	37	44	28	30	29		115
5:30 AM	*	40	36	36	37	32		115
5:45 AM	*	46	44	36	50	45	5:00 AM	136
6:00 AM	*	47	42	30	36	38		148
6:15 AM	*	57	71	66	55	57		178
6:30 AM	*	79	88	93	78	77		227
6:45 AM	*	82	80	78	70	68	6:00 AM	258
7:00 AM	*	66	82	73	65	47		286
7:15 AM	*	65	73	86	87	72		302
7:30 AM	*	100	98	99	107	85		317
7:45 AM	*	106	83	117	101	100	7:00 AM	**342**
8:00 AM	*	78	85	86	80	81		358
8:15 AM	*	83	103	83	89	82		**369**
8:30 AM	*	87	89	92	73	100		360
8:45 AM	*	72	76	95	83	71	8:00 AM	338
9:00 AM	*	63	66	66	54	80		321
9:15 AM	*	63	59	65	78	65		299
9:30 AM	*	77	63	63	78	72		282
9:45 AM	*	61	67	71	79	81	9:00 AM	274

REFERENCE: 1202201
SITE ID: 201450
LOCATION: Rt 32 s/o Industry Dr
COMMENTS:

Rt 32 s/o Industry Dr
Southbound

Start Time	SUNDAY 01/23/22	MONDAY 01/24/22	TUESDAY 01/25/22	WEDNESDAY 01/26/22	THURSDAY 01/27/22	FRIDAY 1/28/2022	Hour Starting	Average Weekday Traffic**
10:00 AM	*	63	59	61	65	51		268
10:15 AM	*	71	92	81	87	90		286
10:30 AM	*	86	94	81	76	73		298
10:45 AM	*	72	66	84	75	70	10:00 AM	299
11:00 AM	*	71	51	55	60	87		304
11:15 AM	*	67	64	72	55	81		288
11:30 AM	*	77	59	67	88	69		278
11:45 AM	*	64	80	64	75	70	11:00 AM	275
12:00 PM	*	61	57	95	59	85		276
12:15 PM	*	58	71	61	74	84		278
12:30 PM	*	55	53	63	75	80		266
12:45 PM	*	44	71	58	69	79	12:00 PM	256
1:00 PM	*	53	58	50	70	65		246
1:15 PM	45	65	80	67	59	*		248
1:30 PM	58	82	63	71	66	*		257
1:45 PM	81	82	66	67	67	*	1:00 PM	267
2:00 PM	61	68	73	75	80	*		283
2:15 PM	67	92	73	66	76	*		292
2:30 PM	85	76	87	77	84	*		302
2:45 PM	73	81	71	67	71	*	2:00 PM	304
3:00 PM	64	73	60	70	72	*		299
3:15 PM	62	69	81	87	67	*		298
3:30 PM	71	77	88	65	73	*		293
3:45 PM	58	73	70	77	77	*	3:00 PM	295
4:00 PM	49	72	70	76	80	*		301
4:15 PM	63	94	72	94	72	*		308
4:30 PM	74	71	106	80	84	*		317
4:45 PM	69	73	97	68	82	*	4:00 PM	323
5:00 PM	61	78	82	100	85	*		335
5:15 PM	60	98	80	83	110	*		344
5:30 PM	68	97	101	90	102	*		357
5:45 PM	49	80	66	90	80	*	5:00 PM	**356**
6:00 PM	51	58	68	86	72	*		340
6:15 PM	47	62	73	62	80	*		317
6:30 PM	46	56	60	55	68	*		279
6:45 PM	37	54	57	67	54	*	6:00 PM	258
7:00 PM	44	57	56	65	51	*		244
7:15 PM	43	48	51	41	47	*		222
7:30 PM	31	39	43	44	56	*		208
7:45 PM	34	47	33	40	50	*	7:00 PM	192

REFERENCE: 1202201
SITE ID: 201450
LOCATION: Rt 32 s/o Industry Dr
COMMENTS:

Rt 32 s/o Industry Dr
Southbound

Start Time	SUNDAY 01/23/22	MONDAY 01/24/22	TUESDAY 01/25/22	WEDNESDAY 01/26/22	THURSDAY 01/27/22	FRIDAY 1/28/2022	Hour Starting	Average Weekday Traffic**
8:00 PM	28	41	46	39	44	*		177
8:15 PM	24	34	30	52	48	*		172
8:30 PM	20	29	34	31	33	*		158
8:45 PM	28	20	33	27	27	*	8:00 PM	142
9:00 PM	11	22	25	21	28	*		124
9:15 PM	15	23	14	26	26	*		105
9:30 PM	11	18	25	26	21	*		96
9:45 PM	20	19	18	29	20	*	9:00 PM	90
10:00 PM	13	15	16	16	15	*		82
10:15 PM	12	18	19	19	20	*		79
10:30 PM	19	10	19	14	10	*		69
10:45 PM	10	17	7	14	19	*	10:00 PM	62
11:00 PM	13	7	5	10	11	*		55
11:15 PM	8	16	6	11	5	*		45
11:30 PM	11	7	7	8	6	*		39
11:45 PM	9	5	10	17	11	*	11:00 PM	36
		4562	4673	4728	4751			

* no data
** Monday 6 a.m. to Friday noon (NYSDOT)
Sources: ATI 2022

WEEKDAY PEAK 15 MINUTE COUNTS

PROJECT	Star Warehouse Expansion
LOCATION	Route 32 and Industrial drive
DATE	Wednesday, January 26, 2022
TIME	6:00 AM to 10:00 AM

TIM MILLER ASSOCIATES, INC.

15 Minute Traffic

START TIME	END TIME	Route 32 Southbound thru 1	right 2	Total	Industrial Drive eastbound left 3	right 4	Total	Route 32 Northbound left 5	thru 6	Total		Total	GRAND TOTAL
06:00 AM	06:15 AM	34	6	40	6	0	6	1	16	17			**63**
06:15 AM	06:30 AM	57	11	68	3	2	5	0	31	31			**104**
06:30 AM	06:45 AM	88	3	91	0	1	1	1	54	55			**147**
06:45 AM	07:00 AM	69	10	79	2	1	3	1	54	55			**137**
07:00 AM	07:15 AM	66	5	71	0	1	1	1	58	59			**131**
07:15 AM	07:30 AM	80	1	81	0	0	0	2	46	48			**129**
07:30 AM	**07:45 AM**	**93**	**2**	**95**	**0**	**1**	**1**	**1**	**71**	**72**			**168**
07:45 AM	**08:00 AM**	**112**	**6**	**118**	**0**	**1**	**1**	**0**	**56**	**56**			**175**
08:00 AM	**08:15 AM**	**78**	**1**	**79**	**1**	**2**	**3**	**1**	**55**	**56**			**138**
08:15 AM	**08:30 AM**	**82**	**10**	**92**	**1**	**2**	**3**	**4**	**64**	**68**			**163**
08:30 AM	08:45 AM	75	3	78	2	2	4	5	67	72			**154**
08:45 AM	09:00 AM	84	6	90	1	3	4	4	66	70			**164**
09:00 AM	09:15 AM	63	0	63	2	4	6	6	82	88			**157**
09:15 AM	09:30 AM	55	2	57	1	2	3	4	64	68			**128**
09:30 AM	09:45 AM	60	1	61	2	0	2	4	74	78			**141**
09:45 AM	10:00 AM	66	2	68	1	2	3	3	51	54			**125**
TOTAL		1162	69	1231	22	24	46	38	909	947			2224

WEEKDAY PEAK HOURLY APPROACH VOLUMES

PROJECT	Star Warehouse Expansion	TIM MILLER ASSOCIATES, INC.
LOCATION	Route 32 and Industrial drive	
DATE	Wednesday, January 26, 2022	
TIME	6:00 AM to 10:00 AM	

HOURLY SUMMARY

START TIME	END TIME	Route 32 Southbound thru 1	right 2	Total	Industrial Drive eastbound left 3	right 4	Total	Route 32 Northbound left 5	thru 6	Total		Total	GRAND TOTAL
06:00 AM	07:00 AM	248	30	278	11	4	15	3	155	158			**451**
06:15 AM	07:15 AM	280	29	309	5	5	10	3	197	200			**519**
06:30 AM	07:30 AM	303	19	322	2	3	5	5	212	217			**544**
06:45 AM	07:45 AM	308	18	326	2	3	5	5	229	234			**565**
07:00 AM	08:00 AM	351	14	365	0	3	3	4	231	235			**603**
07:15 AM	08:15 AM	363	10	373	1	4	5	4	228	232			**610**
07:30 AM	**08:30 AM**	**365**	**19**	**384**	**2**	**6**	**8**	**6**	**246**	**252**			**644**
07:45 AM	08:45 AM	347	20	367	4	7	11	10	242	252			**630**
08:00 AM	09:00 AM	319	20	339	5	9	14	14	252	266			**619**
08:15 AM	09:15 AM	304	19	323	6	11	17	19	279	298			**638**
08:30 AM	09:30 AM	277	11	288	6	11	17	19	279	298			**603**
08:45 AM	09:45 AM	262	9	271	6	9	15	18	286	304			**590**
09:00 AM	10:00 AM	244	5	249	6	8	14	17	271	288			**551**
07:30 AM	**08:30 AM**	**365**	**19**	**384**	**2**	**6**	**8**	**6**	**246**	**252**			**644**
Peak 15 Minutes													**175**
Peak Hour Factor													**0.92**
Peak Hr. Trucks		**35**	**1**		**0**	**4**		**1**	**27**				
Percent Trucks		10%	5%		0%	67%		17%	11%				

