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environmental/infrastructure consultants

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report

Montague Department of Public Works Facility

Master Plan - Feasibility Study Supplemental Information

August 31, 2016

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I. Introduction

This document is intended to supplement the *Montague Department of Public Works Facility, Master Plan – Feasibility Study*, dated April 6, 2016 (Study). The Study developed a DPW building program and site features which are capable of cost effectively and efficiently supporting the services offered by the DPW to the community.

The supplemental information was requested to better define unknowns in an attempt to reduce contingencies for budgeting purposes. This supplemental information includes wetland resource area investigations, a geotechnical feasibility investigation, and a preliminary site layout. This supplemental information, coupled with the Study, was used to develop an independent preliminary cost estimate. A summary of the supplemental information and independent cost estimate is presented herein.

II. Wetland Resource Area Investigation

Wetland resource areas were identified and flagged by a nationally certified Professional Wetland Scientist (PWS) and trained in the wetland delineation process using the Massachusetts Department of Environmental Protection (MassDEP) manual “Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act”.

Two areas of Bordering Vegetated Wetlands (BVW) were identified (flagged) and located using GPS surveying equipment. These areas are associated with an intermittent stream on the east side of the proposed work area. The north-western bank of this intermittent stream was also flagged.

A memorandum detailing the wetland investigation, including DEP Bordering Vegetated Wetland Delineation Field Data forms and additional backup information is attached as Appendix A. The wetland flags have been incorporated into our Preliminary Site Layout Plan discussed later in this document.

III. Geotechnical Feasibility Investigation

The purpose of our evaluation was to complete preliminary subsurface investigations and analyses and provide a discussion of geotechnical considerations and foundation alternatives for the proposed site development. Our original scope of work included one day of soil borings; however, after completion of the soil borings, additional information was necessary for adequate assessment and a test pit program was advanced. An overview of both of these programs is described below, while additional supporting information detailing the geotechnical approach and findings is attached as Appendix B.

Soil Borings

Subsurface conditions were first explored by advancing three borings to depths up to 32 ft. below the existing ground surface (bgs). A Weston & Sampson geotechnical engineer monitored drilling activities in the field and prepared logs for each boring.

Subsurface conditions encountered in the borings generally consisted of 5 to 13 inches of topsoil overlying sand fill with debris underlain by native sand to the depths explored. The sand fill with debris generally consisted of sand with some debris (including glass, rubber, wood, plastic, metal, fabric, ceramic, brick, styrofoam), trace to little silt, and up to trace gravel and organics. The bottom of the fill was encountered at depths varying between 2 ft to 29 ft.

Groundwater was encountered at depths varying between 23 ft bgs to 28 ft bgs. We anticipate that ground water levels will fluctuate with season, variations in precipitation, construction in the area, and other factors.

Test Pits

As a result of the fill with debris identified in the soil borings, additional test pit explorations were recommended to evaluate the composition, lateral extent, and thickness of fill and debris at the site (including the presence of obstructions), feasibility of ground improvement, provide data for settlement and liquefaction analyses, and investigate the presence of a glacial lake deposit and depth to till and bedrock. Test pits are preferable to borings for these purposes as they allow for a better visual observation of shallow subsurface conditions than borings.

Fourteen test pits were excavated to depths up to 12 ft. below the existing ground surface (bgs) using equipment and personnel provided by the Town of Montague. A Weston & Sampson geotechnical engineer monitored excavation and prepared logs for each test pit.

Subsurface conditions encountered in the test pits were highly variable and generally consistent with those encountered in our previous borings. In general, test pits excavated north and east of the proposed development area (TP-2 through TP-6) encountered the least amount of fill. Fill was not observed in TP-3, TP-5, and TP-6; while TP-2 and TP-4 encountered 2 ft. to 5 ft. of sand fill with trace to some amount of debris including metal, ceramic, glass, pipes, and a rubber vehicle tire (TP-4).

Test pits excavated in the central and southwest areas of the site (TP-1, TP-7, TP-9, TP-12, TP-13, and TP-14) generally encountered fill ranging in thickness from 5.5 ft. to the depth of excavation (thickness not determined). The fill encountered in these test pits contained debris as described above and also layers of mostly trash and solid waste

including trash bags, bottle, metal, shoes, plastic, foam, fabric, carpet, and concrete.

No fill was encountered in TP-10 and up to 1.5 ft. of fill and buried topsoil/subsoil layers were observed in TP-8 and TP-11. The approximate depth to native, inorganic soil (fill thickness plus any layers of buried organics) at each exploration is noted in the attached Exploration Plan. The test pits did not encounter groundwater.

Geotechnical Recommendations

Based on the subsurface conditions observed in the test pits, the fill composition and thickness is highly variable across the site, but the fill appears to be thinner and contain less trash and solid waste in northern and eastern areas of site. The geotechnical considerations and foundation alternatives presented in our June 27, 2016 report are unchanged, with the exception that we do not anticipate that ground improvement of fill containing trash and solid waste will be feasible for support of foundations, slabs, and other structural site improvement.

Over-Excavation and Replacement – In areas where native soils are present within several feet of proposed bottom-of-footing and slab subgrade elevations, the fill could be removed to expose undisturbed native soils and the resulting excavations brought back to proposed grades with structural fill. Over-excavation limits should include the entire zone-of-influence beneath proposed site improvements, which is defined by a plane extending horizontally away from the bottom edges of footings, utilities, and other existing and proposed site improvements a distance of two feet in all directions, then down and away at 1H:1V slopes.

Deep Foundations – Support of proposed building walls, columns, and slabs by deep foundations is anticipated to be significantly more expensive than over-excavation and replacement. Deep foundation alternatives include driven steel H-piles and pressure injected footings (PIFs). PIFs, also known as ‘Franki’ or ‘enlarged base’ piles, are cast-in-place concrete displacement piles.

Additional information regarding the recommendations is provided in the geotechnical

reports included in Appendix B.

IV. Preliminary Site Layout

Utilizing the results of the Study and the supplemental information, Weston & Sampson developed alternatives site layouts. These alternatives were heavily influenced by the geotechnical information discussed in Section III of this document. In an effort to reduce costs, and recognizing that the landfill is in the process of design and permitting for closure, we took an approach of moving the building east and orientating the building within the shallow waste areas. This provides an opportunity to over-excavate and replace the debris to the landfill before capping. Areas of waste beneath the building and beneath areas of the zone of influence from the footings would be removed, and backfilled with clean structural fill, if necessary. Grading of this site layout is designed to minimize the amount of structural backfill required following the waste relocation. The attached site layout, included as Appendix C, shows the layout of driveways, buildings, circulation, canopies, and parking.

V. Abbreviated Permit Review

The following is our understanding of regulatory agencies permitting and design requirements.

Planning Board

A Site Plan Review through the Planning Board will be required. Additional permitting and design information is included in Appendix D.

Conservation

The site is not within a wetland resource area or associated buffer zone and therefore, a Notice of Intent is not required. It is possible that a Request for Determination of

Applicability be discussed with the Conservation Commission Agent during the design stage once the stormwater design is approximately 75% complete.

MassDEP Bureau of Waste Prevention

The site is adjacent to a landfill and is believed to be on Site Assigned Land; therefore, MassDEP Bureau of Waste Prevention has regulatory authority of the site. MassDEP's regulatory authority is further exercised by the fact that addition waste deposits were identified in the geotechnical investigation.

An initial discussion was held between Weston & Sampson and MassDEP regarding the intentions of developing the site to the north of the burn dump as a new DPW facility. MassDEP was aware of the potential for development based on past activities and studies being performed by the Town. MassDEP asked to keep the project in close communication, as additional gas monitoring or control measures (i.e. cut off trench, sub-slab gas venting system, and/or methane monitors) may be warranted.

Following identification of waste deposits through the geotechnical investigation, Weston & Sampson contacted the Town's landfill consultant, Tighe & Bond regarding the approach of relocating waste as discussed in the preceding Section, along with capping areas of deeper waste deposits. Both consultants thought the approach was sound and a meeting with MassDEP is currently being arranged. It is anticipated that the waste relocation and the additional capping will be permitted with the landfill closure permit application being prepared as part of the landfill closure.

VI. Predesign Independent Cost Estimate

A conceptual cost estimate for the preliminary site layout was developed using an

independent cost estimator. The independent estimate is attached in Appendix E, and a summary comparison to our April 6, 2016 estimate is included as follows:

Item	Feasibility Study 4/6/2016	Supplement Report 8/31/2016
New Building Cost	$6,869,596	$ 6,052,390
Industrial Equipment	$255,299	$ 293,728
Mezzanine Systems	$123,060	$ 240,209
Open Canopy Storage	$419,402	$ 599,519
Site Development and Support Structure Costs	$1,266,453	$ 2,081,031
Design Contingency (5%)	INCL. ABOVE	INCL. ABOVE
Escalation (3%)		
Subtotal Construction Cost (includes Design Contingency and Escalation):	$8,933,810	$ 9,266,877
Owner Costs:	$1,544,409	$1,544,409
· A&E Fees		
· Furnishings		
· Communication/low voltage system		
· Printing/advertisement		
· Testing & Inspections		
Construction contingency (8%):	$714,705	$741,350
Subtotal Administrative and Contingency:	$2,259,114	$2,285,759
Total Project Cost DPW Facility:	**$11,192,923**	**$11,552,636**

Appendix A

Wetland Delineation Memorandum

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MEMORANDUM

TO: Mike Richard

FROM: Mel Higgins, PWS

DATE: May 26, 2016

SUBJECT: Wetlands Delineation
Montague, MA – off Sandy Lane

Background

On May 25, 2016, wetland resource areas were delineated at the off of Sandy Lane in Montague, Massachusetts.

Wetland resource areas were identified and flagged in the field using pink flagging by a Weston & Sampson employee who is a nationally certified Professional Wetland Scientist (PWS) and trained in the wetland delineation process using the Massachusetts Department of Environmental Protection (MassDEP) manual "*Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act*". The location and flag numbering system can be seen on the attached field map. A further description of these wetland resource areas is presented, below.

Bordering Vegetated Wetlands

Two areas were identified and flagged as bordering vegetated wetlands (BVW). These areas are associated with an intermittent stream on the east side of the proposed work area. The two BVW areas are divided by a dirt road. The BVW areas are contained by very steep walls. The eastern BVW area contains wetland flags BVW-A1 through BVW-A6 (the "A" series). The A series of flags locates the western most edge of the wetland before it is stopped by the bank associated with the dirt road. While this area is associated with an intermittent stream, the surface water body in this area resembled a very small pond, with standing water reaching a depth of approximately 2 feet, and a surface area of approximately 20-feet by 30-feet. This ponding is the result of perennial stream water being blocked by the steep bank.

The BVW area on the western side of the dirt road is associated with the northern/western bank of the intermittent stream. These flags included BVW-B1 through BVW-B18.

Both the A-series and B-series contained similar wetland vegetation with dominant wetland vegetation as being skunk cabbage (*Symplocarpus foetidus*), cinnamon fern (*Osmunda cinnamomea*), and jewelweed (*Impatiens capensis*), all species that thrive in wet conditions.

Hydrology indicators included site inundation and water stained leaves.

Soils at the A-series (at the edge of the ponded area), was considered muck, and the soils at the edge of the bank at the B-series was considered loamy sand being underlain by clay.

Bank of Intermittent Stream

MassDEP mapped this resource area as an intermittent stream, and further mapping using USGS Streamstats (Version 3.0) confirms that this is considered an intermittent stream since the drainage area of the stream at this location is calculated as 0.16 square miles (per 310 CMR 10.58(2)(a)(1)(c)(i), a stream mapped as intermittent with a drainage area of less than 0.5 square miles cannot be considered perennial).

At the time of this field effort, there was flowing water in the stream, with the water being approximately 6-inches deep and 6 – 8-feet wide. Water was seeping out of the bank associated with the road on the east side, and also along the length of the stream. The stream flowed in a south-westerly direction. Because this resource area is considered an intermittent stream, the bank of this stream was flagged. The top of bank was determined using the first observable break in slope. Flags TOB-1 through TOB 15 represent the North-western bank of this intermittent stream.

Attached please find a field map showing the wetland limits flagged in the field with associated wetland flag numbers. Completed DEP Bordering Vegetated Wetland Delineation Field Data forms area also attached to this memorandum.

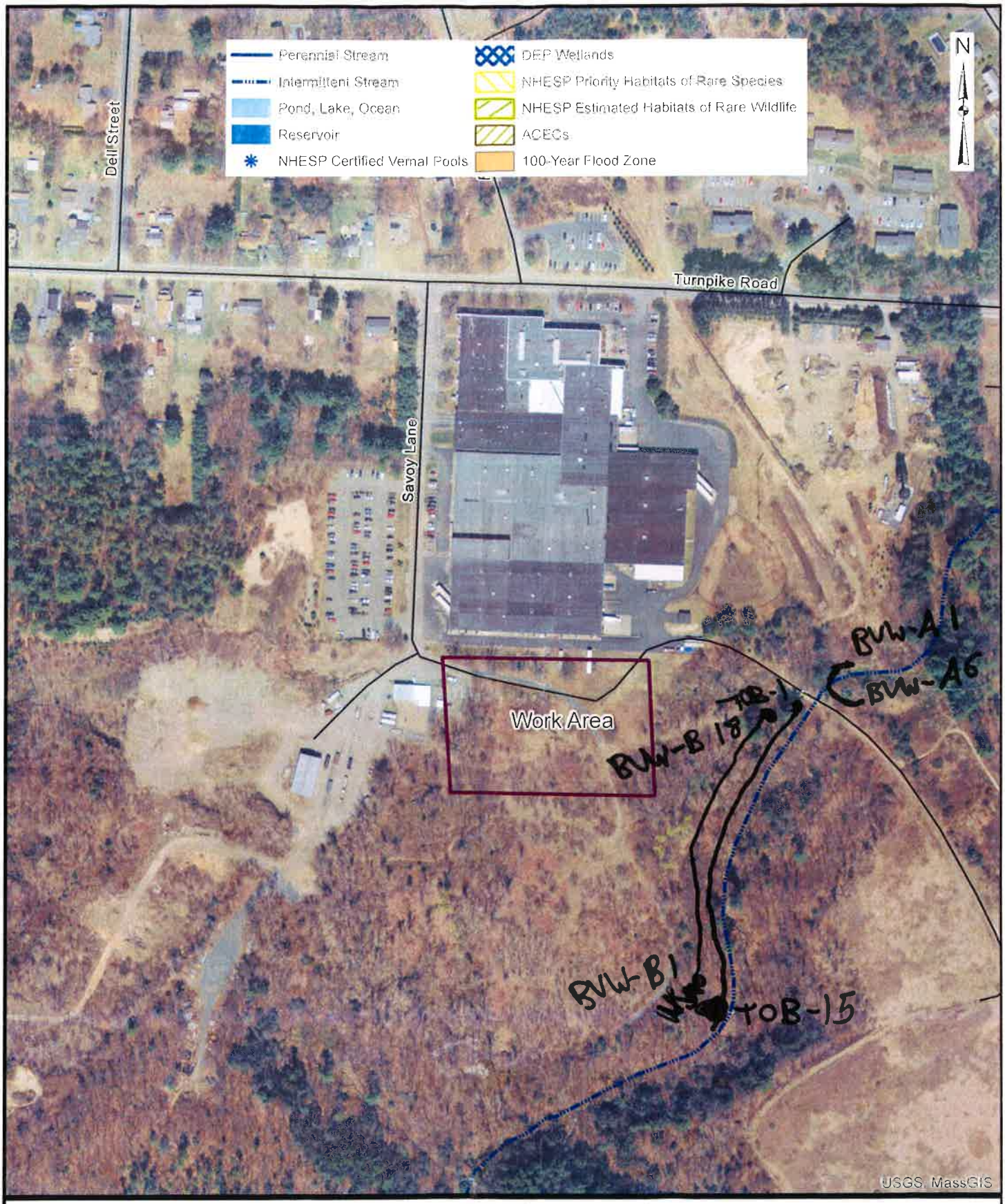

FIGURE 1
Sandy Lane
Montague, Massachusetts

ENVIRONMENTAL RESOURCES MAP

500 0 500

Scale In Feet

Weston&Sampson

Path: T:\Water\ERMAP\GIS - Constraints Mapping\Montague MA\Figure 1 - Env Receptor.mxd User: higginsm Saved: 3/9/2016 11:08:57 AM Opened: 3/9/2016 11:09:43 AM