WEEKDAY PEAK 15 MINUTE COUNTS

PROJECT	Star Warehouse Expansion	TIM MILLER ASSOCIATES, INC.
LOCATION	Route 32 and Industrial drive	
DATE	Wednesday, January 26, 2022	
TIME	3:00 PM to 7:00 PM	

15 Minute Traffic

START TIME	END TIME	Route 32 Southbound thru 1	right 2	Total	Industrial Drive eastbound left 3	right 4	Total	Route 32 Northbound left 5	thru 6	Total				Total	GRAND TOTAL
03:00 PM	03:15 PM	67	1	68	0	1	1	2	90	92					**161**
03:15 PM	03:30 PM	80	1	81	1	5	6	5	86	91					**178**
03:30 PM	03:45 PM	59	0	59	1	1	2	3	83	86					**147**
03:45 PM	04:00 PM	79	1	80	2	2	4	1	76	77					**161**
04:00 PM	04:15 PM	72	2	74	2	1	3	0	96	96					**173**
04:15 PM	04:30 PM	88	1	89	2	2	4	1	84	85					**178**
04:30 PM	04:45 PM	82	0	82	1	0	1	2	92	94					**177**
04:45 PM	05:00 PM	69	0	69	4	0	4	3	91	94					**167**
05:00 PM	05:15 PM	88	3	91	5	6	11	5	106	111					**213**
05:15 PM	**05:30 PM**	**81**	**2**	**83**	**4**	**4**	**8**	**3**	**124**	**127**					**218**
05:30 PM	**05:45 PM**	**89**	**3**	**92**	**3**	**4**	**7**	**1**	**97**	**98**					**197**
05:45 PM	**06:00 PM**	**87**	**8**	**95**	**6**	**3**	**9**	**4**	**98**	**102**					**206**
06:00 PM	**06:15 PM**	**72**	**3**	**75**	**23**	**10**	**33**	**1**	**107**	**108**					**216**
06:15 PM	06:30 PM	58	1	59	12	5	17	0	104	104					**180**
06:30 PM	06:45 PM	49	0	49	6	4	10	1	81	82					**141**
06:45 PM	07:00 PM	60	0	60	2	5	7	1	64	65					**132**
TOTAL		1180	26	1206	74	53	127	33	1479	1512					2845

WEEKDAY PEAK HOURLY APPROACH VOLUMES

PROJECT	Star Warehouse Expansion	TIM MILLER ASSOCIATES, INC.
LOCATION	Route 32 and Industrial drive	
DATE	Wednesday, January 26, 2022	
TIME	3:00 PM to 7:00 PM	

HOURLY SUMMARY

START TIME	END TIME	Route 32 Southbound thru 1	right 2	Total	Industrial Drive eastbound left 3	right 4	Total	Route 32 Northbound left 5	thru 6	Total		Total	GRAND TOTAL
03:00 PM	04:00 PM	285	3	288	4	9	13	11	335	346			**647**
03:15 PM	04:15 PM	290	4	294	6	9	15	9	341	350			**659**
03:30 PM	04:30 PM	298	4	302	7	6	13	5	339	344			**659**
03:45 PM	04:45 PM	321	4	325	7	5	12	4	348	352			**689**
04:00 PM	05:00 PM	311	3	314	9	3	12	6	363	369			**695**
04:15 PM	05:15 PM	327	4	331	12	8	20	11	373	384			**735**
04:30 PM	05:30 PM	320	5	325	14	10	24	13	413	426			**775**
04:45 PM	05:45 PM	327	8	335	16	14	30	12	418	430			**795**
05:00 PM	06:00 PM	345	16	361	18	17	35	13	425	438			**834**
05:15 PM	**06:15 PM**	**329**	**16**	**345**	**36**	**21**	**57**	**9**	**426**	**435**			**837**
05:30 PM	06:30 PM	306	15	321	44	22	66	6	406	412			**799**
05:45 PM	06:45 PM	266	12	278	47	22	69	6	390	396			**743**
06:00 PM	07:00 PM	239	4	243	43	24	67	3	356	359			**669**
05:15 PM	**06:15 PM**	**329**	**16**	**345**	**36**	**21**	**57**	**9**	**426**	**435**			**837**
Peak 15 Minutes													**218**
Peak Hour Factor													**0.96**
Peak Hr. Trucks		**8**	**0**		**1**	**0**		**5**	**17**				
Percent Trucks		2%	0%		3%	0%		56%	4%				

Attachment E

Collision Data

2016-2021 Collisions
Table 1

Case Num	37765244	36908483	36870311	37123334	36529366
Case Year	2018	2017	2017	2018	2016
County	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE
Comp Muni	Cornwall	Cornwall	Cornwall	Cornwall	Cornwall
Muni Type	3	3	3	3	3
Comp Ref Marker	32 83011069	32 83011069	32 83011069	32 83011070	32 83011070
At Intersection	N	N	N	Y	N
Comp X	576842.1707	576875.3367	576866.0828	576940.9900	576954.5870
Comp Y	4583220.4172	4583258.2627	4583247.7032	4583346.9500	4583374.2291
Accd Date	12/05/2018 W	09/25/2017 M	08/07/2017 M	01/19/2018 F	11/30/2016 W
Accd Time	11:14pm	04:59pm	05:53pm	11:45am	05:38pm
Severity	PROPERTY DAMAGE	PROPERTY DAMAGE	PROPERTY DAMAGE AND INJURY	PROPERTY DAMAGE	PROPERTY DAMAGE
Num Of Injuries	0	0	1	0	0
Num Serious Injuries					
Num Of Fatalities	0	0	0	0	0
Num Of Vehicles	1	1	1	1	1
Accd Type	COLLISION WITH DEER	COLLISION WITH DEER	COLLISION WITH TREE	COLLISION WITH DEER	COLLISION WITH GUIDE RAIL
Collision Type	OTHER	OTHER	OTHER	OTHER	OTHER
Traffic Control	NONE	NO PASSING ZONE	UNKNOWN	NONE	UNKNOWN
Light Condition	DARK-ROAD UNLIGHTED	DAYLIGHT	DAYLIGHT	DARK-ROAD UNLIGHTED	DARK-ROAD UNLIGHTED
Weather	CLEAR	CLEAR	RAIN	CLEAR	RAIN
Road Surf Cond	DRY	DRY	WET	DRY	WET
Ped Loc	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
Ped Action	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
Veh Type Veh 1	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP	OTHER	CAR/VAN/ PICKUP
Veh Type Veh 2					
Dir Of Travel Veh 1	NORTH	NORTH	SOUTH	NORTH	NORTH
Dir Of Travel Veh 2					
Apparent Factor Veh 1	ANIMAL'S ACTION	ANIMAL'S ACTION	FATIGUED/ DROWSY	NOT ENTERED	FAILURE TO YIELD RIGHT OF WAY
Apparent Factor Veh 2					
Driver Age Veh 1	23	77	33	49	48
Driver Age Veh 2					
PRE_ACCD_ACTN_ VEH1	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD
PRE_ACCD_ACTN_ VEH2					
Day_Of_Week	Wed	Mon	Mon	Fri	Wed
On Street	[Route] 32	STATE ROUTE 32	[Route] 32	[Route] 32	[Route] 32
Closest Cross Street	OLD ROUTE 32	Old Route 32	Old Route 32	OLD ROUTE 32	OLD ROUTE 32
Parking Lot Ind	N	N	N	N	N