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Weston & Sampson Prepared by: Weston & Sampson Project location: Montague DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☒ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 1		Transect Number: BVW-A7-WET	Date of Delineation: 5/25/16
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Tree layer				
Red maple (Acer rubrum)	20%	100%	Yes	FAC*
Shrub layer				
Witch Hazel (Hamamelis virginiana)	20%	100%	Yes	FAC-
Cover layer				
Skunk cabbage (Symplocarpus foetidus)	50%	50%	Yes	OBL*
Cinnamon fern (Osmunda cinnamomea)	30%	30%	Yes	FACW*
Jewelweed (Impatiens capensis)	20%	20%	Yes	FACW*

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? (yes) no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? (yes) no
title/date: Franklin Co. MA
map number: MA011
soil type mapped: loamy sand
hydric soil inclusions:

Are field observations consistent with soil survey? yes (no)
Remarks:

Muck noted in wetland area

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
Muck at edge of open water.			

Remarks:

3. Other:

Conclusion: Is soil hydric? (yes) no

Other Indicators of Hydrology: (check all that apply & describe)

- ☑ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☑ Depth to soil saturation in observation hole: Sat. at surface
- ☐ Water marks: _____
- ☐ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☑ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☐ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	✓	
Wetland hydrology present:		
Hydric soil present	✓	
Other indicators of hydrology present	✓	
Sample location is in a BVW	✓	

Submit this form with the Request for Determination of Applicability or Notice of Intent.

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Weston & Sampson Prepared by: Weston & Sampson Project location: Montague DEP File #: _____

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☒ Vegetation and other indicators of hydrology usedto delineateBVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Vegetation	Observation Plot Number: 2		Transect Number: BVW-B3-WET	Date of Delineation: 5/25/16
A. Sample Layer & Plant Species (by common/scientific name)	B. Percent Cover (or basal Area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*
Tree layer - none				
Shrub layer				
Witch Hazel (Hamamelis virginiana)	20%	100%	Yes	FAC-
Cover layer				
Skunk cabbage (Symplocarpus foetidus)	80%	73%	Yes	OBL *
Jewelweed (Impatiens capensis)	20%	18%	No	FACW *
Cinnamon fern (Osmunda cinnamomea)	10%	9%	No	FACW *

* *Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.*

Vegetation conclusion:

Number of dominant wetland indicator plants: 1 Number of dominant non-wetland indicator plants: 1

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? (yes) no

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? (yes) no
title/date: Franklin Co. MA
map number: MA011
soil type mapped: loamy sand
hydric soil inclusions:

Are field observations consistent with soil survey? (yes) no
Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color
A	0-5"	2.5Y 3/2	–
B	5-12"	Glayed soil - clay	

Remarks:

3. Other:

Conclusion: Is soil hydric? (yes) no

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated: _____
- ☐ Depth to free water in observation hole: _____
- ☑ Depth to soil saturation in observation hole: Sat. at ground level
- ☐ Water marks: _____
- ☑ Drift lines: _____
- ☐ Sediment Deposits: _____
- ☐ Drainage patterns in BVW: _____
- ☐ Oxidized rhizospheres: _____
- ☐ Water-stained leaves: _____
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo; other): _____
- ☐ Other: _____

Vegetation and Hydrology Conclusion

	Yes	No
Number of wetland indicator plants ≥ # of non-wetland indicator plants	✓	
Wetland hydrology present:		
Hydric soil present	✓	
Other indicators of hydrology present	✓	
Sample location is in a BVW	✓	

Submit this form with the Request for Determination of Applicability or Notice of Intent.

Appendix B

Geotechnical Feasibility Investigation Documents

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planning, permitting, design, construction, operation, maintenance

Weston&Sampson®

Town of Montague, Massachusetts
Weston & Sampson Project No. 2160048

June 27, 2016

Walter Ramsey, AICP
Town Planner and Conservation Agent
Town of Montague
One Avenue A
Montague, MA 01376

RE: Geotechnical Feasibility Evaluation
Proposed Department of Public Works Facility
Montague, Massachusetts

INTRODUCTION

Weston & Sampson Engineers, Inc. (Weston & Sampson) is pleased to present this letter report summarizing our geotechnical feasibility evaluation for the proposed new Department of Public Works (DPW) facility at the south end of Sandy Lane in Montague, Massachusetts. The purpose of our evaluation was to complete preliminary subsurface investigations and analyses and provide a discussion of geotechnical considerations and foundation alternatives for the proposed site development.

A preliminary site layout developed by Weston & Sampson (Option 1A dated June 8, 2016) includes an approximately 24,000 square foot main building at the approximate location shown in the attached ***Figure 1 – Exploration Plan***. The main building includes administration offices, employee facilities, maintenance shops, vehicle maintenance and storage areas, a vehicle wash bay, and exterior canopy-covered storage areas. Proposed site features also include paved driveway, parking, bulk material storage area, and yard areas and new underground utilities. Future proposed features also shown in Figure 1 include a salt shed, fueling facility, and recycling and compost collection areas.

We assume the lowest building floor will be a slab-on-grade and no basements and/or below grade areas are planned except for possible below grade vaults in isolated areas. Structural information was not available at the time of this study but based on our experience with similar structures, we anticipate that loads will be less than 250 kips for columns, less than 5 kips per lineal foot for walls, and up to 250 pounds per square foot (psf) for floor slabs.

Preliminary site grading and proposed first floor building elevations had not been developed at the time of this study but based on existing site topography we anticipate that mass grading will require cuts and fills of less than 10 ft. relative to existing grades. We also assume that new utilities and any below grade vaults will be less than 10 feet below existing grades.

EXISTING INFORMATION

A survey prepared by Tighe & Bond dated May 16, 2000 shows an "old burn dump area" immediately south of the proposed DPW site. A sanitary landfill is shown southeast of the burn dump area and proposed DPW site.

In 2015, Fuss & O'Neill excavated several test pits along the west, north, and east boundaries of the burn dump area, presumably to delineate the limits of the burn dump area. Electromagnetic (EM) and ground penetrating radar (GPR) surveys were completed by TPI Environmental (TPI) to supplement information from the test pits. The results of the EM and GPS surveys were provided in a June 11, 2015 report prepared by TPI. A revised burn dump delineation based on the 2015 data is shown in a September 28, 2015 drawing prepared by Fuss & O'Neill. The 2015 burn dump delineation is shown in the attached Figure 1.

SITE OBSERVATIONS AND CONDITIONS

Surface Conditions

The site is currently undeveloped and located immediately southeast of the south end of Sandy Lane. The site is bordered to the north by the existing Judd Wire, Inc. facility (124 Turnpike Road), to the west by the Franklin County Sheriff's Office Regional Dog Shelter and Town of Montague Recycling & Transfer Station, and to the south and east by undeveloped areas as shown in Figure 1.

An asphalt concrete (AC) paved roadway extends approximately 350 ft. southeast from the south end of Sandy Lane. At the end of the pavement, an unpaved path continues south before turning to the west along the southern border of the site. The roadway and path are visible in ***Figure 1***.

The ground surface in the northeast portion of the site (northeast of the road) is relatively flat and vegetated with high grass. Other areas of the site are overgrown with thick vegetation including trees, brush, and vines. The ground surface in these areas was not easily observable due to the vegetation, but surface elevations appeared to be variable and range in elevation by several feet. Topographic survey data and ground surface elevations at the site were not available at the time of our evaluation. Debris, including pieces of concrete and a refrigerator, were observed at the ground surface in several locations.

Geologic Setting

Based on information available from the Massachusetts Office of Geographic Information (MassGIS), surficial geology conditions at the site are mapped as coarse grained sand and gravel deposits overlying fine grained glaciolacustrine (glacial lake) deposits underlain by till and bedrock at depths less than 50 feet. Early post-glacial inland dune deposits are mapped immediately north and west of the site.

Bedrock geology at the site is mapped as the Turner Falls Sandstone formation, which is described by the USGS as "*reddish-brown to pale red arkosic sandstone, and gray sandstone,*

gray siltstone, and black shale interpreted as lake beds." No bedrock outcrops are mapped in the vicinity of the site.

Subsurface Explorations

Subsurface conditions were explored on June 8, 2016 by advancing three borings (B1 through B3) to depths up to 32.0 ft. below the existing ground surface (bgs) at the approximate locations shown in ***Figure 1***. The borings were completed by Seaboard Drilling, Inc. of Springfield, MA using a track-mounted ATV drill rig and hollow-stem auger (HSA) drilling methods. A Weston & Sampson geotechnical engineer monitored drilling activities in the field and prepared logs for each boring. Subsurface conditions encountered in the borings are described in the following section and the attached ***Boring Logs***.

Standard penetration tests (SPT) were conducted at 2 ft. to 5 ft. intervals by driving a 24 in. long by 1-3/8 in. inside diameter (2 in. outside diameter) split spoon sampler with blows from a 140 lb. automatic hammer falling 30 in. per blow. The blow counts for the middle 12 inches of sampler penetration are combined and designated as the SPT blow count, which is correlated to soil consistencies and engineering soil properties.

Subsurface Conditions

General – Subsurface conditions encountered in the borings generally consisted of 5 to 13 inches of topsoil overlying SAND FILL WITH DEBRIS underlain by native SAND to the depths explored. The bottom of the fill was encountered at depths of approximately 10 ft. in B1, 29 ft. in B2, and 2 ft. in B3. The subsurface conditions encountered in the borings were generally consistent with the site history and mapped surficial geology.

The SAND FILL WITH DEBRIS generally consisted of very loose to very dense (SPT blow counts potentially affected by debris) sand with up to some debris (including glass, rubber, wood, plastic, metal, fabric, ceramic, brick, styrofoam), trace to little silt, and up to trace gravel and organics. The debris encountered in B2 appeared to be partially burnt and contained ash.

The native SAND was generally loose to medium dense, fine to coarse grained, and contained trace to little silt to the depths explored. Samples of the native sand from 9 ft. to 13 ft. in B3 contained trace gravel.

Groundwater – Groundwater was encountered at depths of 24 ft. in B1, 28 ft. in B2, and 23 ft. in B3 based on wet samples and observations during drilling. We anticipate that ground water levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched ground water conditions could exist close to the ground surface, especially during and after extended periods of wet weather.

GEOTECHNICAL CONSIDERATIONS

Based on the subsurface conditions encountered in the explorations, primary geotechnical considerations for the proposed site development and foundation design include existing undocumented (non-engineered) fill, buried debris, settlement and liquefaction potential of loose native sands, and the potential for a soft fine grained glaciolacustrine deposit underlying the site

at depths greater than those explored by the preliminary borings. These considerations are addressed in greater detail in the following sections.

Existing Fill and Debris

Existing undocumented fill and debris were observed in all borings to depths up to 29 ft. Undocumented fill and debris are not suitable for support of foundations or other rigid site improvements that could be adversely affected by differential settlement. Foundation alternatives are discussed below.

Based on the site history and conditions observed in the borings, we anticipate that the composition, consistency, and thickness of the fill is highly variable. It also appears that burn dump debris extends further north and onto the site than indicated by the 2015 burn dump delineation. Additional explorations are recommended as described below to evaluate the extent and thickness of areas of undocumented fill and buried debris and determine the most economical foundation alternative(s).

Settlement and Liquefaction of Loose Native Sand

Geotechnical considerations associated with the loose native sand encountered in all borings include settlement due to increases in stress (loads from foundations, slabs, stockpiled materials, etc.) and liquefaction of layers of loose sand below the groundwater table during a seismic event.

Liquefaction is the sudden drop in shear strength between soil particles that can occur in a saturated, cohesionless soil as a result of ground acceleration during an earthquake. Conditions most likely to contribute to liquefaction include a soil matrix containing loose, uniform medium to fine sand (poorly graded sand). Liquefaction can result in settlement and/or bearing capacity failure of foundations resulting in sudden and catastrophic failure of structures during or immediately following a seismic event.

Additional borings will be required to evaluate liquefaction hazard as the preliminary borings did not penetrate layers of loose sand below the groundwater level and did not extend to the minimum depth of 60 ft. required by the Building Code for evaluation of liquefaction on level ground. Liquefaction hazard associated with sloping ground (i.e. lateral spreading) may also need to be evaluated once topographic survey data of the site and surrounding areas is available.

Glaciolacustrine Deposits

While not encountered in the preliminary borings, fine grained glacial lake deposits are mapped as underlying the site. These deposits typically consist of very soft to medium stiff layers of silt and/or clay. Thin alternating layers of silt and clay, called varves, are common in the Connecticut River Valley. This “varved clay” possesses unique engineering properties. The presence of and settlement associated with fine grained glacial lake deposits, especially due to stress increases from site grading and stockpiled materials at this site, will need to be evaluated by future investigations and analyses.