2016-2021 Collisions
Table 2

Case Num	**38506749**	**37315568**	38009349	37147019	38590028
Case Year	**2020**	**2018**	2019	2018	2020
County	**ORANGE**	**ORANGE**	ORANGE	ORANGE	ORANGE
Comp Muni	**Cornwall**	**Cornwall**	Cornwall	Cornwall	Cornwall
Muni Type	**3**	**3**	3	3	3
Comp Ref Marker	**32 83011070**	**32 83011070**	32 83011070	32 83011070	32 83011070
At Intersection	**N**	**Y**	N	N	Y
Comp X	**576961.9061**	**576940.9900**	576974.1465	576977.9364	576940.9900
Comp Y	**4583392.8243**	**4583346.9500**	4583429.0003	4583443.7616	4583346.9500
Accd Date	**07/20/2020 M**	**05/18/2018 F**	05/14/2019 Tu	02/13/2018 Tu	09/15/2020 Tu
Accd Time	**04:31pm**	**08:45am**	05:42pm	04:38am	11:03pm
Severity	**PROPERTY DAMAGE**	**PROPERTY DAMAGE**	PROPERTY DAMAGE AND INJURY	PROPERTY DAMAGE	PROPERTY DAMAGE
Num Of Injuries	**0**	**0**	1	0	0
Num Serious Injuries			0		
Num Of Fatalities	**0**	**0**	0	0	0
Num Of Vehicles	**2**	**2**	1	1	1
Accd Type	**COLLISION WITH MOTOR VEHICLE**	**COLLISION WITH MOTOR VEHICLE**	COLL. W/EARTH ELE./ROCK CUT/DITCH	COLL. W/EARTH ELE./ROCK CUT/DITCH	COLLISION WITH DEER
Collision Type	**OVERTAKING**	**REAR END**	OTHER	OTHER	OTHER
Traffic Control	**UNKNOWN**	**STOP SIGN**	UNKNOWN	NO PASSING ZONE	UNKNOWN
Light Condition	**DAYLIGHT**	**DAYLIGHT**	DAYLIGHT	DARK-ROAD UNLIGHTED	DARK-ROAD UNLIGHTED
Weather	**CLEAR**	**CLEAR**	CLEAR	CLEAR	CLEAR
Road Surf Cond	**DRY**	**DRY**	WET	SNOW/ICE	DRY
Ped Loc	**NOT APPLICABLE**	**NOT APPLICABLE**	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
Ped Action	**NOT APPLICABLE**	**NOT APPLICABLE**	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
Veh Type Veh 1	**CAR/VAN/ PICKUP**	**CAR/VAN/ PICKUP**	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP
Veh Type Veh 2	**CAR/VAN/ PICKUP**	**CAR/VAN/ PICKUP**			
Dir Of Travel Veh 1	**NORTH**	**SOUTH**	NORTH	NORTH	NORTH
Dir Of Travel Veh 2	**NORTH**	**SOUTH**			
Apparent Factor Veh 1	**UNSAFE LANE CHANGE**	**NOT ENTERED**	UNSAFE SPEED	PAVEMENT SLIPPERY	ANIMAL'S ACTION
Apparent Factor Veh 2	**NOT ENTERED**	**DRIVER INATTENTION**			
Driver Age Veh 1	**22**	**38**	25	24	48
Driver Age Veh 2	**26**	**23**			
PRE_ACCD_ACTN_VEH1	**GOING STRAIGHT AHEAD**	**GOING STRAIGHT AHEAD**	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD
PRE_ACCD_ACTN_VEH2	**GOING STRAIGHT AHEAD**	**GOING STRAIGHT AHEAD**			
Day_Of_Week	**Mon**	**Fri**	Tue	Tue	Tue
On Street	**STATE ROUTE 32**	**[Route] 32**	[Route] 32	[Route] 32	[Route] 32
Closest Cross Street	**Old Route 32**	**OLD ROUTE 32**	Old Route 32	Old Route 32	OLD ROUTE 32
Parking Lot Ind	**N**	**N**	N	N	N

2016-2021 Collisions
Table 3

Case Num	38708555	36561873	37724771	38699014	37146157
Case Year	2021	2016	2019	2020	2018
County	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE
Comp Muni	Cornwall	Cornwall	Cornwall	Cornwall	Cornwall
Muni Type	3	3	3	3	3
Comp Ref Marker	32 83011071	32 83011071	32 83011071	32 83011071	32 83011071
At Intersection	Y	Y	Y	N	Y
Comp X	576987.3000	576995.6900	576995.6900	577002.9513	576995.6900
Comp Y	4583481.9000	4583517.8600	4583517.8600	4583547.4624	4583517.8600
Accd Date	01/10/2021 Su	12/19/2016 M	02/02/2019 Su	11/19/2020 Th	02/12/2018 M
Accd Time	12:17pm	12:30am	04:30pm	07:12pm	09:28pm
Severity	PROPERTY DAMAGE	PROPERTY DAMAGE	PROPERTY DAMAGE	PROPERTY DAMAGE	PROPERTY DAMAGE
Num Of Injuries	0	0	0	0	0
Num Serious Injuries					
Num Of Fatalities	0	0	0	0	0
Num Of Vehicles	1	1	1	1	1
Accd Type	COLLISION WITH DEER	COLL. W/EARTH ELE./ROCK CUT/DITCH	COLL. W/EARTH ELE./ROCK CUT/DITCH	COLLISION WITH ANIMAL	COLLISION WITH SIGN POST
Collision Type	OTHER	OTHER	OTHER	OTHER	OTHER
Traffic Control	NONE	NONE	NO PASSING ZONE	NONE	NO PASSING ZONE
Light Condition	DAYLIGHT	DARK-ROAD UNLIGHTED	DAYLIGHT	DARK-ROAD UNLIGHTED	DARK-ROAD UNLIGHTED
Weather	CLEAR	CLEAR	CLEAR	CLOUDY	CLEAR
Road Surf Cond	DRY	SNOW/ICE	DRY	DRY	SNOW/ICE
Ped Loc	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
Ped Action	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
Veh Type Veh 1	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP	CAR/VAN/PICKUP	CAR/VAN/PICKUP	CAR/VAN/ PICKUP
Veh Type Veh 2					
Dir Of Travel Veh 1	SOUTH	NORTH	NORTH	NORTH	NORTH
Dir Of Travel Veh 2					
Apparent Factor Veh 1	ANIMAL'S ACTION	PAVEMENT SLIPPERY	REACTION TO OTHER UNINVOLVED VEHICL	ANIMAL'S ACTION	PAVEMENT SLIPPERY
Apparent Factor Veh 2					
Driver Age Veh 1	65	58	22	27	25
Driver Age Veh 2					
PRE_ACCD_ACTN_VEH1	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD
PRE_ACCD_ACTN_VEH2					
Day_Of_Week	Sun	Mon	Sat	Thu	Mon
On Street	[Route] 32	[Route] 32	[Route] 32	[Route] 32	[Route] 32
Closest Cross Street	INDUSTRY DR	INDUSTRY DR	INDUSTRY DR	INDUSTRY DR	INDUSTRY DR
Parking Lot Ind	N	N	N	N	N

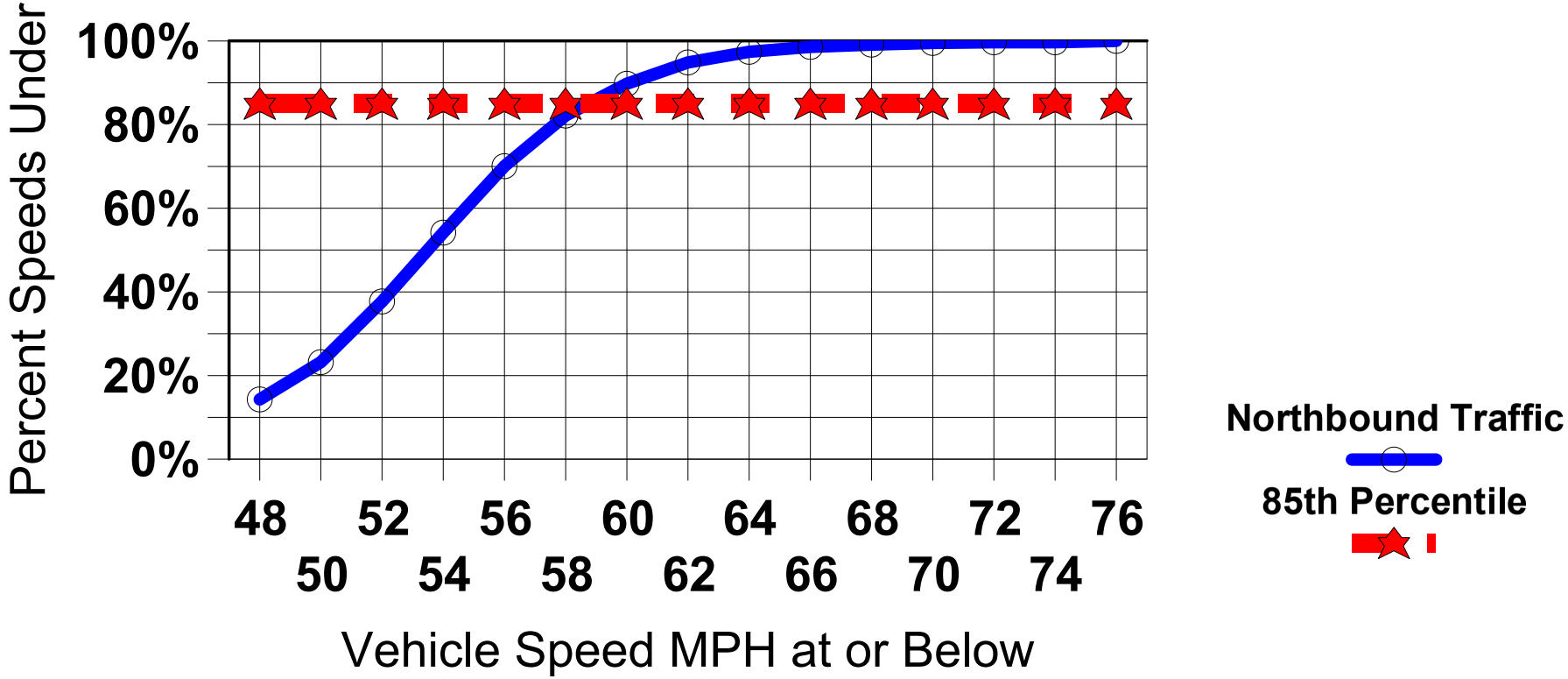
2016-2021 Collisions
Table 4

Case Num	38666433	37092023	38781325	38826929	**36409685**
Case Year	2020	2018	2021	2021	**2016**
County	ORANGE	ORANGE	ORANGE	ORANGE	**ORANGE**
Comp Muni	Cornwall	Cornwall	Cornwall	Cornwall	**Cornwall**
Muni Type	3	3	3	3	**3**
Comp Ref Marker	32 83011072	32 83011072	32 83011072	32 83011072	**32 83011072**
At Intersection	Y	Y	Y	Y	**N**
Comp X	577023.7800	577031.7831	577032.0800	577023.7800	**577029.1944**
Comp Y	4583651.7300	4583733.4965	4583736.5300	4583651.7300	**4583707.0485**
Accd Date	12/26/2020 Sa	01/14/2018 Su	02/22/2021 M	04/13/2021 Tu	**09/30/2016 F**
Accd Time	09:36am	11:56pm	07:02pm	10:14pm	**04:18pm**
Severity	PROPERTY DAMAGE	PROPERTY DAMAGE	PROPERTY DAMAGE	PROPERTY DAMAGE AND INJURY	**PROPERTY DAMAGE AND INJURY**
Num Of Injuries	0	0	0	2	**3**
Num Serious Injuries				0	**0**
Num Of Fatalities	0	0	0	0	**0**
Num Of Vehicles	2	1	1	2	**2**
Accd Type	COLLISION WITH MOTOR VEHICLE	COLLISION WITH GUIDE RAIL	COLLISION WITH SNOW EMBANKMENT	COLLISION WITH MOTOR VEHICLE	**COLLISION WITH MOTOR VEHICLE**
Collision Type	REAR END	OTHER	OTHER	REAR END	**REAR END**
Traffic Control	NO PASSING ZONE	NO PASSING ZONE	UNKNOWN	NO PASSING ZONE	**NO PASSING ZONE**
Light Condition	DAYLIGHT	DARK-ROAD UNLIGHTED	DAYLIGHT	DARK-ROAD UNLIGHTED	**DAYLIGHT**
Weather	CLEAR	CLEAR	SNOW	CLEAR	**RAIN**
Road Surf Cond	SNOW/ICE	SNOW/ICE	SLUSH	DRY	**WET**
Ped Loc	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	**NOT APPLICABLE**
Ped Action	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	**NOT APPLICABLE**
Veh Type Veh 1	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP	CAR/VAN/ PICKUP	**CAR/VAN/ PICKUP**
Veh Type Veh 2	CAR/VAN/ PICKUP			CAR/VAN/ PICKUP	**CAR/VAN/ PICKUP**
Dir Of Travel Veh 1	NORTH	NORTH	NORTH	NORTH	**SOUTH**
Dir Of Travel Veh 2	SOUTH			NORTH-EAST	**NORTH**
Apparent Factor Veh 1	PAVEMENT SLIPPERY	PAVEMENT SLIPPERY	UNKNOWN	ALCOHOL INVOLVEMENT	**FOLLOWING TOO CLOSELY**
Apparent Factor Veh 2	NOT APPLICABLE			NOT APPLICABLE	**NOT APPLICABLE**
Driver Age Veh 1	24	27	55	52	**17**
Driver Age Veh 2	47			41	**44**
PRE_ACCD_ACTN_VEH1	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	GOING STRAIGHT AHEAD	**SLOWED OR STOPPING**
PRE_ACCD_ACTN_VEH2	GOING STRAIGHT AHEAD			MAKING RIGHT TURN	**SLOWED OR STOPPING**
Day_Of_Week	Sat	Sun	Mon	Tue	**Fri**
On Street	[Route] 32	[Route] 32	[Route] 32	[Route] 32	**STATE ROUTE 32**
Closest Cross Street	PARADISE HL	HESS RD	HESS RD	PARADISE HL	**Creamery Rd**
Parking Lot Ind	N	N	N	N	**N**