FOUNDATION ALTERNATIVES

As described above, all borings encountered undocumented fill and buried debris to depths ranging from 2 ft. to 29 ft. and these materials are not suitable for support of foundations or other rigid site improvements. Foundation alternatives therefore include complete removal (over-excavation) of the existing fill and replacement with structural fill, in-situ ground improvement, or support of proposed foundations, slabs, and other rigid site improvements on deep foundations such as driven piles or pressure injected footings that extend through the fill and debris and develop their capacity in the underlying soils or bedrock.

In areas where native soils are present within a few feet below proposed foundations and slabs, over-excavation and replacement may be the most economical alternative. Where the fill and debris extends greater than a few feet below the bottom of footing and slab elevations, ground improvement or deep foundations will likely be more economical. Environmental considerations, such as handling and disposal of debris and impacted soils, may make ground improvement or deep foundations more feasible and economically attractive than over-excavation and replacement.

Over-Excavation and Replacement

In areas where native soils are present within several feet of proposed bottom-of-footing and slab subgrade elevations, the fill could be removed to expose undisturbed native soils and the resulting excavations brought back to proposed grades with structural fill. Over-excavation limits should include the entire zone-of-influence beneath proposed site improvements, which is defined by a plane extending horizontally away from the bottom edges of footings, utilities, and other existing and proposed site improvements a distance of two feet in all directions, then down and away at 1H:1V slopes.

Following removal and replacement of the fill and debris with structural fill, or in areas where no fill is present, the proposed building can be supported on conventional shallow foundations and slabs on-grade. Additional geotechnical explorations and analyses will be required to evaluate settlement of foundations and slabs and provide recommendations for design and construction of shallow foundations.

Ground Improvement

Ground improvement involves installation of elements in the ground to improve the soil bearing capacity and limit settlement to acceptable tolerances. Improvement is done in-place and typically without generating significant spoils, which can be a distinct advantage where removal of soils would require special handling and off-site disposal.

Improvement of inorganic fill soils can typically be achieved using compacted stone columns, also known the trademarked names Geopiers (Geopier Foundation Company) and Vibro Piers (Hayward Baker). Grouted stone columns or rigid inclusions (grouted columns) may be appropriate for conditions with limited thicknesses of organic soils or debris. Additional explorations will be required to determine if and what method(s) of ground improvement are feasible for this site based on the debris content of the soils. Obstructions in the fill that may

prevent or complicate installation of ground improvement elements will also need to be evaluated.

Deep Foundations

Support of proposed building walls, columns, and slabs by deep foundations is anticipated to be significantly more expensive than ground improvement, however, deep foundations may be the only alternative if ground improvement is not feasible. Deep foundation alternatives include driven steel H-piles and pressure injected footings (PIFs).

PIFs, also known as 'Franki' or 'enlarged base' piles, are cast-in-place concrete displacement piles. In general, a heavy hollow steel casing with a bottom plug is driven into the ground to a design bottom (tip) elevation. The plug is expelled and a fixed volume (batch) of dry zero-slump concrete is placed in the bottom of the casing and expelled with blows of a heavy (typically 20,000 pounds) steel drop hammer. Successive batches of concrete are placed and expelled until the number of hammer blows required to expel the batch exceeds a predetermined value. The zero-slump concrete forms a densified bulb of concrete surrounded by densified soil, which provides the load carrying capacity of the PIF. The PIF shaft is then constructed using corrugated steel casing and reinforced concrete shaft construction methods

PIFs will likely be more economically attractive at this site than H-piles provided the fill does not contain obstructions that would prevent driving of the steel casing to the design PIF tip elevation, which is likely up to several feet into the native soils. Driven H-piles are more able to penetrate obstructions than PIFs, but lengths would be longer, as H-piles would need to be driven as end-bearing piles to refusal in the till and/or bedrock underlying the site. Additional explorations will be required to investigate the potential for obstructions in the fill, native soil conditions beneath the fill, and depths to till/bedrock.

ADDITIONAL EXPLORATIONS AND ANALYSES

As described in the preceding sections, additional explorations will be required to evaluate the composition, lateral extent, and thickness of undocumented fill and debris at the site (including the presence of obstructions), feasibility of ground improvement, provide data for settlement and liquefaction analyses, and investigate the presence of a glacial lake deposit and depth to till and bedrock.

Additional explorations should include test pits to further define the lateral extent and composition of the fill materials. Test pits are preferable to borings for these purposes as they allow for a better visual observation of shallow subsurface conditions than borings. Borings will be required to evaluate fill thicknesses deeper than the limits of excavation equipment, engineering parameters (e.g. SPT blow counts) for settlement and liquefaction analyses, the presence and consistency of a glacial lake deposit, and depths to till and bedrock. We recommend that future evaluations and explorations include environmental assessments as necessary to evaluate requirements for handling and off-site disposal of existing soils and debris, which may be a significant consideration for development of this site.

LIMITATIONS

We have prepared this preliminary feasibility study for use by the Town of Montague, Massachusetts and their design and construction teams for this site and project only. The information herein may be used for preliminary cost estimating and/or alternative analyses, but is not considered sufficient for design or bidding and should not be construed as a warranty of subsurface conditions.

Additional geotechnical explorations and analyses will be required for final design. We have made observations only at the aforementioned locations and only to the stated depths. These observations do not reflect soil types, strata thicknesses, water levels or seepage that may exist between or below preliminary observations.

If any changes are made to the anticipated site layout, loads, grading, configurations, or construction timing, the conclusions and recommendations contained herein may not be applicable, and we should be consulted. Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared. No warranty, expressed or implied, is given.

It has been a pleasure assisting you with this project and we look forward to our continued involvement. Please call if you have any questions.

Very truly yours,

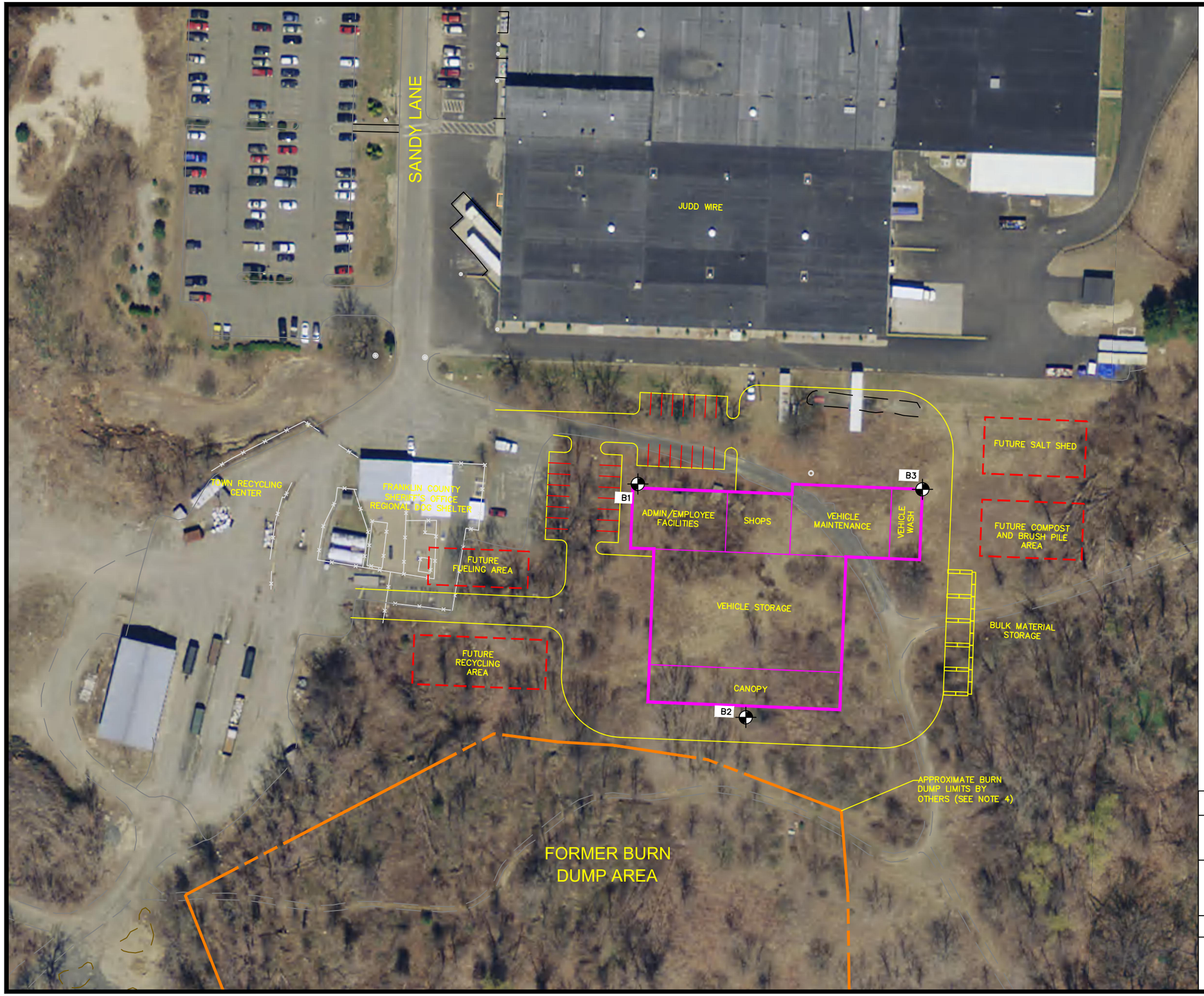
WESTON & SAMPSON, INC.

Christopher J. Palmer, PE
Team Leader

Julie A. Eaton, EIT
Engineer

Attachments:

- Figure 1 - Exploration Plan
- Boring Logs (3 pages)



NOTES:

1. THIS DRAWING AND SITE LAYOUT ARE BASED ON CURRENT SITE PLAN ""OPTION 1A" PREPARED BY WESTON & SAMPSON ENGINEERS ON JUNE 8, 2016.
2. BORING LOCATIONS SHOWN ARE BASED ON FIELD MEASUREMENTS RELATIVE TO EXISTING SITE FEATURES. LOCATIONS ARE THEREFORE APPROXIMATE.
3. BORINGS WERE COMPLETED BY SEABOARD DRILLING, INC. OF SPRINGFIELD, MASSACHUSETTS AND OBSERVED BY A WESTON & SAMPSON GEOTECHNICAL ENGINEER ON JUNE 8, 2016.
4. BURN DUMP LIMITS BASED ON A DRAWING PREPARED BY FUSS & O'NEILL DATED SEPTEMBER 28, 2015.

LEGEND:

B1 BORING NUMBER AND APPROXIMATE LOCATION

80 40 0 80 160

SCALE: 1"=80'

FIGURE 1

MONTAGUE DPW
MONTAGUE, MA

EXPLORATION PLAN

DESIGNED BY: JAE	CHECKED BY: CJP	DATE: JUNE 2016

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O:\Montague MA\2160048 - Montague DPW Feasibility Study\Geotechnical\Field\EXPLORATION PLAN.dwg

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PROJECT	REPORT OF BORING No.	B1
Montague DPW Montague, MA	SHEET	1 OF 1
	Project No.	2160048
	CHKD BY	Christopher J. Palmer, PE

BORING Co.	Seaboard Drilling Inc.	BORING LOCATION	See attached plan		
FOREMAN	Dave Robeaux	GROUND SURFACE ELEV.		DATUM	
WSE ENGINEER:	Julie A. Eaton, EIT	DATE START	6/8/2016	DATE END	6/8/2016

SAMPLER: 2 IN. O.D. SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES USING A 140 lb. AUTO HAMMER.

CASING: HOLLOW STEM AUGER DRILLING METHODS

CASING SIZE: 4 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
6/8/2016		24 ft. +/-	25 ft.	Upon termination.

DEPTH (feet)	CASING (blows/ft)	SAMPLE No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"	PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
0		S1	21/24	0-2	0-2-4-3		Loose, dark brown, fine to coarse SAND FILL, some silt, little organics (roots); moist.		**5" TOPSOIL**
		S2	8/24	2-4	2-18-41-36		Very dense, light brown, fine to coarse SAND FILL, trace debris (rubber), trace gravel and silt; moist.		**SAND FILL WITH DEBRIS**
5		S3	0/24	4-6	18-21-11-6		Dense, no recovery.		
		S4	3/24	6-8	4-3-3-3		Loose, brown, SAND FILL, some debris (wood, plastic), trace gravel, trace silt; moist.		
		S5	3/24	8-10	4-5-7-9		Medium dense, gray-brown, fine to medium SAND FILL, some debris (metal, plastic), trace silt; moist.		
10		S6	24/24	10-12	5-5-5-4		Medium dense, gray, fine to medium SAND, trace to little silt; moist. Bottom 8": grades to fine to coarse, little to some silt.		**SAND**
15		S7	15/24	15-17	2-3-2-3		Loose, light brown, fine to coarse SAND, trace silt; moist.		
20		S8	19/24	20-22	3-4-6-5		Medium dense, gray, fine to medium SAND, trace silt; moist. Bottom 7": orange stained seams.		
25		S9	14/24	25-27	1-2-5-8		Loose, brown, fine to medium SAND, trace silt; wet.		
							Boring terminated at 27.0 ft.		
30									

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY
0-4	V. LOOSE	0-2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
> 50	V. DENSE	15-30	V. STIFF
		> 30	HARD

NOTES:

1. Slow advance from 0 - 10 ft. Auger cuttings included fabric and plastic debris.

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B1

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PROJECT	REPORT OF BORING No.	B2
Montague DPW Montague, MA	SHEET	1 OF 1
	Project No.	2160048
	CHKD BY	Christopher J. Palmer, PE

BORING Co.	Seaboard Drilling Inc.	BORING LOCATION	See attached plan
FOREMAN	Dave Robeaux	GROUND SURFACE ELEV.	DATUM
WSE ENGINEER:	Julie A. Eaton, EIT	DATE START 6/8/2016	DATE END 6/8/2016

SAMPLER: 2 IN. O.D. SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES USING A 140 lb. AUTO HAMMER.

CASING: HOLLOW STEM AUGER DRILLING METHODS

CASING SIZE: 4 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
6/8/2016		28 ft. +/-	30 ft.	Upon termination.