Attachment F

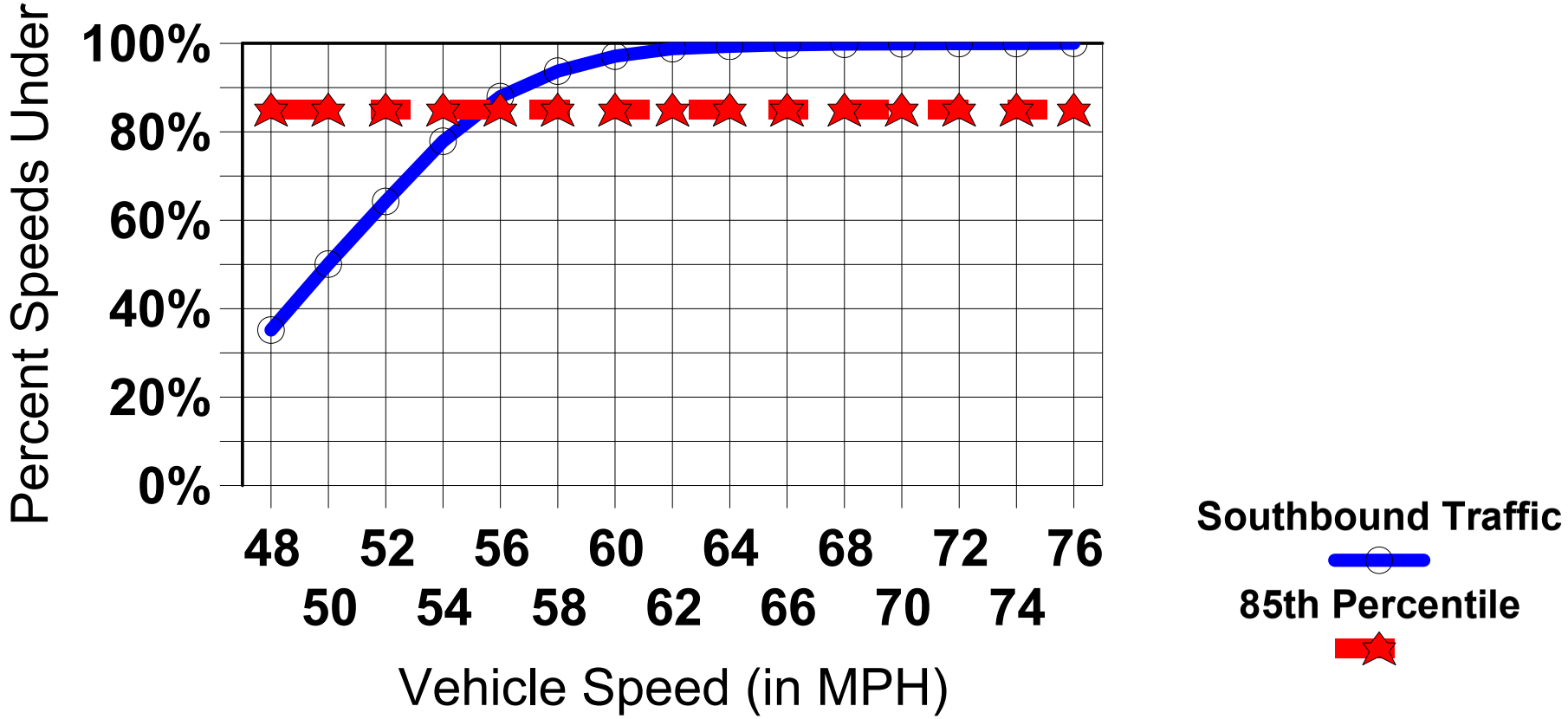
Speed Figures

Figure F-1
Northbound Percentile Speed
Clear Uncongested Daylight Conditions



NYS Route 32
April 5, 2022 from 9 a.m. to 4 p.m. period

Figure F-2
Southbound Percentile Speed
Clear Uncongested Daylight Conditions



NYS Route 32
Jan 25 to Jan 26, 2022 from 9 a.m. to 4 p.m. periods

Attachment G

Speed Data

Speed by Lane

Name: 22001A

Latitude: Unknown Longitude: Unknown

Started: 4/5/2022 0:00 Ended: 4/5/2022 23:59

RT 32 s/o Industrial Drive

Northbound

4/5/2022 0:00																Lane 1
Interval	48 mph	50 mph	52 mph	54 mph	56 mph	58 mph	60 mph	62 mph	64 mph	66 mph	68 mph	70 mph	72 mph	74 mph	> 74 mph	Total
00:00	0	1	0	4	4	2	1	1	0	0	0	1	0	0	0	14
00:15	2	0	0	0	2	0	1	1	0	1	0	0	0	0	0	7
00:30	3	2	0	1	1	0	0	1	1	0	0	0	0	0	0	9
00:45	0	2	1	0	0	0	2	0	0	0	0	0	0	0	0	5
01:00	0	1	0	2	0	0	0	0	0	1	0	0	0	0	0	4
01:15	1	0	2	2	1	0	2	1	1	0	1	0	0	0	0	11
01:30	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	4
01:45	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
02:00	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	3
02:15	1	3	1	0	1	1	0	0	0	1	0	0	0	0	0	8
02:30	1	0	1	0	0	0	2	0	1	2	0	0	0	0	0	7
02:45	1	0	0	3	0	1	0	0	0	0	0	0	0	1	0	6
03:00	1	1	0	0	1	0	1	0	2	0	1	1	0	0	0	8
03:15	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	3
03:30	1	0	0	2	0	2	0	0	0	1	0	1	0	0	0	7
03:45	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	3
04:00	0	1	0	0	1	2	0	1	1	0	0	0	0	0	0	6
04:15	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	4
04:30	0	1	1	1	0	2	0	0	1	1	0	0	0	0	0	7
04:45	2	0	1	0	1	1	0	2	0	2	0	0	0	0	0	9
05:00	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
05:15	1	2	7	2	3	5	2	3	4	3	1	1	0	1	0	35
05:30	6	2	0	1	5	1	2	3	0	0	0	0	0	0	0	20
05:45	2	1	2	4	2	2	3	1	1	0	1	0	0	0	0	19
06:00	2	3	2	3	3	7	1	3	2	2	1	0	1	0	0	30
06:15	1	1	0	6	4	2	5	6	3	1	1	1	0	0	0	31
06:30	1	1	3	3	5	4	12	5	2	1	0	0	0	0	0	37
06:45	13	7	2	5	7	10	6	4	1	2	0	0	0	0	0	57
07:00	2	3	2	10	9	6	7	4	2	5	1	0	0	0	0	51
07:15	7	8	11	2	8	10	5	3	5	2	1	0	0	0	0	62
07:30	7	3	5	7	16	16	9	6	2	1	0	0	0	0	0	72
07:45	4	5	12	17	15	4	4	4	4	1	3	0	0	0	0	73
08:00	16	7	6	7	7	6	4	2	4	1	4	0	0	0	0	64
08:15	15	13	7	17	8	7	4	2	2	1	2	1	0	0	0	79

08:30	9	8	14	8	12	5	7	1	2	0	0	0	0	0	0	66
08:45	14	8	13	11	17	12	4	3	2	1	0	0	0	0	0	85
09:00	25	6	11	10	6	3	3	3	4	0	1	0	0	0	0	72
09:15	3	5	9	9	10	5	6	6	2	1	1	0	1	0	0	58
09:30	4	8	9	12	12	8	3	2	0	0	0	0	0	0	0	58
09:45	3	3	13	14	11	9	4	2	1	0	0	0	0	0	0	60
10:00	2	7	6	6	8	10	4	3	0	0	0	0	0	0	0	46
10:15	35	3	6	10	4	7	5	4	0	0	0	0	0	0	1	75
10:30	9	10	9	9	8	7	7	4	1	0	0	0	0	0	1	65
10:45	6	2	7	11	11	8	1	4	2	2	1	0	0	0	1	56
11:00	10	7	12	6	8	2	0	3	1	1	0	1	0	0	0	51
11:15	10	4	10	7	8	6	0	3	1	0	0	1	0	0	0	50
11:30	11	2	6	13	9	8	8	3	3	1	1	0	0	0	0	65
11:45	9	3	9	10	2	2	5	4	2	0	0	0	0	0	0	46
12:00	8	11	7	12	6	6	2	0	1	1	0	0	0	0	1	55
12:15	8	12	9	7	8	13	3	5	1	0	0	0	0	0	0	66
12:30	20	5	9	9	10	5	1	0	1	0	0	0	1	0	0	61
12:45	3	6	9	13	15	5	7	2	1	1	0	0	0	0	0	62
13:00	7	9	10	7	6	2	8	4	4	1	0	0	0	0	1	59
13:15	9	12	12	14	14	11	6	3	1	2	0	0	0	0	0	84
13:30	2	2	12	11	21	15	1	0	1	1	0	0	0	0	0	66
13:45	8	6	6	3	10	13	5	6	3	0	2	1	0	0	1	64
14:00	14	2	7	9	9	11	9	3	1	2	1	0	0	0	0	68
14:15	9	4	14	12	10	5	2	6	3	2	0	1	0	0	0	68
14:30	11	7	16	10	20	7	8	1	1	0	0	1	0	0	0	82
14:45	18	7	13	19	13	8	9	5	0	1	1	1	1	0	0	96
15:00	9	9	9	18	8	8	7	8	4	3	2	0	0	0	0	85
15:15	9	4	12	24	20	8	9	2	4	1	0	0	0	0	0	93
15:30	1	2	6	13	20	16	12	8	5	2	0	0	0	0	0	85
15:45	7	10	16	12	13	20	9	2	0	0	0	2	0	0	0	91
16:00	6	3	12	5	17	14	17	8	3	4	0	0	0	0	0	89
16:15	9	12	12	28	13	16	9	7	4	0	0	0	0	0	0	110
16:30	7	6	13	8	16	23	17	6	0	0	0	1	0	0	0	97
16:45	6	11	9	14	18	12	12	10	4	1	1	0	0	0	0	98
17:00	11	8	3	8	22	16	10	9	3	0	0	0	0	1	0	91
17:15	32	14	23	15	18	23	13	6	0	3	1	0	0	0	0	148
17:30	7	1	8	22	24	33	13	11	4	1	0	0	0	0	0	124
17:45	5	8	11	17	25	23	16	6	2	1	0	0	0	1	0	115
18:00	13	6	10	7	10	17	6	2	4	1	0	0	0	0	0	76
18:15	0	5	7	6	10	6	12	3	4	2	3	0	0	0	0	58
18:30	5	12	22	27	17	8	5	4	0	0	0	0	0	0	0	100
18:45	19	4	7	14	11	24	8	8	5	0	1	1	1	0	1	104
19:00	9	20	18	16	14	6	7	5	1	1	0	1	0	0	1	99

19:15	15	11	16	21	17	11	7	1	4	0	1	2	0	1	1	108
19:30	8	6	6	11	6	9	5	6	1	3	0	0	0	0	0	61
19:45	15	11	4	8	11	10	2	1	0	0	0	0	0	0	0	62
20:00	10	12	17	10	4	4	2	1	0	1	0	0	0	0	0	61
20:15	7	7	16	15	16	16	4	3	0	0	0	0	0	0	0	84
20:30	8	6	7	11	8	7	5	4	0	1	0	0	0	0	0	57
20:45	22	8	3	4	6	2	0	1	3	0	1	0	0	0	0	50
21:00	3	4	6	3	7	6	4	0	0	0	0	1	0	0	0	34
21:15	7	7	8	7	7	6	4	2	1	0	0	0	0	0	0	49
21:30	4	4	3	6	3	4	0	2	2	1	0	0	0	0	0	29
21:45	1	3	8	4	4	3	2	0	1	0	3	0	1	0	0	30
22:00	3	2	3	1	7	2	1	2	0	3	1	0	1	0	0	26
22:15	5	3	3	5	5	4	2	3	0	1	0	0	0	0	0	31
22:30	4	2	2	4	1	4	5	0	0	0	0	0	1	0	0	23
22:45	0	1	2	6	4	5	1	5	4	1	0	0	0	0	0	29
23:00	2	0	3	4	1	2	4	3	0	0	0	0	0	0	0	19
23:15	1	1	6	3	7	4	2	1	1	0	0	0	0	0	0	26
23:30	2	1	1	1	4	2	0	0	0	0	0	1	0	0	0	12
23:45	2	1	0	4	2	0	3	1	1	1	1	0	0	0	0	16
24 Hour Total	635	453	638	743	773	660	429	277	144	78	40	21	8	5	10	4914
10 mile pace (entire report duration)					49 - 58	Vehicles within pace range:					3305	Percentage of total volume:				67.26%
85th Speed Percentiles (entire report duration)																
		Lane 1	59													

Array Type: Tube - Tube,
Deadtime (in ms): 40,
Maximum vehicle length: 110.0 ft,
Maximum inter-axle spacing: 45.0 ft,
Classification Scheme: FHWA-USA,
Sensor Spacing: 4.0 ft,

Report Generated Friday, April 08, 2022 02:49 PM

Speed by Lane

Name: 22001SB

Latitude: Unknown Longitude: Unknown

Started: 1/25/2022 0:00 Ended: 1/26/2022 23:59

RT 32 N/O Industry DR

Southbound

1/25/2022 0:00 Lane 1

Interval	48 mph	50 mph	52 mph	54 mph	56 mph	58 mph	60 mph	62 mph	64 mph	66 mph	68 mph	70 mph	72 mph	74 mph	> 74 mph	Total
00:00	2	0	1	3	0	0	0	0	0	0	0	0	0	0	0	6
00:15	0	3	1	0	0	0	0	0	0	1	0	0	0	0	0	5
00:30	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
00:45	0	1	0	3	0	1	0	0	0	0	0	0	0	0	0	5
01:00	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
01:15	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45	2	0	2	1	1	0	0	0	0	0	0	0	0	0	0	6
02:00	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2
02:15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:30	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
02:45	2	0	0	1	1	0	0	0	0	1	0	0	0	0	0	5
03:00	1	0	0	1	2	1	1	1	0	0	0	0	0	0	0	7
03:15	1	4	0	0	1	0	0	1	0	1	1	0	0	0	0	9
03:30	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3
03:45	0	0	1	3	1	3	0	1	0	0	0	0	0	0	0	9
04:00	0	2	1	0	1	1	1	2	2	1	0	0	0	0	0	11
04:15	6	0	4	3	4	3	0	1	0	0	0	0	0	0	0	21
04:30	4	3	4	6	2	8	2	0	4	0	0	0	0	0	0	33
04:45	5	3	4	4	4	3	3	1	2	1	1	0	0	0	0	31
05:00	4	1	6	7	3	2	1	2	1	2	0	0	0	0	0	29
05:15	10	3	10	5	1	2	1	0	1	0	0	0	0	0	0	33
05:30	9	3	7	5	4	7	2	0	1	0	0	1	0	0	0	39
05:45	19	6	4	9	10	1	1	2	1	0	0	0	0	0	0	53
06:00	19	6	2	8	3	5	1	2	0	0	0	0	0	0	0	46
06:15	15	16	17	10	2	4	1	4	0	0	0	0	0	0	0	69
06:30	13	12	15	16	10	11	5	1	2	0	0	0	0	0	0	85
06:45	39	13	10	11	7	1	0	2	0	0	0	0	0	0	0	83
07:00	30	18	7	8	7	2	2	2	0	1	0	0	0	0	0	77
07:15	28	13	8	9	5	3	3	2	0	1	1	1	0	0	0	74
07:30	39	17	7	16	10	1	6	2	0	0	0	1	0	0	0	99
07:45	37	6	13	14	8	7	1	1	0	0	0	0	0	0	0	87

08:00	14	9	17	21	14	5	4	2	0	0	0	0	0	0	0	86
08:15	54	9	20	13	6	0	0	0	0	0	0	0	0	0	0	102
08:30	39	19	10	9	13	3	2	0	0	0	0	0	0	1	0	96
08:45	29	7	9	11	12	2	2	2	0	0	0	0	0	0	0	74
09:00	20	11	6	4	10	2	1	1	0	0	0	1	0	0	0	56
09:15	22	6	7	6	7	6	3	2	0	0	0	0	0	0	0	59
09:30	23	11	6	7	7	1	1	1	1	0	0	0	0	0	0	58
09:45	17	9	10	9	9	3	2	1	0	1	0	0	0	0	0	61
10:00	15	13	8	8	2	3	4	0	0	0	0	0	0	0	1	54
10:15	31	15	10	9	9	3	2	1	0	0	0	1	0	0	0	81
10:30	27	14	18	18	11	5	1	1	1	0	0	0	0	0	0	96
10:45	19	7	6	9	5	7	1	0	0	0	0	0	0	0	0	54
11:00	4	9	10	9	4	4	3	0	0	1	0	0	0	0	0	44
11:15	22	10	3	8	7	4	1	1	1	0	0	0	0	0	0	57
11:30	9	9	13	8	11	4	2	0	0	1	0	0	0	0	0	57
11:45	26	12	11	13	7	6	3	2	0	0	0	0	0	0	0	80
12:00	33	5	8	3	1	1	2	1	0	0	0	0	0	0	0	54
12:15	9	8	14	13	10	4	2	4	0	0	0	0	1	0	0	65
12:30	21	5	14	5	2	1	3	0	0	0	0	0	0	0	0	51
12:45	27	11	4	8	3	3	8	1	1	0	0	0	0	0	0	66
13:00	8	13	7	10	11	4	0	1	0	0	0	0	0	0	1	55
13:15	29	12	8	12	9	5	1	0	1	0	0	0	0	0	0	77
13:30	9	10	11	13	7	2	2	1	1	0	0	0	0	0	0	56
13:45	14	12	10	9	9	4	4	3	2	1	0	0	0	0	0	68
14:00	44	10	5	9	4	0	1	1	0	0	0	0	0	0	0	74
14:15	26	9	10	12	3	6	3	1	0	0	0	0	0	0	0	70
14:30	29	12	17	8	10	2	0	1	0	0	0	0	0	0	0	79
14:45	30	10	5	13	7	2	3	0	0	0	0	0	0	0	0	70
15:00	15	13	11	8	3	3	2	1	2	0	0	0	0	0	0	58
15:15	36	7	7	7	12	1	4	0	0	0	0	0	0	0	0	74
15:30	53	16	6	2	5	1	2	1	0	0	0	0	0	0	0	86
15:45	21	8	9	11	9	4	2	1	0	0	0	0	0	0	0	65
16:00	22	11	12	10	7	1	4	1	0	0	0	0	0	0	0	68
16:15	24	8	10	10	7	5	4	1	0	0	0	0	0	0	0	69
16:30	34	15	16	19	9	2	5	0	0	0	0	0	0	0	0	100
16:45	49	13	5	14	5	1	1	2	2	0	0	0	0	0	0	92
17:00	32	17	16	6	8	2	2	1	0	0	0	0	0	0	0	84
17:15	34	10	6	8	11	7	3	1	1	0	0	0	0	0	0	81
17:30	47	20	18	4	2	2	0	0	0	0	0	0	0	0	0	93
17:45	29	6	4	9	9	5	0	4	1	0	0	0	0	0	0	67
18:00	27	12	13	8	3	2	1	0	0	0	0	0	0	0	1	67

18:15	24	8	10	9	3	3	3	1	1	1	0	0	0	0	0	63
18:30	29	9	2	5	2	3	1	1	0	0	0	0	0	0	0	52
18:45	23	13	8	5	3	2	0	2	0	0	0	0	0	0	0	56
19:00	33	11	6	1	0	0	1	0	1	1	0	0	0	0	0	54
19:15	18	6	6	8	4	2	1	0	1	0	0	0	0	1	0	47
19:30	13	6	7	6	5	2	0	0	0	1	0	0	0	0	0	40
19:45	4	4	4	7	6	3	3	0	1	0	0	0	0	1	0	33
20:00	21	5	7	4	2	1	0	2	0	0	0	0	0	0	0	42
20:15	9	5	7	1	2	2	1	0	1	1	0	0	0	0	0	29
20:30	8	5	2	9	2	1	1	3	0	0	1	0	0	0	0	32
20:45	17	3	3	3	3	1	1	1	0	1	0	0	0	0	0	33
21:00	3	3	4	3	1	4	2	1	0	0	1	0	0	0	0	22
21:15	2	1	4	3	2	1	1	0	0	0	0	0	0	0	0	14
21:30	6	1	3	7	2	0	2	2	0	0	0	0	0	0	0	23
21:45	5	4	3	1	3	1	1	1	0	0	0	0	0	0	0	19
22:00	4	1	1	2	2	1	0	1	1	1	0	0	0	0	0	14
22:15	5	0	2	4	3	4	0	0	0	1	0	0	0	0	0	19
22:30	5	1	0	7	2	0	0	1	0	0	0	0	0	0	0	16
22:45	2	0	0	1	0	1	2	0	0	0	0	0	0	0	0	6
23:00	2	0	1	0	1	0	0	0	0	0	2	0	1	0	0	7
23:15	0	1	0	0	2	1	1	0	0	0	1	0	0	0	0	6
23:30	1	0	1	2	3	0	0	0	0	0	0	0	0	0	0	7
23:45	3	0	0	1	1	2	1	2	0	0	0	0	0	0	0	10
24 Hour Total	1602	665	616	626	442	229	144	87	35	20	8	5	2	3	3	4487