DEPTH (feet)	CASING (blows/ft)	SAMPLE No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"	PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
0		S1	19/24	0-2	1-4-5-2		Loose, brown, SILTY SAND FILL, some organics (roots), trace gravel; moist.		**13" TOPSOIL**
		S2	16/24	2-4	5-8-1-2		Loose, brown, fine to medium SAND FILL, little silt, trace gravel, trace organics (roots); moist.	1	
5		S3	21/24	4-6	8-8-4-2		Medium dense, dark brown, SAND FILL, some debris (glass, ash, plastic), trace silt; moist.		
		S4	16/24	6-8	2-1-4-4		Loose, black, SAND FILL, some debris (glass, plastic, ash, wood), trace silt; moist.		
		S5	9/24	8-10	3-3-4-3		Loose, black, SAND FILL, some debris (glass, plastic, ash, wood), little silt, trace gravel; moist.		
10		S6	3/24	10-12	3-3-1-1		Loose, dark brown, SAND FILL, little debris (ash, metal), trace organics (roots), trace silt; moist.		
		S7	6/24	12-14	1-1-1-1		Very loose, black, SAND FILL, some debris (wood, glass, ash), little gravel, little silt; moist.		**SAND FILL WITH DEBRIS**
15		S8	9/24	14-16	1-1-2-4		Very loose, black, SAND FILL, some debris (glass, ash), little gravel, little silt; moist.	2	
		S9	14/24	16-18	4-2-2-2		Loose, dark brown, SAND FILL, some debris (ash, ceramic, plastic), little silt, trace gravel; moist.		
		S10	11/24	18-20	2-2-2-1		Loose, black, SAND FILL, little silt, little debris (ash, styrofoam), trace gravel; moist.		
20		S11	3/24	20-22	3-2-2-3		Loose, black, SAND FILL, some debris (ash, styrofoam), little to some silt, trace gravel; moist.		
25		S12	12/24	25-27	2-2-2-3		Loose, black, SAND FILL, some debris (brick, glass, ash, wood), trace to little silt, trace gravel; moist.	3	
30		S13	20/24	30-32	3-4-5-6		Loose, brown, fine to coarse SAND, little silt; wet. Bottom 13": grades to fine to medium.		**SAND**
							Boring terminated at 32.0 ft.		

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY
0-4	V. LOOSE	0-2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
> 50	V. DENSE	15-30	V. STIFF
		> 30	HARD

NOTES:

1. Slow auger advance from 5 ft. to 14 ft. and sporadic auger grinding.
2. Auger grinding from 15 ft. to 18 ft. and sporadic auger grinding from 18 ft. to 28 ft.
3. Change in auger advance indicating possible change in soil conditions.

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B2

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PROJECT	REPORT OF BORING No.	B3
Montague DPW Montague, MA	SHEET	1 OF 1
	Project No.	2160048
	CHKD BY	Christopher J. Palmer, PE

BORING Co.	Seaboard Drilling Inc.	BORING LOCATION	See attached plan
FOREMAN	Dave Robeaux	GROUND SURFACE ELEV.	DATUM
WSE ENGINEER:	Julie A. Eaton, EIT	DATE START 6/8/2016	DATE END 6/8/2016

SAMPLER: 2 IN. O.D. SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES USING A 140 lb. AUTO HAMMER.

CASING: HOLLOW STEM AUGER DRILLING METHODS

CASING SIZE: 4 1/4 IN. INSIDE DIAMETER. OTHER:

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
DATE		23 ft. +/-	25 ft.	Upon termination

DEPTH (feet)	CASING (blows/ft)	SAMPLE No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"	PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
0		S1	18/24	0-2	5-10-11-11		Medium dense, brown, SAND FILL, some gravel, little debris (brick, glass, ash), little silt; moist.	1	**5" TOPSOIL**
									SAND FILL W/DEBRIS
		S2	14/24	2-4	9-9-10-10		Medium dense, light brown, fine to medium SAND, trace silt; moist.		
		S3	17/24	4-6	5-5-4-5		Loose, light brown, fine to medium SAND, trace silt; moist.		
5									
		S4	16/24	9-11	3-5-5-4		Medium dense, light brown, fine to coarse SAND, trace gravel, trace silt; moist.		
10									
		S5	15/24	11-13	4-4-4-3		Loose, light brown, fine to coarse SAND, trace gravel, trace silt; moist.		**SAND**
15		S6	17/24	15-17	3-3-4-5		Loose, light brown, fine to coarse SAND, trace to little silt; moist. Bottom 7": orange stained seams.		
20		S7	20/24	20-22	3-3-5-5		Loose, brown, fine SAND, trace silt; moist. Bottom 12": grades to little silt; wet.		
25		S8	18/24	25-27	3-5-6-5		Medium dense, brown, fine to medium SAND, little silt; wet.		
							Boring terminated at 27.0 ft.		
30									

GRANULAR SOILS		COHESIVE SOILS	
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY
0-4	V. LOOSE	0-2	V. SOFT
4-10	LOOSE	2-4	SOFT
10-30	M. DENSE	4-8	M. STIFF
30-50	DENSE	8-15	STIFF
> 50	V. DENSE	15-30	V. STIFF
		> 30	HARD

NOTES:

1. Auger grinding from 1 ft. to 2 ft.

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.

ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B3

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www.westonandsampson.com

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Weston&Sampson®

MEMORANDUM

TO: Mike Richards, PE - Weston & Sampson Engineers, Inc.

FROM: Chris Palmer, PE - Weston & Sampson Engineers, Inc.
Julie A. Eaton, EIT - Weston & Sampson Engineers, Inc.

DATE: July 22, 2016

SUBJECT: Additional Subsurface Investigations and Geotechnical Considerations
Proposed Department of Public Works Facility - Montague, MA

This memorandum summarizes the subsurface conditions encountered in additional explorations (test pits) completed at the site of the proposed new Department of Public Works (DPW) facility at the south end of Sandy Lane in Montague, Massachusetts. The test pits were completed to evaluate the composition, extent, and thickness of undocumented fill encountered in three borings (B-1 through B-3) completed previously as part of our geotechnical feasibility evaluation. The information below supplements the information provided in our June 27, 2016 letter report. The limitations of the report apply.

SUBSURFACE CONDITIONS

Fourteen test pits (TP-1 through TP-14) were excavated to depths up to 12.0 ft. below the existing ground surface (bgs) on July 19, 2016 using equipment and personnel provided by the Town of Montague. Approximate test pit locations are shown in the attached ***Figure 1 - Exploration Plan***. A Weston & Sampson geotechnical engineer monitored excavation and prepared logs for each test pit. Subsurface conditions encountered in the test pits are described in the following section and the attached ***Test Pit Logs***.

Subsurface conditions encountered in the test pits were highly variable and generally consistent with those encountered in our previous borings. In general, test pits excavated north and east of the paved access road (TP-2 through TP-6) encountered the least amount of fill. Fill was not observed in TP-3, TP-5, and TP-6. TP-2 and TP-4 encountered 2 ft. to 5 ft. of SAND FILL with trace to some amount of debris including metal, ceramic, glass, pipes, and a rubber vehicle tire (TP-4).

Test pits excavated in the central and southwest areas of the site (TP-1, TP-7, TP-9, TP-12, TP-13, and TP-14) generally encountered fill ranging in thickness from 5.5 ft. to the depth of excavation (thickness not determined). The fill encountered in these test pits contained debris as described above and also layers of mostly trash and solid waste including trash bags, bottle, metal, shoes, plastic, foam, fabric, carpet, and concrete.

No fill was encountered in TP-10 and up to 1.5 ft. of fill and buried topsoil/subsoil layers were observed in TP-8 and TP-11. The approximate depth to native, inorganic soil (fill thickness plus any layers of buried organics) at each exploration is noted in the attached Exploration Plan. The test pits did not encounter groundwater.

GEOTECHNICAL CONSIDERATIONS

Based on the subsurface conditions observed in the test pits, the fill composition and thickness is highly variable across the site, but the fill appears to be thinner and contain less trash and solid waste in northern and eastern areas of site. The geotechnical considerations and foundation alternatives presented in our June 27, 2016 report are unchanged, with the exception that we do not anticipate that ground improvement of fill containing trash and solid waste will be feasible for support of foundations, slabs, and other structural site improvement.

Please call with any questions.

Attachments: Exploration Plan (1 page)
Test Pit Logs (14 pages)

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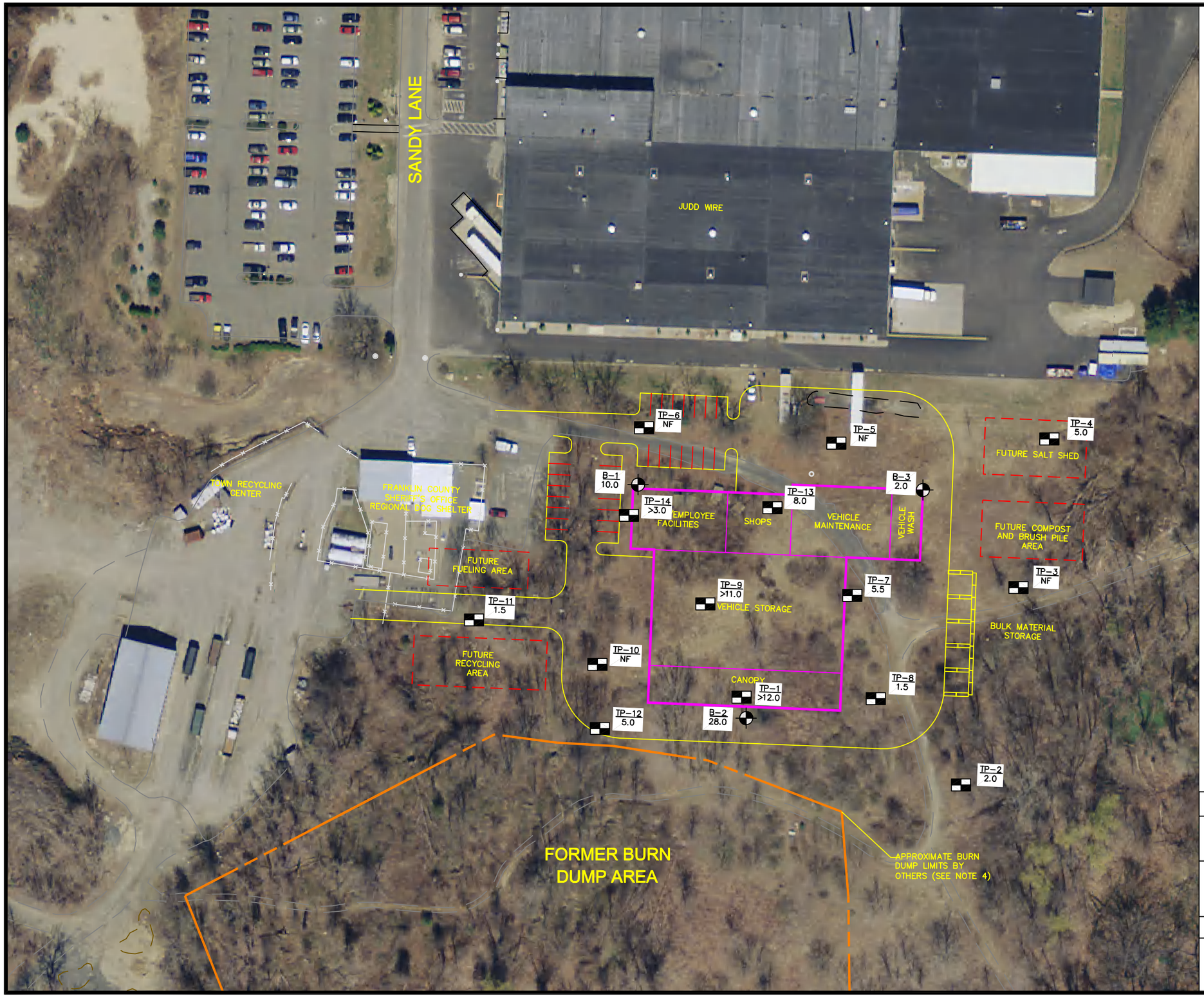

NOTES:

1. THIS DRAWING AND SITE LAYOUT ARE BASED ON CURRENT SITE PLAN ""OPTION 1A" PREPARED BY WESTON & SAMPSON ENGINEERS ON JUNE 8, 2016.
2. BORING AND TEST PIT LOCATIONS SHOWN ARE BASED ON FIELD MEASUREMENTS RELATIVE TO EXISTING SITE FEATURES. LOCATIONS ARE THEREFORE APPROXIMATE.
3. BORINGS WERE COMPLETED BY SEABOARD DRILLING, INC. OF SPRINGFIELD, MASSACHUSETTS AND OBSERVED BY A WESTON & SAMPSON GEOTECHNICAL ENGINEER ON JUNE 8, 2016.
4. TEST PITS WERE EXCAVATED BY THE TOWN OF MONTAGUE AND OBSERVED BY A WESTON & SAMPSON GEOTECHNICAL ENGINEER ON JULY 19, 2016.
5. BURN DUMP LIMITS BASED ON A DRAWING PREPARED BY FUSS & O'NEILL DATED SEPTEMBER 28, 2015.

LEGEND:

B-1 10.0 — BORING NUMBER, APPROX. LOCATION, AND APPROX. DEPTH TO NATIVE, INORGANIC SOIL (FT.)

TP-1 >12.0 — TEST PIT NUMBER, APPROX. LOCATION, AND APPROX. DEPTH TO NATIVE, INORGANIC SOIL (FT.)

80 40 0 80 160

SCALE: 1"=80'

FIGURE 1

MONTAGUE DPW
MONTAGUE, MA

EXPLORATION PLAN

DESIGNED BY: JAE	CHECKED BY: CJP	DATE: JULY 2016

Weston&Sampson®

O:\Montague MA\2160048 - Montague DPW Feasibility Study\Geotechnical\Field\EXPLORATION PLAN including TP.dwg

TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-1	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND FILL, little to some silt, little organics (roots), trace gravel; moist.	**12" TOPSOIL**
2	Light brown, fine to medium SAND FILL, trace silt, trace gravel; moist.	**SAND FILL**
3	- grades to trace debris (metal, rubber, glass, brick, lumber)	
4	- grades to little debris.	
5		
6		
7	Black, fine to coarse SAND FILL, some debris (ash, wood, glass, metal, plastic, brick), little silt, trace gravel; moist.	**SAND FILL WITH DEBRIS**
8		
9		
10	~6" layer of DEBRIS (shredded plastic), some sand, trace silt; moist.	
11	Black, fine to coarse SAND FILL, some debris (ash, styrofoam, wood, glass, metal, plastic, brick), little silt, trace gravel; moist.	
12		
13	Test pit terminated at 12.0 ft. due to excavator limitations.	
14		
15		
16		

NOTES:

Test pit was excavated with moderate difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket. Below 9 ft., became difficult to excavate.

Minor caving observed below 6 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-1

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-2	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND FILL, little to some silt, little organics (roots), trace gravel; moist.	**4" TOPSOIL**
2	Light brown, fine to medium SAND FILL, trace silt, trace debris (plastic), trace gravel, trace organics (roots); moist.	**SAND FILL**
3	Light brown, fine SAND, trace silt, trace gravel; moist. - occasional 4" layers with grades to little silt.	**SAND**
4		
5		
6		
7		
8		
9	Test pit terminated at 8.0 ft.	
10		
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Minor caving observed below 3 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-2

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-3	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND, little to some silt, little organics (roots), trace gravel; moist.	**4" TOPSOIL**
2	Orange brown, fine to medium SAND, little silt, trace gravel, trace organics (roots); moist.	**12" SUBSOIL**
3	Light brown, fine to medium SAND, trace silt, trace gravel; moist.	
4		
5		**SAND**
6		
7		
8	Test pit terminated at 7.5 ft.	
9		
10		
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Minor caving observed below 3 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-3

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-4	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND, little to some silt, little organics (roots), trace gravel; moist.	**12" TOPSOIL**
2	Brown, fine to coarse SAND FILL, little to some debris (metal, plastic, cermaic, rubber tire, glass, pipes), little gravel, trace silt; moist.	**SAND FILL WITH DEBRIS**
3		
4		
5	Dark brown, SAND FILL, some silt, some organics (roots), trace gravel; moist.	**POSSIBLE BURIED TOPSOIL LAYER**
6	Light brown, fine to medium SAND, trace silt, trace gravel; moist.	**SAND**
7		
8		
9		
10	Test pit terminated at 9.0 ft.	
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with moderate difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Severe caving observed below 2.5 ft.

Test pit was backfilled using a front loader.

Reportedly along approximate former road alignment.

TEST PIT NUMBER

TP-4

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-5	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Red-brown, fine to coarse SAND, little to some silt, little organics (roots), little gravel; moist.	**6" TOPSOIL**
		6" SUBSOIL
2	Orange brown, fine to medium SAND, little silt, trace gravel, trace organics (roots); moist.	
3	Light brown, fine to medium SAND, trace silt, trace gravel; moist.	
4		
5	- few cobbles observed at 4.5 ft.	**SAND**
6		
7		
8	Test pit terminated at 7.0 ft.	
9		
10		
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Moderate caving observed below 2.5 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-5

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-6	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND, some organics (roots), little to some silt, trace gravel; moist.	**6" TOPSOIL**
		6" SUBSOIL
2	Orange brown, fine to medium SAND, little silt, trace gravel, little organics (roots); moist.	
3	Light brown, fine to medium SAND, trace silt, trace gravel, little organics (roots); moist.	
4		
5		**SAND**
6		
7		
8		
9	- without organics.	
10	Test pit terminated at 9.0 ft.	
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Minor caving observed below 3 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-6

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-7	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND FILL, little to some silt, little organics (roots), trace gravel; moist.	**7" TOPSOIL**
2	Light brown, fine to coarse SAND FILL, little debris (plastic, metal); moist.	**SAND FILL**
3	TRASH & DEBRIS FILL (plastic garbage bags, bottles, rubber tire, metal, fabric), some sand, little silt, trace gravel; moist.	**DEBRIS FILL***
4		
5		
6	Light brown, fine to medium SAND, trace to little silt, trace gravel; moist.	**SAND**
7		
8		
9		
10	Test pit terminated at 9.5 ft.	
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with moderate difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Moderate caving observed below 2.0 ft.

Test pit was backfilled using a front loader.

* East side of test pit, debris fill was between 1.5 ft. to 4.5 ft. West side of test pit, debris fill was between 2.5 ft. to 5.5 ft.

TEST PIT NUMBER

TP-7

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-8	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
	Dark brown, SAND FILL, little to some silt, little organics (roots), trace gravel; moist.	**7" TOPSOIL**
1	Brown, SAND FILL, trace silt, trace debris (metal,plastic), trace gravel, trace organics (roots); moist.	**SAND FILL**
2	Light brown, fine to medium SAND, trace silt, trace gravel, trace organics (roots); moist.	
3	- without organics.	
4		
5		**SAND**
6		
7		
8		
9	Test pit terminated at 8.0 ft.	
10		
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Minor caving observed below 3 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-8

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-9	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND FILL, little to some silt, little organics (roots), trace gravel; moist.	**6" TOPSOIL**
2	TRASH & DEBRIS FILL (plastic garbage bags, bottles, carpet, wood, foam, metal, fabric), some sand, trace silt, trace gravel; moist.	**TRASH AND DEBRIS FILL**
3	 	
4		
5		
6		
7		
8		
9	Gray-brown, SAND FILL, little debris, trace silt, trace gravel; moist.	**SAND FILL***
10		
11		
12	Test pit terminated at 11.0 ft. due to excavator limitations.	
13		
14		
15		
16		

NOTES:

Test pit was excavated with moderate difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Severe caving observed below 1.5 ft.

Test pit was backfilled using a front loader.

* Sand Fill was encountered at 7.5 ft. at the north side of the test pit and at 8.5 ft. at the south side of the test pit.

TEST PIT NUMBER

TP-9

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-10	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND, some organics (roots), little to some silt, trace gravel; moist.	**8" TOPSOIL**
2	Orange brown, fine to medium SAND, little silt, trace gravel, little organics (roots); moist.	**12" SUBSOIL**
3	Light brown, fine to medium SAND, trace silt, trace gravel; moist.	
4		
5		**SAND**
6	- grades to fine.	
7		
8	Test pit terminated at 7.5 ft.	
9		
10		
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Minor caving observed below 2 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-10

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-11	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND, some organics (roots), some silt, trace gravel; moist.	**3" TOPSOIL**
	Black, fine to coarse SAND FILL, little debris (ash, asphalt), trace silt, trace gravel; moist.	**9" SAND FILL**
2	Orange brown, fine to medium SAND, little silt, trace gravel, little organics (roots); moist.	**8" SUBSOIL**
3	Light brown, fine to medium SAND, trace silt, trace gravel; moist.	**SAND**
4	- grades to light gray-brown, fine.	
5		
6	- few cobbles (up to 8" diameter) at 5 ft.	
7		
8	Test pit terminated at 7.5 ft.	
9		
10		
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Minor caving observed below 2 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-11

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-12	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND FILL, some organics (roots), little to some silt, trace debris (plastic), trace gravel; moist.	**6" TOPSOIL**
2	Brown, SAND FILL, some debris (trash, bottles, bags, metal, glass, rubber), little silt, trace gravel; moist.	**SAND FILL WITH DEBRIS**
3		
4	Dark brown, SAND FILL, some debris (coal ash, brick, wood), little silt, trace gravel; moist.	
5		
6	Light brown, fine to medium SAND, trace silt, trace gravel, trace organics (roots); moist.	**SAND**
7		
8	-grades to light gray, fine, without organics.	
9		
10		
11		
12	Test pit terminated at 11.0 ft.	
13		
14		
15		
16		

NOTES:

Test pit was excavated with moderate difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Moderate caving observed below 9 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-12

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-13	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Dark brown, fine to coarse SAND FILL, some organics (roots), little to some silt, trace debris (plastic), trace gravel; moist.	**9" TOPSOIL**
2	Light brown, SAND FILL, little debris (concrete, fabric, plastic, trash, bottles, bags), little silt, trace gravel; moist.	**SAND FILL WITH DEBRIS**
3	DEBRIS AND TRASH FILL (wood, trash, metal, glass, shoes), some sand, trace silt, trace gravel; moist.	**DEBRIS FILL**
4		
5	Light brown, SAND FILL, little to some debris, little gravel, trace silt; moist.	**SAND FILL**
6		
7		
8		
9	Light brown, fine to medium SAND, trace silt, trace gravel; moist.	**SAND**
10		
11	Test pit terminated at 10.0 ft.	
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with moderate difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Moderate caving observed below 3 ft.

Test pit was backfilled using a front loader.

TEST PIT NUMBER

TP-13

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TEST PIT LOG

PROJECT NAME/NO.	Montague DPW/2160048			**TEST PIT NUMBER**	
LOCATION	Montague, MA			TP-14	
CLIENT	Town of Montague			GROUND SURFACE	
CONTRACTOR	Town of Montague	FOREMAN:	Richard Clough	ELEVATION	Not available.
OBSERVED BY	Julie A. Eaton, EIT	DATE	7/19/16	DEPTH TO GROUNDWATER	
CHECKED BY	Chris Palmer, PE	DATE	7/20/16		Not encountered.

DEPTH BELOW GROUND SURFACE (ft.)	SOIL DESCRIPTION	STRATUM DESCRIPTION
Surface		
1	Orange brown, fine to medium SAND FILL, little silt, trace gravel, trace organics (roots); moist.	**7" SUBSOIL***
2	Light brown, fine to coarse SAND FILL, trace silt, trace gravel.	**SAND FILL**
3	-grades to little to some debris (trash, metal, plastic, glass)	
4	Test pit terminated at 3.0 ft. due to mechanical problem with excavator.	
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

NOTES:

Test pit was excavated with minimal difficulty with a Komatsu WB 156 PS 15,000 lb backhoe and toothed bucket.

Moderate caving observed below 0.8 ft.

Test pit was backfilled using a front loader.

* Topsoil cleared during tree clearing with front loader.

TEST PIT NUMBER

TP-14

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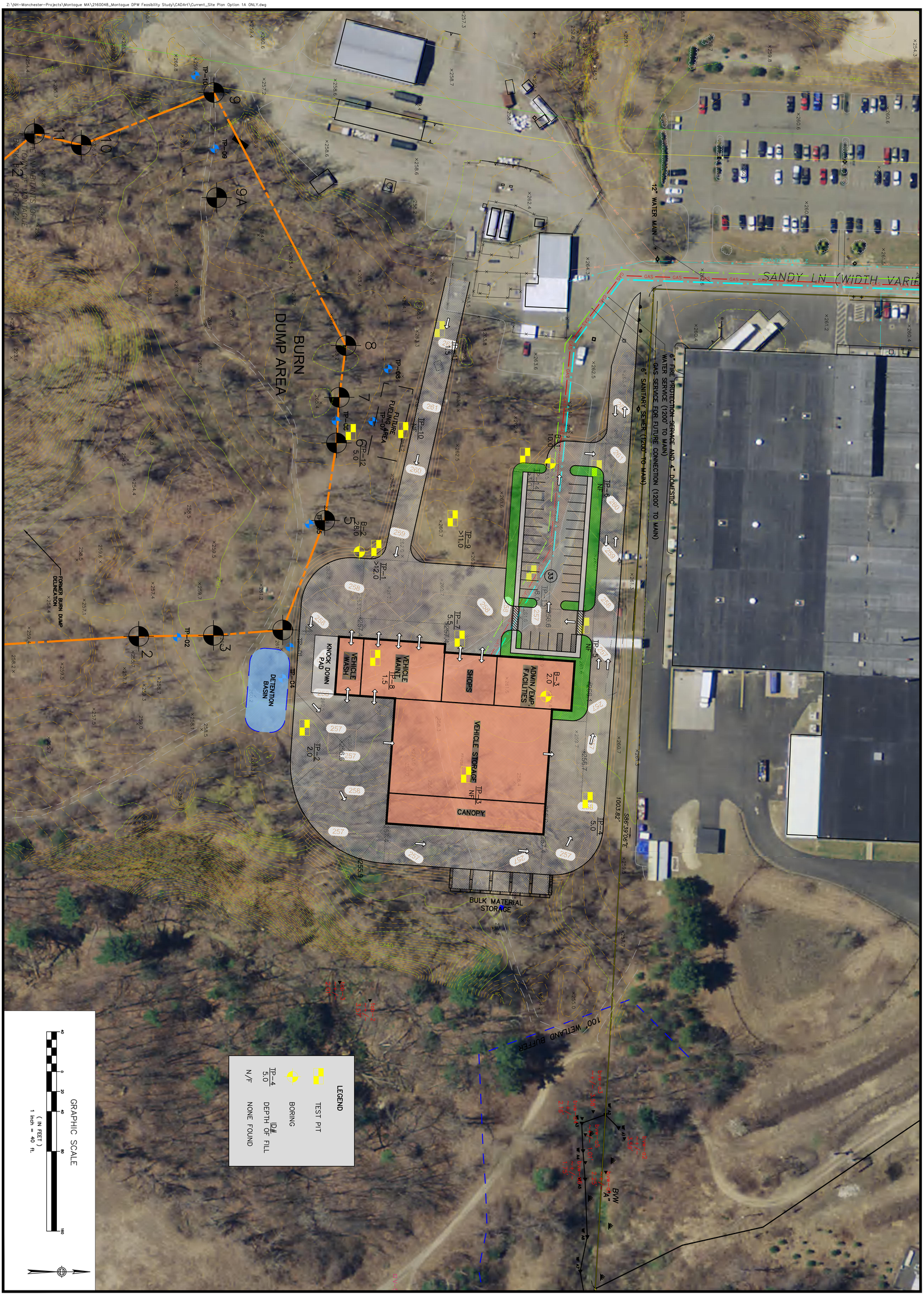
Appendix C

Site Layout

Z:\NH-Manchester-Projects\Montague MA\2160048_Montague DPW Feasibility Study\CADArt\Current_Site Plan Option 1A ONLY.dwg



SHEET — OF —

C-1A

TOWN OF MONTEGUE, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

DPW FEASIBILITY STUDY

PRELIMINARY SITE LAYOUT

FILE NO.	CADD NO.	SCALE:	CONTRACT:	JOB NO.	DR.BY	DSN.BY	CHK.BY	APP.BY
August 2016		AS SHOWN	—	—	JMF	MR	JJA	—

No.	Date	Dr.By	Ck.By	App.By	Description
					A P P R O V E D

REGISTERED PROFESSIONAL ENGINEER — DATE

Weston&Sampson®
100 Foxborough Blvd., S.250, Foxborough, MA
(508) 698-3034 (800) SAMPSON
www.westonandsampson.com

Appendix D

Permitting Review Documentation

Five Centennial Drive
Peabody, MA 01960-7985
tel: 978-532-1900 fax: 978-977-0100
www.westonandsampson.com

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MEMORANDUM

TO: Montague DPW Feasibility Study File

FROM: Joseph M. Fitzpatrick

DATE: August 26, 2016

SUBJECT: **Zoning and Permitting Review – Rear Turnpike Road**

Zoning Review

Site Address: ..... Rear Turnpike Road / Shady Lane
Parcel ID:..... 21-0-007
Zoning District:..... ID – INDUSTRIAL District (Source: Town of Montague Zoning Map and Property Card)
Documents: ..... Montague Zoning Map (2013); Zoning Bylaws (1/30/2014)

4.1 OVERLAY DISTRICTS		
District	Site Within	Comments
Flood Plain District	No	--
Agricultural Business District	No	--
Water Supply Protection District	No	--

DISTRICT REGULATIONS – USES – INDUSTRIAL DISTRICT – 5.2	
Use	Classification
(a) Business or professional office, manufacturing, processing, or research, bulk storage, warehousing, distribution, or solar energy facility (in accordance with Section 7.9) Uses customarily accessory to the above	Permitted
(b) Retail sales and services, motel or hotel, earth removal, open recreational enterprise, public utility, or registered marijuana dispensary (in accordance with Section 7.10) Other uses similar to the above in externally observable attributes	Allowed on Special Permit from the Board of Appeals
(c) All uses in Section (a) that involve the construction or alteration of over 10,000 square feet of floor area or the development of over 217,800 square feet (5 acres) of land; solar energy facility exceeding 130,680 square feet (3 acres) of land; self-service storage facility (in accordance with Section 7.7)	Allowed on Special Permit from the Planning Board
(d) All uses covered in Section (a) that involve the construction or alteration of over 5,000 square feet of floor area or the development of over 130,680 square feet (3 acres) of land or a solar energy facility	Subject to Environmental Impact and Site Plan Review from the

	Planning Board	
5.4 DIMENSIONAL REQUIREMENTS – INDUSTRIAL DISTRICT - 5.4		
Requirement	Required	Existing
Minimum lot area:	N/A for ID uses	37.1 AC
Minimum front yard and street line setback:	25 feet*	--
Minimum lot frontage:	N/A for ID uses	--
Minimum side yard setback: Principal building	15 feet**	--
Minimum rear yard setback: Principal building	30 feet***	--
Maximum building height:	36 feet	--
Minimum floor area ration (FAR)	N/A for ID uses	--

Notes: (*) – No building need provide a street line setback greater than that of the principal buildings on 3 out of the 4 adjacent properties
(**) – The setback is10 feet for accessory buildings. Districts need not provide a side yard where abutting a non-residential use provided that there is access to the rear of the lot over a drive of at least 12 feet in width. In the NB District, ten (10) feet each side for principal or accessory building
(***) – The setback is 10 feet for accessory buildings
Bold Italicized text indicates currently non-conforming.