1/26/2022 0:00 Lane 1

Interval	48 mph	50 mph	52 mph	54 mph	56 mph	58 mph	60 mph	62 mph	64 mph	66 mph	68 mph	70 mph	72 mph	74 mph	> 74 mph	Total
00:00	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	4
00:15	1	2	1	0	0	0	1	1	0	0	0	0	0	0	0	6
00:30	1	0	2	0	0	3	0	0	0	0	1	0	0	0	0	7
00:45	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
01:15	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	3
01:30	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:45	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	4
02:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
02:15	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
02:30	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
02:45	1	1	1	3	0	1	3	1	0	1	0	0	0	0	0	12
03:00	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
03:15	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	4
03:30	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
03:45	2	0	0	1	1	1	1	0	0	0	0	0	0	0	0	6
04:00	2	0	2	0	1	0	1	3	0	2	0	0	0	0	0	11
04:15	2	1	3	2	2	2	4	2	0	0	0	0	0	0	0	18
04:30	5	2	4	4	4	4	6	2	0	2	1	0	0	0	0	34
04:45	4	4	2	2	1	2	3	1	3	0	0	0	2	0	0	24
05:00	4	1	1	4	1	1	4	1	0	0	1	1	0	0	0	19
05:15	6	5	5	6	1	2	2	2	1	2	0	0	0	0	0	32
05:30	8	3	6	7	6	2	3	0	0	0	0	0	0	0	0	35
05:45	15	6	2	6	4	10	2	2	1	0	0	0	0	0	0	48
06:00	8	2	6	7	5	5	2	2	0	0	1	0	0	0	0	38
06:15	14	8	10	6	4	8	6	1	0	0	0	0	0	0	0	57
06:30	45	8	10	10	9	6	3	3	1	0	0	0	0	0	0	95
06:45	26	8	14	12	11	4	2	2	0	0	0	0	0	0	0	79
07:00	16	19	14	5	10	4	1	1	1	0	0	0	0	0	0	71
07:15	38	10	12	12	7	2	3	1	0	1	0	0	0	0	0	86
07:30	27	19	24	15	7	4	1	1	1	0	0	0	0	0	0	99
07:45	65	12	17	15	8	1	1	0	0	0	0	0	0	0	0	119
08:00	20	16	13	13	11	3	2	1	0	0	0	1	0	0	0	80
08:15	39	11	13	9	8	4	1	1	1	1	0	0	0	0	1	89
08:30	35	14	8	12	5	7	1	0	0	0	0	0	0	0	0	82
08:45	32	9	16	17	8	3	1	0	0	0	0	0	0	0	0	86
09:00	16	11	13	6	7	3	1	0	0	0	0	1	0	0	0	58
09:15	25	11	7	4	4	3	0	3	0	1	0	0	0	0	0	58

09:30	14	13	6	12	7	8	0	0	1	0	0	0	0	0	0	61
09:45	28	7	8	15	5	4	1	0	1	1	0	0	0	0	0	70
10:00	19	4	8	10	8	4	1	0	1	1	1	0	0	0	0	57
10:15	24	7	10	15	6	2	2	0	2	1	0	0	0	0	0	69
10:30	32	13	7	11	6	8	1	0	1	0	0	0	0	0	0	79
10:45	31	11	10	5	10	6	1	1	0	0	0	0	0	0	0	75
11:00	19	11	2	9	5	1	2	2	0	0	0	0	0	0	0	51
11:15	22	10	13	5	9	2	4	1	1	0	0	0	0	0	0	67
11:30	26	8	10	10	3	3	3	0	0	0	0	0	0	0	0	63
11:45	10	13	11	8	2	2	3	3	0	0	0	0	0	0	0	52
12:00	42	9	17	10	11	4	1	0	0	0	0	0	0	0	0	94
12:15	30	6	9	7	2	4	1	0	0	1	1	0	0	0	0	61
12:30	23	8	9	5	8	1	1	0	0	1	0	0	0	0	0	56
12:45	22	7	4	7	4	1	4	1	0	0	0	0	0	0	0	50
13:00	13	6	7	11	4	2	1	0	0	0	0	0	0	0	0	44
13:15	29	8	9	7	5	5	2	0	0	0	0	0	0	0	0	65
13:30	15	4	13	11	10	4	3	2	0	0	0	0	0	0	0	62
13:45	25	15	8	4	5	1	1	1	0	0	1	0	0	0	0	61
14:00	27	7	15	9	4	5	1	0	0	0	0	0	0	0	0	68
14:15	25	7	9	5	7	6	4	1	1	0	0	0	0	0	0	65
14:30	19	11	14	12	2	5	4	2	0	2	1	0	0	0	0	72
14:45	4	9	10	10	12	10	9	2	1	0	0	0	0	0	0	67
15:00	19	12	9	6	7	3	2	6	0	0	0	0	0	0	0	64
15:15	24	11	11	10	8	10	4	4	0	0	0	0	0	0	0	82
15:30	17	9	6	8	6	8	0	2	1	0	0	0	1	0	0	58
15:45	38	7	5	11	6	3	3	3	0	1	0	0	0	0	0	77
16:00	18	12	15	9	3	12	3	0	0	0	0	0	0	0	0	72
16:15	33	14	15	16	11	2	4	0	0	0	0	0	0	0	0	95
16:30	16	14	13	12	9	11	4	1	2	0	0	0	0	0	0	82
16:45	14	13	13	10	13	5	2	1	0	0	0	0	0	0	0	71
17:00	45	9	8	13	8	4	3	0	1	0	0	0	0	0	0	91
17:15	36	14	10	12	6	5	0	2	0	0	0	0	0	1	0	86
17:30	51	20	9	5	2	0	1	1	0	0	0	0	0	0	0	89
17:45	37	23	11	8	8	5	2	0	0	0	0	0	0	0	0	94
18:00	39	8	11	5	8	3	4	0	0	0	1	0	0	0	0	79
18:15	31	10	5	3	4	2	1	2	0	0	1	0	0	0	0	59
18:30	18	3	11	8	4	4	0	1	0	0	1	0	0	0	0	50
18:45	24	14	10	10	2	0	0	0	0	1	0	0	0	0	0	61
19:00	22	8	7	8	6	4	2	0	1	1	0	0	0	0	0	59
19:15	14	9	5	4	5	1	0	1	0	0	0	0	0	0	0	39
19:30	19	7	3	3	5	3	0	3	0	0	0	0	1	0	0	44

19:45	10	8	10	5	2	4	0	0	1	1	0	0	0	0	0	41
20:00	11	6	3	9	5	0	0	2	0	0	0	0	0	0	0	36
20:15	9	9	10	9	9	1	4	0	0	0	0	0	0	0	0	51
20:30	6	4	4	4	5	5	1	0	0	0	0	0	0	0	0	29
20:45	10	4	4	2	5	0	1	0	0	0	1	0	0	0	0	27
21:00	5	5	4	3	1	2	0	0	0	0	0	0	0	0	0	20
21:15	4	6	2	6	1	4	1	0	0	0	0	0	0	0	0	24
21:30	10	4	3	2	0	1	1	0	0	0	1	0	0	0	0	22
21:45	8	4	3	6	1	5	0	2	0	1	0	0	0	0	0	30
22:00	2	2	0	0	4	3	2	0	0	0	0	0	0	0	0	13
22:15	4	3	1	6	2	0	0	0	0	0	0	0	0	0	0	16
22:30	4	0	4	0	2	0	2	1	0	0	0	0	0	0	0	13
22:45	1	1	4	3	0	1	1	0	0	0	0	0	0	0	0	11
23:00	1	3	4	3	1	0	0	0	0	0	0	0	0	0	0	12
23:15	1	4	1	0	2	1	1	0	1	0	0	0	0	0	0	11
23:30	0	0	1	1	4	1	0	0	1	0	0	0	0	0	0	8
23:45	6	3	0	1	1	1	0	0	0	0	0	0	0	0	0	12
24 Hour Total	1568	661	657	604	430	289	154	80	27	23	13	3	4	1	1	4515
Lane Total	3170	1326	1273	1230	872	518	298	167	62	43	21	8	6	4	4	9002
10 mile pace (entire report duration)					46 - 55		Vehicles within pace range:				5899		Percentage of total volume:			65.53%
85th Speed Percentiles (entire report duration)																
		Lane 1	55													

Attachment H

Level of Service Criteria

Traffic: Performance Measures

Introduction

The Highway Capacity Manual[1] and the *Synchro Software*[2] procedures document the methodology used for modeling levels of service, average vehicle delay, and volume -to-capacity ratios at both signalized and unsignalized intersections. Level of service is a measure of the operational quality of an intersection; level of service A is the highest, most efficient level, and level of service F is the lowest level. The operational quality of an intersection for the automobile mode is based on the average amount of time vehicles are delayed. Levels of service are examined by 'lane group', the set of lanes allowing common movement(s) on an approach.