INTENSITY REQUIREMENTS - 5.3.2	
Requirements	Notes
Multiple principle uses on one lot are permitted provided that the dimensional requirements of section 5.4 are met for each building without counting any area, frontage or minimum side yard or minimum front or rear {5/5/01} yard setback requirements twice. Setback requirements must be met for each building from property lines and from other building setback lines {5/5/01}. Not more than one principle building shall be erected on a lot unless each such building is served by accesses and services determined by the Planning Board to be functionally equivalent to those required for separate lots by the Planning Board in its Subdivision Regulation	Suggest a discussion with the Town to identify how they intend to permit or subdivide the future Industrial Park
GENERAL REGULATION - 6	
Regulation	Notes
Sign Requirements – 6.1 (6.1.2) Signs whose content relates exclusively to the premises on which they are located, or to products, accommodations, services or activities on those premises shall be allowed, subject to the following: a) Permitted on any premises are unlighted directional signs of 2 square feet or smaller, or subsidiary signs such as travel, club and credit card signs if incorporated within an approved on-premise sign framework b) On any premises there shall not be more than one free standing sign, plus not more than one building sign per business or other enterprise c) In a Residential District or Agricultural District, no sign shall exceed 4 square feet. In all other districts, signs shall not exceed 32 square feet. However, signs of larger areas may be allowed in any district on Special Permit from the Zoning Board of Appeals	

Parking and Loading Requirements – 6.2 (6.2.1) All parking demand created by new structures or uses, additions to existing structures or uses, and change of use in existing structure shall be accommodated on the premises entirely off-street. At least the following shall be provided unless the Board of Appeals allows a reduction upon their determination that a lesser amount will satisfy all parking demand owing to particular circumstances: • One and a half parking spaces per dwelling unit, plus one space per employee, plus one space per 175 square feet of retail or office floor space, plus one space per motel, hotel or lodging house unit, plus one space per four seats in a restaurant, theater or such. • In the CB District, retail, office, restaurant, theater and such uses are not required to provide off-street customer parking • In the RB District, more than 25 spaces or parking to the front of the principal building may be allowed by Special Permit from the Board of Appeals (6.2.2) Parking areas for six or more cars shall be so designed that their use does not require backing onto a public way, and shall be screened from any abutting residential use by densely planted shrubs. (6.2.3) Adequate off-street loading facilities and space must be provided to service all needs created by new construction, whether through new structures or uses, additions to existing structures or uses, or change of use. Facilities shall be so sized and arranged that no trucks need back onto or off of a public way, or be parked on a public way while loading, or unloading, or waiting to do so.	
Vehicular Egress / Access to a Lot – 6.3 (6.3.1) Vehicular egress/access to a lot must be across the front lot line meeting the minimum frontage requirements, except that in particular instances, the Planning Board may issue a Special Permit permitting vehicular egress/access to a lot over a front lot line having less than the required minimum frontage, or over any side lot line or rear lot line. (6.3.2) Common Driveways – the purpose of a common driveway is to enhance public safety by reducing congestion entering and leaving roadways, to conserve land and minimize impacts on agricultural and natural resources and to protect the value of real property. A Special Permit is required from the Planning Board for common driveways. Designs, plans, easements and maintenance agreements for common driveways shall be developed in accordance with Planning Board regulations and shall require a standard of construction, financing and maintenance adequate for the anticipated uses. (6.3.3) For residences with a setback of 500 feet or more from an accepted way, a driveway for such residence must have a grade of no greater than 10%, a curve radius not less than 30 feet, a turn-around area with a minimum 30 foot turn-around radius and that the driveway be no less than 20 feet in width over its entire length. (6.3.4) Egress/access to a lot or use must be over land zoned for such use, except that in particular instances, the Planning Board	

may issue a Special Permit, with appropriate conditions, permitting egress/access over land where the use is not otherwise permitted.	
SPECIAL REGULATIONS - 7	
Regulation	Notes
Earth Removal Regulations – 7.2 (7.2.1) The removal from any premises of topsoil, borrow, rock, sod, loam, peat, humus, clay, sand, or gravel shall be done only in accordance with Sections 7.2.2 through 7.2.6 and 9.5.3a, except that the following shall be exempted from these provisions: a) The removal of less than 50 cubic yards of such material within any twelve-month period. b) Removal, incidental to construction on the premises, where such removal is explicitly allowed under a currently valid building permit or under agreements governing road construction in an approved subdivision, or as a routine part of normal farming operations. c) Special conditions apply to removal on a parcel for which removal was authorized under a legal permit issued prior to adoption of this section (6/16/73). See 7.2.1.c for details. (7.2.2) Removal shall be allowed only under a Special Permit issued by the Board of Appeals following written application, a copy of which shall be forwarded to the Conservation Commission. See section 7.2.2 – 7.2.6 for specific requirements pertaining to the application for this Special Permit.	
ENVIRONMENTAL IMPACT AND SITE PLAN REVIEW - 8	
Regulation	Notes
All uses that involve the construction or alteration or change of use of over 5,000 square feet of floor area or the development of over 130,680 square feet (3 acres) of land shall be subject to Environmental Impact and Site Plan Review as outlined in Section 8 of this bylaw. Environmental Impact and Site Plan Review shall be conducted by the Board of Appeals unless otherwise stated. See Section 8.3 for requirement details for the Impact Statement. The statement shall be prepared by a registered professional engineer and shall explain how the project will promote the environmental health of the community and minimize if not eliminate adverse effects on the natural resources and infrastructure of the Town. See Section 8.4 for requirement details for the Site Plan Review process. Applicant shall submit a site plan prepared by a registered professional engineer, and if applicable, a building plan, to enable the Board of Appeals or Planning Board, as appropriate, to determine if the project will promote the orderly development of infrastructure and the natural, scenic and aesthetic qualities of the Town.	

Town of Montague
New Public Works Facility
Permitting Matrix

8/31/16

Permit Name	*Activity Requiring Permit*	*Review Agency*	*Authority*	*Required (Yes / No)*	*Responsible Party*	*Comments/Dependencies*
LOCAL						
Notice of Intent	Construction within 100' of a wetlands or 200' watercourse (Rivers Protection Act)	Local Conservation Commission & MADEP	M.G.L. c. 131, § 40: Massachusetts Wetlands Protection Act; 310 CMR 10.00: Wetlands Regulations	NO	N/A	May want to submit a request for determination to the Conservation Commission to verify no permit is required due to the proximity of the nearby wetlands
Natural Heritage	Construction within NHESP protected areas	NHESP		NO	N/A	
Building Permit	Construction of new facility	Local Building Department	780 CMR 8th Edition	YES	Contractor	
Planning Board Environmental Impact and Site Plan Review	Construction of over 5,000 SF of floor area (Zoning Bylaws 5.2 (c))	Planning Board	Town of Montague	YES	Owner / Engineer	
Water /Sewer Connections	Connection to existing utilities	Local Utility	Local Utility	YES	Owner / Engineer / Contractor	
historic district / buildings	Work within an historic district or work on a historic building	N/A	N/A	NO	N/A	
Demolition Delay Permit	Demolition of buildings meeting criteria of the local demolition delay bylaw	Local Authority	Massachusetts Historical Commission	NO	N/A	
Board of Health	--	N/A	N/A	NO	N/A	No Board of Health approval anticipated at this time. It is recommended that a meeting be held with the Board of Health during the early design phase to verify this assumption
Fueling System Permit	Relocation of Fuel Island	Local Fire Department	Local Fire Department	NO	N/A	Permit will be required if existing system is relocated or reconstructed
Street Opening / Trench Permit	Any excavation activity	DPW	MGL c. 82A Section 1 and 520 CMR 14.00	YES	Contractor	

Town of Montague
New Public Works Facility
Permitting Matrix

8/31/16

Permit Name	*Activity Requiring Permit*	*Review Agency*	*Authority*	*Required (Yes / No)*	*Responsible Party*	*Comments/Dependencies*
STATE						
Fueling Permits FP290	Underground Storage Tanks regulated under 527 CMR 9.0	Fire Department	MA DEP 527 CMR 9.00	NO	N/A	Permit will be required if existing system is relocated or reconstructed
Fueling Permits FP291	Removal and disposal of UST formerly containing motor fuel	Fire Department	MA State Fire Marshal	NO	N/A	Permit will be required if existing system is relocated or reconstructed
BWP AQ 06 Notification Prior to Construction or Demolition	Required on any building in Massachusetts (except for residential buildings with less than 20 units) where any structure is either renovated/upgraded or to be demolished. An asbestos materials survey should be conducted by the Engineer/Owner at the outset of the development of the project design to incorporate all required asbestos removal into the plans and specs	MADEP	MADEP	YES	Contractor	Require contractor to obtain in specifications.
Hazards to Air Navigation	Filing is required if the proposed construction site and/or construction height above grade meets or exceeds the parameters outlined in Chapter 90 of the Massachusetts General Laws; or, if under FAR Part 77, a filing was required by the federal government	MassDOT	Chapter 90 of the Massachusetts General Laws - Commonwealth of Massachusetts [780 CMR (Code of Massachusetts Regulations) 111.7 Hazards to Air Navigation]	NO	N/A	
MBTA Construction Notification	Work adjacent to MBTA property	MBTA	MBTA	NO	N/A	N/A
Mass. State Highway Opening Permit	New/modified entrance off of Mystic Valley Parkway (Route 16)	MassDOT	MassDOT	NO	N/A	
Driveway Opening Permit	New curb cuts	MassDOT	MassDOT	NO	N/A	
Backflow Preventers	New backflow preventers	MADEP	MADEP	YES	Contractor	Require contractor to obtain in specifications.
Landfill Related Permits	Construction on Site Assigned Land / Waste Relocation	MassDEP Bureau of Waste Prevention	MassDEP	YES	Owner / Engineer	Permit requirements need to be further evaluated with the DEP to better define submission requirements
Mass. DEP Chapter 91 Waterways License	Work within waterway		310 CMR 9.00	NO	N/A	
Tight Tank	Tight tank to handle industrial wastewater (floor drains, etc.)	MADEP	MADEP	NO	N/A	
Underground Injection Control Permit	Required for knock-down pads	MADEP	MADEP	YES	Owner / Engineer	Submit during design and obtain approval post construction
Oil Burning Equipment	The contractor must pull a permit for "application for permit and certificate of completion for the installation or alternation of fuel oil burning equipment and the storage of fuel oil	Fire Department	527 CMR section 4	YES	Contractor	To be included in specifications
FEDERAL						
NPDES Construction General Permit	This is required in all states where EPA is the NPDES permitting authority (ID, MA, NH, NM, Wash. DC, Puerto Rico as well as other special operations) for all construction projects resulting in a disturbance greater than one acre	EPA	EPA	YES	Contractor	Require contractor to obtain in specifications.

Appendix E

Independent Cost Estimate

Concept Design Estimate

Department of Public Works

Town of Montague, Ma

Prepared by:

TCi Construction Cost Estimating

165 Middlesex Turnpike
Suite 106
Bedford, MA 01730
phone 781-275-5511
www.tortoraconsulting.com

Prepared for:

Weston and Sampson

August 31, 2016

MAIN CONSTRUCTION COST SUMMARY

	Gross Floor Area	$/sf	Estimated Construction Cost
SITEWORK			$1,732,330
EARTHWORK (Replace unsuitable soils)			$348,701
VEHICLE STORAGE	14,824	$170.21	$2,523,136
ADMIN/EMPLOYEE/SHOPS	5,503	$318.03	$1,750,097
VEHICLE MAINTENANCE	4,285	$288.40	$1,235,785
WASH BAY	1,390	$390.92	$543,372
MEZZANINES	2,134	$112.56	$240,209
VEHICLE STORAGE CANOPY	4,625	$129.63	$599,519
INDUSTRIAL EQUIPMENT	32,761	$8.97	$293,728
PROJECTED TOTAL CONSTRUCTION COSTS	**32,761**	**$282.86**	**$9,266,877**

This Concept Design cost estimate was produced from drawings and other documentation prepared by Weston and Sampson and their design team received August 2016 (A.100 floor plan date March 28, 2016 and C-1A site plan dated February 2016). Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, general contractor's overhead and profit and design contingency. Cost escalation assumes 1 year

Bidding conditions are expected to be public bidding to pre-qualified general contractors, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

All professional fees and insurance
Land acquisition, feasibility, and financing costs
All Furnishings, Fixtures and Equipment
Items identified in the design as Not In Contract (NIC)
Items identified in the design as by others
Rock excavation
Utility company back charges, including work required off-site
Work to City streets and sidewalks, (except as noted in this estimate)
Construction or occupancy phasing or off hours' work, (except as noted in this estimate)
Mold remediation
Winter conditions
Enclosure and fit-up of mezzanines
Building Permit
Sales Tax
Salt/Sand Shed
Fuel island

Note - Construction Cost Only. Refer to Page 7 of the Executive Summary for the Total Project Cost (including soft costs and contingencies)

Department of Public Works

Town of Montague, Ma

TCi Construction Cost Estimating

31-Aug-16

Concept Design Estimate

	CONSTRUCTION COST SUMMARY										*32,761*	SF
	BUILDING SYSTEM		*EARTHWORK (Replace unsuitable soils)*	*SITEWORK*	*VEHICLE STORAGE*	*ADMIN/EMPLOYEE/ SHOPS*	*VEHICLE MAINTENANCE*	*WASH BAY*	*MEZZANINES*	*VEHICLE STORAGE CANOPY*	*INDUSTRIAL EQUIPMENT*	***TOTAL COSTS***	**$/SF**
A10	BUILDING FOUNDATIONS				$433,469	$187,311	$153,753	$82,971	$0	$114,986	$0	**$972,490**	**$29.68**
B10	SUPERSTRUCTURE				$636,008	$240,126	$196,770	$62,780	$71,878	$138,750	$0	**$1,346,312**	**$41.09**
B20	EXTERIOR CLOSURE				$124,750	$170,370	$112,760	$80,290	$0	$15,924	$0	**$504,094**	**$15.39**
B30	ROOFING				$0	$0	$0	$0	$0	$0	$0	**$0**	**$0.00**
C10	INTERIOR CONSTRUCTION				$62,550	$189,355	$153,608	$51,560	$14,740	$0	$0	**$471,813**	**$14.40**
C20	STAIRCASES				$0	$0	$0	$0	$61,200	$0	$0	**$61,200**	**$1.87**
C30	INTERIOR FINISHES				$38,186	$140,603	$26,670	$21,905	$3,201	$6,938	$0	**$237,503**	**$7.25**
D10	CONVEYING SYSTEMS				$0	$0	$0	$0	$0	$0	$0	**$0**	**$0.00**
D20	PLUMBING				$85,972	$106,359	$79,205	$30,270	$0	$54,772	$0	**$356,578**	**$10.88**
D30	HVAC				$296,480	$176,096	$128,550	$52,820	$10,670	$0	$0	**$664,616**	**$20.29**
D40	FIRE PROTECTION				$63,950	$34,000	$26,030	$16,860	$14,920	$34,240	$0	**$190,000**	**$5.80**
D50	ELECTRICAL			166,100	$187,524	$111,783	$81,788	$24,534	$15,792	$88,569	$0	**$676,090**	**$20.64**
E20	FURNISHINGS				$0	$10,600	$0	$0	$0	$0	$0	**$10,600**	**$0.32**
F10	INDUSTRIAL EQUIPMENT				$0	$0	$0	$0	$0	$0	$239,584	**$239,584**	**$7.31**
F20	FUEL ISLAND				$0	$0	$0	$0	$0	$0	$0	**$0**	**$0.00**
G10	SITEWORK			1,221,448	$92,072	$35,174	$30,694	$11,235	$0	$26,018	$0	**$1,416,641**	**$43.24**
G20	EARTHWORK (Replace unsuitable soils)		279,300		$0	$0	$0	$0	$0	$0	$0	**$279,300**	**$8.53**
G30	BUILDING DEMOLITION AND HAZ-MAT			0	$0	$0	$0	$0	$0	$0	$0	**$0**	**$0.00**
	TOTAL DIRECT COST (Trade Costs)		*$279,300*	*$1,387,548*	*$2,020,961*	*$1,401,777*	*$989,828*	*$435,225*	*$192,401*	*$480,197*	*$239,584*	**$7,426,821**	**$226.70**
	GENERAL CONDITIONS	7.0%	$19,551	$97,128	$141,467	$98,124	$69,288	$30,466	$13,468	$33,614	$16,771	**$519,877**	**$15.87**
	GENERAL REQUIREMENTS	2.0%	$5,586	$27,751	$40,419	$28,036	$19,797	$8,705	$3,848	$9,604	$0	**$143,746**	**$4.39**
	BONDS	2.0%	$5,586	$27,751	$40,419	$28,036	$19,797	$8,705	$3,848	$9,604	$4,792	**$148,538**	**$4.53**
	BUILDING PERMIT (waived)	0.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**	**$0.00**
	OVERHEAD AND PROFIT	4.0%	$12,401	$61,607	$89,731	$62,239	$43,948	$19,324	$8,543	$21,321	$10,446	**$329,560**	**$10.06**
	DESIGN AND PRICING CONTINGENCY	5.0%	$16,121	$80,089	$116,650	$80,911	$57,133	$25,121	$11,105	$27,717	$13,580	**$428,427**	**$13.08**
	ESCALATION (1 YEAR)	3.0%	$10,156	$50,456	$73,489	$50,974	$35,994	$15,826	$6,996	$17,462	$8,555	**$269,908**	**$8.24**
	PROJECTED TOTAL CONSTRUCTION COSTS		**$348,701**	**$1,732,330**	**$2,523,136**	**$1,750,097**	**$1,235,785**	**$543,372**	**$240,209**	**$599,519**	**$293,728**	**$9,266,877**	**$282.86**

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK							
	A ELECTRICAL						
	Power						
26000	Primary elec OHW and pole connections	**1**	ls	8,500.00	8,500		
26000	Primary and secondary conduit and wire	**400**	lf	88.00	35,200		
26000	Allow for Generator - size TBD	**1**	ls	90,000.00	90,000		
	Site Lighting						
26000	Double head light poles, conduit and wiring	**4**	ea	3,500.00	14,000		
26000	Single head light poles, conduit and wiring	**4**	ea	2,800.00	11,200		
26000	Light bollard, conduit and wiring				NIC		
	Communication						
26000	Communication conduits	**400**	lf	18.00	7,200		
	SUBTOTAL					166,100	
	TOTAL - ELECTRICAL						***166,100***
	B EARTHWORK (Replace unsuitable soils)						
	Export						
02200	Mass excavate unsuitables	**6,000**	cy	12.00	72,000		
02200	Export unsuitable (truck to adjacent burn dump area)	**6,000**	cy	15.00	90,000		
	Import						
02200	Structural fill to replace unsuitable to subgrade levels	**5,100**	cy	23.00	117,300		
	SUBTOTAL					279,300	
	TOTAL - EARTHWORK						***279,300***
	C SITEWORK						
	Site Contractor general conditions						
02200	Site sub Field Engineering	**8**	dy	1,375.00	11,000		
02200	Trench Plates Trench Safety	**1**	ls	3,500.00	3,500		
02200	Site Supervision	**2**	mo	7,800.00	15,600		
02200	Mobilization	**1**	ea	5,000.00	5,000		
02200	Site fencing, protection, barricades	**1**	ls	10,000.00	10,000		
	Site Demo and prep						
02200	Stabilized Construction Entrance	**1**	ea	5,000.00	5,000		
02200	Haybales/Silt Fence	**1,000**	lf	9.00	9,000		
02200	Infiltration Filters at CB	**10**	ea	168.00	1,680		
02200	Clear, grub and remove topsoil	**5**	cd	5,000.00	25,000		
	Earthwork						
02200	Site Cuts				See section B		
02200	Export excess unsuitable				See section B		
02200	Import structural fill under new foundations				See section B		
02200	Shape & Compact Subgrade	**3**	dy	5,000.00	15,000		
	Structural excavation and backfill						
02200	Included with each bldg estimate						
	Slab Prep						
02200	Included with each bldg estimate						
02200	Paving and walks prep						
02200	Bitum. Paving 12" Dense Grade	**2,474**	cy	25.00	61,850		
02200	Conc. Walks 8" Dense Grade	**20**	cy	25.00	500		

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK							
	Paving and curbing						
02200	Heavy duty pavement	**6,444**	sy	26.50	170,766		
02200	Light duty pavement	**978**	sy	23.50	22,983		
02200	Gravel storage areas - 1-1/2'' stone	**393**	cy	38.00	14,934		
02200	Curbing (HMA)	**1,845**	lf	15.00	27,675		
	Utilities						
	Storm						
02200	Manhole structures	**7**	ea	4,800.00	33,600		
02200	OCS structures	**2**	ea	8,500.00	17,000		
02200	Catch basin structures	**16**	ea	4,000.00	64,000		
02200	Storm drainage piping	**1,450**	lf	40.00	58,000		
02200	Detention areas, riprap, flared ends and swales	**1**	ls	20,000.00	20,000		
	Water						
02200	4'' Dom piping	**1,300**	lf	50.00	65,000		
02200	6'' FP piping	**1,300**	lf	65.00	84,500		
02200	CTE on street	**2**	ea	2,500.00	5,000		
02200	Cut, remove and replace paving	**1,300**	lf	18.00	23,400		
	Gas						
02200	Gas piping	**1,300**	lf	50.00	65,000		
02200	CTE on street	**1**	ls	2,500.00	2,500		
02200	Cut, remove and replace paving	**1,300**	lf	18.00	23,400		
	Sanitary						
02200	6'' sanitary piping	**1,300**	lf	65.00	84,500		
02200	CTE on street	**1**	ea	2,500.00	2,500		
02200	Cut, remove and replace paving	**1,300**	lf	18.00	23,400		
02200	Oil water sep	**1**	ea	10,500.00	10,500		
	Site Improvements						
02200	Concrete walks	**800**	sf	6.00	4,800		
02200	Allow for pads, ramps and misc	**1**	ls	10,000.00	10,000		
02200	Bollards	**20**	ea	550.00	11,000		
02200	Block retaining walls and bulk storage walls	**900**	sf	28.00	25,200		
02200	Block retaining walls at grading changes	**600**	sf	30.00	18,000		
02200	HC signs	**3**	ea	200.00	600		
02200	Parking space lines/symbols	**32**	ea	45.00	1,440		
02200	40' sliding gate	**2**	ea	15,000.00	30,000		
02200	6' vinyl covered chainlink fence and gates	**1,750**	lf	38.00	66,500		
02200	Dumpster enclosure	**1**	ea	2,500.00	2,500		
02200	Misc site improvements, Signs and misc	**1**	ls	5,000.00	5,000		
	Landscaping						
02200	Loam, seed and plantings	**1**	ls	20,000.00	20,000		
	Ductbanks and pole bases						
03300	Transformer Pad	**1**	ea	5,000.00	5,000		
03300	Generator Pad	**1**	ea	5,000.00	5,000		
03300	E&B Elec/communication duct banks	**400**	lf	25.00	10,000		
03300	Encase duct banks in concrete	**119**	cy	180.00	21,420		
03300	L.Pole Base	**8**	ea	400.00	3,200		
03300	Light bollard base				NIC		
	SUBTOTAL					1,221,448	
	TOTAL - SITE DEVELOPMENT						***1,221,448***
	D BUILDING DEMOLITION AND HAZ-MAT						
02200	N/A						
	SUBTOTAL					-	
	TOTAL - BUILDING DEMOLITION AND HAZMAT						*-*

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE							
	GROSS FLOOR AREA CALCULATION						
	Vehicle storage			**14,824**			
	TOTAL GROSS FLOOR AREA (GFA)				**14,824** ***sf***		
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Strip footings to exterior walls						
03300	Formwork	**1,290**	sf	15.00	19,350		
03300	Re-bar	**903**	lbs	2.00	1,806		
03300	Concrete material	**75**	cy	155.00	11,625		
03300	Placing concrete	**75**	cy	35.00	2,625		
	Foundation walls at exterior (4' above FFA)						
03300	Formwork	**8,600**	sf	15.00	129,000		
03300	Re-bar	**4,730**	lbs	2.00	9,460		
03300	Concrete material	**222**	cy	155.00	34,410		
03300	Placing concrete	**222**	cy	35.00	7,770		
07150	Dampproofing foundation wall and footing	**2,580**	sf	3.50	9,030		
07210	Insulation board to 4' above FFA on foundation walls	**2,580**	sf	6.00	15,480		
	Column footings						
03300	Formwork	**384**	sf	15.00	5,760		
03300	Re-bar	**342**	lbs	2.00	684		
03300	Concrete material	**15**	cy	155.00	2,325		
03300	Placing concrete	**15**	cy	35.00	525		
03300	Set anchor bolts grout plates	**16**	ea	125.00	2,000		
	Miscellaneous						
03300	Form key in footing	**430**	lf	4.00	1,720		
03300	Piers						
03300	Formwork	**256**	sf	15.00	3,840		
03300	Re-bar	**1,440**	lbs	2.00	2,880		
03300	Concrete material	**5**	cy	155.00	775		
03300	Placing concrete	**5**	cy	35.00	175		
	SUBTOTAL					261,240	
	A1030 LOWEST FLOOR CONSTRUCTION						
	Slab on grade						
07210	Vapor barrier	**14,824**	sf	0.50	7,412		
03300	Rebar reinforcing	**17,048**	sf	2.00	34,096		
03300	Concrete - 8" thick	**392**	cy	155.00	60,760		
03300	Placing concrete	**392**	cy	30.00	11,760		
03300	Finishing and curing concrete	**14,824**	sf	1.50	22,236		
03300	Control joints - saw cut	**14,824**	sf	0.20	2,965		
	Miscellaneous						
03300	Column ties	**8**	ea	3,500.00	28,000		
03300	Misc pads and curbs	**1**	ls	5,000.00	5,000		
07100	SUBTOTAL					172,229	
	TOTAL - FOUNDATIONS						***$433,469***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE							
	B10 SUPERSTRUCTURE						
	B1020 ROOF CONSTRUCTION						
	Pre-fabricated Structure (includes steel, insulated metal panels walls and roof) :						
13000	Prefabricated metal building package (galv steel, 4" metal panels and metal roof)	**14,824**	sf	42.00	622,608		
	Miscellaneous						
05120	Overhead door frames	**2**	ea	2,200.00	4,400		
05120	Large window frame	**6**	ea	1,500.00	9,000		
	SUBTOTAL					636,008	
	TOTAL - SUPERSTRUCTURE						***$636,008***
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS						
	Exterior skin						
04200	CMU veneer	**2,150**	sf	25.00	53,750		
07461	Metal Panel system with Prefabricated metal building package						
	SUBTOTAL					53,750	
	B2020 WINDOWS						
	Curtainwall and Aluminum windows						
07900	Translucent windows	**600**	sf	65.00	39,000		
07900	Backer rod & double sealant	**450**	lf	5.00	2,250		
06100	Wood blocking at openings	**450**	lf	6.00	2,700		
	SUBTOTAL					43,950	
	B2030 EXTERIOR DOORS						
08300	Overhead doors - 16' x 14'	**2**	ea	11,200.00	22,400		
08100	3x7 ext galv doors with vision glass	**2**	ea	1,500.00	3,000		
07900	Backer rod & double sealant	**150**	lf	5.00	750		
06100	Wood blocking at openings	**150**	lf	6.00	900		
	SUBTOTAL					$27,050	
	TOTAL - EXTERIOR CLOSURE						***$124,750***
	B30 ROOFING						
	B3010 ROOF COVERINGS						
07500	All roofing included with Prefabricated metal building						
	SUBTOTAL					-	
	B3020 ROOF OPENINGS						
08600	N/A						
	SUBTOTAL					$0	
	TOTAL - ROOFING						***$0***
	C10 INTERIOR CONSTRUCTION						
	C1010 PARTITIONS						
09900	CMU / GWB separation wall at shops/admin/maintenance	**2,625**	sf	22.00	57,750		
	SUBTOTAL					57,750	
	C1020 INTERIOR DOORS						
08140	N/A						
	SUBTOTAL					-	
	C1030 SPECIALTIES / MILLWORK						
05500	Interior bollards	**4**	ea	450.00	1,800		
05500	Exterior bollards	**6**	ea	500.00	3,000		
	SUBTOTAL					$4,800	
	TOTAL - INTERIOR CONSTRUCTION						***$62,550***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE							
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
09900	Paint to interior CMU/GWB separation walls	**2,625**	sf	1.50	3,938		
	SUBTOTAL					$3,938	
	C3020 FLOOR FINISHES						
09700	Sealed concrete - Vehicle storage	**14,824**	sf	2.00	29,648		
09700	Line stripping	**920**	sf	5.00	4,600		
	SUBTOTAL					34,248	
	C3030 CEILING FINISHES						
09900	Exposed prefab metal bldg package						
	SUBTOTAL					$0	
	TOTAL - INTERIOR FINISHES						***$38,186***
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
22000	Sub slab vent system	**14,824**	sf	3.00	44,472		
22000	Floor trench drains	**4**	ea	8,500.00	34,000		
22000	Seismic restraints	**1**	ls	5,000.00	5,000		
22000	Testing and sterilization	**1**	ls	2,500.00	2,500		
	SUBTOTAL					$85,972	
	TOTAL - PLUMBING						***$85,972***
	D30 HVAC						
	D30 HVAC, GENERALLY						
23000	HVAC system	**14,824**	sf	20.00	296,480		
	SUBTOTAL					$296,480	
	TOTAL - HVAC						***$296,480***
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
24000	Sprinkler heads	**135**	ea	150.00	20,250		
24000	Branch sprinkler piping with fittings & hangers	**1,350**	lf	22.00	29,700		
24000	Main sprinkler piping with fittings & hangers	**300**	lf	30.00	9,000		
24000	Hydraulic calculations	**1**	ls	5,000.00	5,000		
	SUBTOTAL					$63,950	
	TOTAL - FIRE PROTECTION						***$63,950***
	D50 ELECTRICAL						
	Power Equipment						
26000	Electrical Power and circuitry - Cost portion of switchboard, panels and misc equipment (located in central location)	**14,824**	sf	4.50	66,708		
	SUBTOTAL					$66,708	
	D5020 LIGHTING & POWER						
	Lighting & Branch Power						
26000	Lighting and branch circuitry	**14,824**	sf	4.00	59,296		
26000	Equipment power	**14,824**	sf	1.00	14,824		
	SUBTOTAL					74,120	