The *Synchro 11 Software* modeled results apply to peak hour periods only. During off peak periods, which is the majority of the time, drivers typically will find operations better than the modeled peak hour periods. During peak periods the experience of individual drivers can vary, because the model calculates average delay.

Level of Service Criteria for Stop-Controlled Intersections

The Highway Capacity Manual[3] describes the level of service criteria as:

> *Level of service for two way stop controlled intersections is determined by the computed or measure control delay. For motor vehicles, level of service is determined for each minor-street movement (or shared movement) as well as major-street left turns by using criteria given in Exhibit 20-2. Level of service is not defined for the intersection as a whole or for the major street-street approaches for three primary reasons: (a) major-street through vehicles are assumed to experience zero delay; (b) the disproportionate number of major-street through vehicles at a typical two way stopped controlled intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (c) the resulting low delay can mask important level of service deficiencies for minor movements. As Exhibit 20-2 notes, level of service F is assigned to the movements if the volume-to-capacity ratio for the movement exceeds 1.0, regardless of the control delay.*
>
> *The level of service criteria for two-way or all-way stop-controlled intersections differ somewhat from the criteria used in Chapter 19 for signalized intersections, primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Unsignalized intersections are also*

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[1]Transportation Research Board of the National Academies, Highway Capacity Manual,, 6th edition, "A Guide for Multimodal Analysis", Washington, DC ,2016.

[2]*Synchro 11*, Computer software, Cubic ITS, Inc. (Trafficware), 2019.

[3]From Transportation Research Board of the National Academies, Highway Capacity Manual,, 6th edition, "A Guide for Multimodal Analysis", Washington DC, Volume 3 page 20-6, Exhibit 20-2, 2016. Abbreviations and mathematical symbols have been replaced for reader clarity.

associated with more uncertainty for users, as delays are less predictable than they are at signals.

Two-Way or All-Way Stop-Controlled (Unsignalized) Intersections Level of Service Criteria Motorized Vehicle Mode		
Average Control Delay (Seconds Per Vehicle)	**Volume-to-capacity Ratio less than or equal to one Level of Service**	**Volume-to-capacity Ratio greater than one Level of Service**
less than or equal to 10	A	F
greater than 10 and less than or equal to 15	B	F
greater than 15 and less than or equal to 25	C	F
greater than 25 and less than or equal to 35	D	F
greater than 35 and less than or equal to 50	E	F
greater than 50	F	F
From Transportation Research Board of the National Academies, Highway Capacity Manual,, 6th edition, "A Guide for Multimodal Analysis", Washington DC, Volume 3 page 20-6, Exhibit 20-2, and page 21-9 Exhibit 21-8, 2016. Abbreviations and mathematical symbols have been replaced for reader clarity. Level of service is not calculated on two-way stop-controlled intersections for major street approaches or for the intersection as a whole as major street through vehicles are assumed to experience no delay.		

Attachment I

Capacity Analysis

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	6	7	276	417	16
Future Vol, veh/h	4	6	7	276	417	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	6	2	10	7	0
Mvmt Flow	4	7	8	307	463	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	795	472	481	0	-	0
Stage 1	472	-	-	-	-	-
Stage 2	323	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.218	-	-	-
Pot Cap-1 Maneuver	359	584	1082	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	356	584	1082	-	-	-
Mov Cap-2 Maneuver	356	-	-	-	-	-
Stage 1	626	-	-	-	-	-
Stage 2	738	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1082	-	465	-	-
HCM Lane V/C Ratio	0.007	-	0.024	-	-
HCM Control Delay (s)	8.4	0	12.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	24	7	454	370	11
Future Vol, veh/h	24	24	7	454	370	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	8	29	2	3	0
Mvmt Flow	29	29	8	540	440	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1003	447	453	0	-	0
Stage 1	447	-	-	-	-	-
Stage 2	556	-	-	-	-	-
Critical Hdwy	6.44	6.28	4.39	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.372	2.461	-	-	-
Pot Cap-1 Maneuver	266	599	979	-	-	-
Stage 1	640	-	-	-	-	-
Stage 2	570	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	263	599	979	-	-	-
Mov Cap-2 Maneuver	263	-	-	-	-	-
Stage 1	632	-	-	-	-	-
Stage 2	570	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.6	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	979	-	366	-	-
HCM Lane V/C Ratio	0.009	-	0.156	-	-
HCM Control Delay (s)	8.7	0	16.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	6	7	332	439	16
Future Vol, veh/h	4	6	7	332	439	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	6	2	10	7	0
Mvmt Flow	4	7	8	369	488	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	882	497	506	0	-	0
Stage 1	497	-	-	-	-	-
Stage 2	385	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.218	-	-	-
Pot Cap-1 Maneuver	319	565	1059	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	316	565	1059	-	-	-
Mov Cap-2 Maneuver	316	-	-	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	692	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.6	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1059	-	430	-	-
HCM Lane V/C Ratio	0.007	-	0.026	-	-
HCM Control Delay (s)	8.4	0	13.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	24	7	481	431	11
Future Vol, veh/h	24	24	7	481	431	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	8	29	2	3	0
Mvmt Flow	29	29	8	573	513	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1109	520	526	0	-	0
Stage 1	520	-	-	-	-	-
Stage 2	589	-	-	-	-	-
Critical Hdwy	6.44	6.28	4.39	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.372	2.461	-	-	-
Pot Cap-1 Maneuver	230	544	917	-	-	-
Stage 1	593	-	-	-	-	-
Stage 2	551	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	227	544	917	-	-	-
Mov Cap-2 Maneuver	227	-	-	-	-	-
Stage 1	585	-	-	-	-	-
Stage 2	551	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.7	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	917	-	320	-	-
HCM Lane V/C Ratio	0.009	-	0.179	-	-
HCM Control Delay (s)	9	0	18.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	8	9	332	439	22
Future Vol, veh/h	5	8	9	332	439	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	6	2	10	7	0
Mvmt Flow	6	9	10	369	488	24

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	889	500	512	0	-	0
Stage 1	500	-	-	-	-	-
Stage 2	389	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.218	-	-	-
Pot Cap-1 Maneuver	316	563	1053	-	-	-
Stage 1	613	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	312	563	1053	-	-	-
Mov Cap-2 Maneuver	312	-	-	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	689	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.7	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1053	-	430	-	-
HCM Lane V/C Ratio	0.009	-	0.034	-	-
HCM Control Delay (s)	8.5	0	13.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	28	8	481	431	13
Future Vol, veh/h	28	28	8	481	431	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	8	29	2	3	0
Mvmt Flow	33	33	10	573	513	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1114	521	528	0	-	0
Stage 1	521	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Critical Hdwy	6.44	6.28	4.39	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.372	2.461	-	-	-
Pot Cap-1 Maneuver	228	544	915	-	-	-
Stage 1	592	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	224	544	915	-	-	-
Mov Cap-2 Maneuver	224	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	548	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.4	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	915	-	317	-	-
HCM Lane V/C Ratio	0.01	-	0.21	-	-
HCM Control Delay (s)	9	0	19.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	9	17	332	439	39
Future Vol, veh/h	6	9	17	332	439	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	6	2	10	7	0
Mvmt Flow	7	10	19	369	488	43

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	917	510	531	0	-	0
Stage 1	510	-	-	-	-	-
Stage 2	407	-	-	-	-	-
Critical Hdwy	6.4	6.26	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	2.218	-	-	-
Pot Cap-1 Maneuver	304	556	1036	-	-	-
Stage 1	607	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	297	556	1036	-	-	-
Mov Cap-2 Maneuver	297	-	-	-	-	-
Stage 1	593	-	-	-	-	-
Stage 2	676	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.1	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1036	-	412	-	-
HCM Lane V/C Ratio	0.018	-	0.04	-	-
HCM Control Delay (s)	8.5	0	14.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	34	8	481	431	13
Future Vol, veh/h	35	34	8	481	431	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	4	8	29	2	3	0
Mvmt Flow	42	40	10	573	513	15

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1114	521	528	0	-	0
Stage 1	521	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Critical Hdwy	6.44	6.28	4.39	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.372	2.461	-	-	-
Pot Cap-1 Maneuver	228	544	915	-	-	-
Stage 1	592	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	224	544	915	-	-	-
Mov Cap-2 Maneuver	224	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	548	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.4	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	915	-	315	-	-
HCM Lane V/C Ratio	0.01	-	0.261	-	-
HCM Control Delay (s)	9	0	20.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	1	-	-