CSI CODE		DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE								
	D5030	**COMMUNICATION & SECURITY SYSTEMS**						
		Telecommunications System						
26000		Rough in allowance				N/A		
		Fire Alarm						
26000		Fire alarm system	**14,824**	sf	2.25	33,354		
		Security System						
26000		Security roughin allowance	**14,824**	sf	0.50	7,412		
26000		***PA/Sound System***						
26000		PA system				NIC		
		SUBTOTAL					$40,766	
	D5040	**OTHER ELECTRICAL SYSTEMS**						
		Lightning protection						
26000		UL Master label lightning protection				NIC		
		Miscellaneous						
26000		Temp services	**14,824**	sf	0.40	5,930		
		SUBTOTAL					5,930	
		TOTAL - ELECTRICAL						***$187,524***
	G	***SITEWORK***						
		Structural Excavation and backfill						
02200		Foundation Perimeter, footings and tie beams	**1,200**	lf	40.00	48,000		
02200		6" ADS Perf Perimeter Drain	**450**	lf	35.00	15,750		
		Special foundations						
02200		Allow for ground improvements				NIC		
		Underslab piping						
02200		E&B Trench	**500**	lf	8.88	4,440		
		Slab Prep						
02200		Slab Prep 9" Stone	**549**	cy	30.00	16,470		
02200		Fine Grade & Compact	**14,824**	sf	0.50	7,412		
		SUBTOTAL					92,072	
		TOTAL - SITE DEVELOPMENT						***92,072***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADMIN/EMPLOYEE/SHOPS							
	GROSS FLOOR AREA CALCULATION						
	Admin/employee facilities/shared shop			**5,503**			
	TOTAL GROSS FLOOR AREA (GFA)				**5,503**	***sf***	
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Strip footings to exterior walls						
03300	Formwork	**750**	sf	15.00	11,250		
03300	Re-bar	**525**	lbs	2.00	1,050		
03300	Concrete material	**36**	cy	155.00	5,580		
03300	Placing concrete	**36**	cy	35.00	1,260		
	Foundation walls at exterior (4' above FFA)						
03300	Formwork	**4,000**	sf	15.00	60,000		
03300	Re-bar	**2,750**	lbs	2.00	5,500		
03300	Concrete material	**103**	cy	155.00	15,965		
03300	Placing concrete	**103**	cy	35.00	3,605		
07150	Dampproofing foundation wall and footing	**1,500**	sf	3.50	5,250		
07210	Insulation board to 4' above FFA on foundation walls	**1,500**	sf	6.00	9,000		
	Column footings						
03300	Formwork	**192**	sf	15.00	2,880		
03300	Re-bar	**171**	lbs	2.00	342		
03300	Concrete material	**7**	cy	155.00	1,085		
03300	Placing concrete	**7**	cy	35.00	245		
03300	Set anchor bolts grout plates	**8**	ea	125.00	1,000		
	Miscellaneous						
03300	Form key in footing	**250**	lf	4.00	1,000		
03300	Piers						
03300	Formwork	**128**	sf	15.00	1,920		
03300	Re-bar	**720**	lbs	2.00	1,440		
03300	Concrete material	**2**	cy	155.00	310		
03300	Placing concrete	**2**	cy	35.00	70		
	SUBTOTAL					128,752	
	A1030 LOWEST FLOOR CONSTRUCTION						
	6" Slab on grade						
07210	Vapor barrier	**5,503**	sf	0.50	2,752		
03300	Rebar reinforcing	**6,328**	sf	2.00	12,656		
03300	Concrete - 6" thick	**107**	cy	155.00	16,585		
03300	Placing concrete	**107**	cy	30.00	3,210		
03300	Finishing and curing concrete	**5,503**	sf	1.50	8,255		
03300	Control joints - saw cut	**5,503**	sf	0.20	1,101		
	Miscellaneous						
03300	Column ties	**3**	ea	3,000.00	9,000		
03300	Misc pads and curbs	**1**	ls	5,000.00	5,000		
	SUBTOTAL					58,559	
	TOTAL - FOUNDATIONS						***$187,311***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADMIN/EMPLOYEE/SHOPS							
	B10 SUPERSTRUCTURE						
	B1020 ROOF CONSTRUCTION						
	Pre-fabricated Structure (includes steel, insulated metal panels walls and roof) :						
13000	Prefabricated metal building package (galv steel, 4" metal panels and metal roof)	**5,503**	sf	42.00	231,126		
	Miscellaneous						
05120	Window frames	**6**	ea	1,500.00	9,000		
	SUBTOTAL					240,126	
	TOTAL - SUPERSTRUCTURE						***$240,126***
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS						
	Interior skin						
09250	Furout exterior walls	**3,600**	sf	12.00	43,200		
09211	5/8" int gwb	**3,600**	sf	2.00	7,200		
09900	Paint	**3,420**	sf	1.00	3,420		
	Exterior skin						
04200	CMU veneer	**1,500**	sf	25.00	37,500		
	Miscellaneous						
06100	Canopy and exterior ceiling supports, framing and blocking	**2**	ea	5,000.00	10,000		
	SUBTOTAL					101,320	
	B2020 WINDOWS						
	Curtainwall and Aluminum windows						
07900	Aluminum window	**600**	sf	80.00	48,000		
07900	Backer rod & double sealant	**400**	lf	5.00	2,000		
06100	Wood blocking at openings	**400**	lf	6.00	2,400		
	SUBTOTAL					52,400	
	B2030 EXTERIOR DOORS						
08100	Ext entry door, sidelight and trans	**3**	ea	5,000.00	15,000		
07900	Backer rod & double sealant	**150**	lf	5.00	750		
06100	Wood blocking at openings	**150**	lf	6.00	900		
	SUBTOTAL					16,650	
	TOTAL - EXTERIOR CLOSURE						***$170,370***
	B30 ROOFING						
	B3010 ROOF COVERINGS						
07540	All roofing included with Prefabricated metal building						
	SUBTOTAL					-	
	TOTAL - ROOFING						**$0**
	C10 INTERIOR CONSTRUCTION						
	C1010 PARTITIONS						
09211	Perimeter partitions at lockers and restrooms	**1,530**	sf	16.00	24,480		
09211	Interior partitions at lockers and restrooms	**1,425**	sf	15.00	21,375		
09211	Partitions at offices	**2,814**	sf	14.00	39,396		
09211	Rated partitions	**750**	sf	18.00	13,500		
06100	Rough blocking	**500**	lf	6.00	3,000		
	SUBTOTAL					101,751	

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADMIN/EMPLOYEE/SHOPS							
	C1020 INTERIOR DOORS						
08100	Single door	**13**	lvs	1,320.00	17,160		
08100	Double door	**1**	lvs	2,520.00	2,520		
08100	Single Vest door w/ 1 sidelight	**1**	lvs	3,500.00	3,500		
08100	Sidelight/borrowed lights	**10**	ea	850.00	8,500		
09900	Paint HM frames	**14**	ea	95.00	1,330		
07920	Sealants & caulking	**14**	ea	68.00	952		
	SUBTOTAL					33,962	
	C1030 SPECIALTIES / MILLWORK						
06402	Lunch/Training Kitchen cabinets and counters	**20**	lf	375.00	7,500		
06402	Restroom vanity counters	**14**	lf	285.00	3,990		
06402	General storage shelving	**32**	lf	35.00	1,120		
06402	Closet shelving	**10**	lf	35.00	350		
06402	Office shelving	**16**	lf	35.00	560		
06402	Office counters	**20**	lf	200.00	4,000		
06402	Copy/mail cab/counter/shelving	**20**	lf	300.00	6,000		
06402	Reception counter/wall/window	**16**	lf	750.00	12,000		
06402	Window sills	**40**	lf	30.00	1,200		
	Lockers						
10800	Lockers	**30**	ea	275.00	8,250		
10800	Lockers benches	**2**	ea	500.00	1,000		
	Restrooms						
10800	Shower curtain and rods	**3**	ea	200.00	600		
10800	Toilet partitions HC	**2**	ea	1,200.00	2,400		
10800	Toilet partitions Reg	**1**	ea	1,000.00	1,000		
10800	Toilet partitions urinal screen	**1**	ea	450.00	450		
10800	Soap disp	**7**	ea	18.00	126		
10800	Mirror	**7**	ea	233.00	1,631		
10800	Robe hook	**15**	ea	23.00	345		
10800	Grab bar	**10**	ea	85.00	850		
10800	TP holder	**6**	ea	45.00	270		
	SUBTOTAL					53,642	
	TOTAL - INTERIOR CONSTRUCTION						***$189,355***
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
09900	Paint to GWB	**10,899**	sf	1.25	13,624		
09300	Tile to walls to 6' aff	**1,080**	sf	20.00	21,600		
	SUBTOTAL					35,224	
	C3020 FLOOR FINISHES						
09651	VCT at lobby, corridors, tele/data, storage, copy/mail, lunch, break, storm event	**3,093**	sf	6.00	18,558		
09665	Carpet at offices	**1,200**	sf	4.50	5,400		
09300	Tile and base at restrooms & Jan	**850**	sf	20.00	17,000		
09900	Epoxy at lockers	**360**	sf	12.00	4,320		
09651	Rubber base	**1,211**	lf	3.00	3,633		
	SUBTOTAL					48,911	
	C3030 CEILING FINISHES						
09510	ACT ceilings; 2' x 2'	**4,402**	sf	4.50	19,809		
09211	MR GWB	**1,101**	sf	8.00	8,808		
09211	Soffits	**600**	lf	40.00	24,000		
09900	Paint to GWB ceilings and soffits	**3,501**	sf	1.10	3,851		
	SUBTOTAL					56,468	
	TOTAL - INTERIOR FINISHES						***$140,603***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADMIN/EMPLOYEE/SHOPS							
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
220000	WC	**6**	ea	4,000.00	24,000		
220000	Vanity sink	**4**	ea	3,500.00	14,000		
220000	Jan sink	**1**	ea	3,000.00	3,000		
220000	Showers	**2**	ea	4,500.00	9,000		
220000	HC Showers	**1**	ea	5,500.00	5,500		
220000	WH sink	**3**	ea	3,850.00	11,550		
220000	Urinals	**1**	ea	3,800.00	3,800		
220000	Kitchen/Break sink	**1**	ea	2,500.00	2,500		
220000	Water cooler	**1**	ea	5,000.00	5,000		
220000	Sub slab vent system	**5,503**	sf	3.00	16,509		
220000	Seismic restraints	**1**	ls	7,500.00	7,500		
220000	Testing and sterilization	**1**	ls	2,500.00	2,500		
220000	Coordination	**1**	ls	1,500.00	1,500		
	SUBTOTAL					$106,359	
	TOTAL - PLUMBING						***$106,359***
	D30 HVAC						
	D30 HVAC, GENERALLY						
23000	HVAC system	**5,503**	sf	32.00	176,096		
	SUBTOTAL					176,096	
	TOTAL - HVAC						***$176,096***
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
24000	Sprinkler heads	**50**	ea	150.00	7,500		
24000	Branch sprinkler piping with fittings & hangers	**500**	lf	22.00	11,000		
24000	Main sprinkler piping with fittings & hangers	**350**	lf	30.00	10,500		
24000	Hydraulic calculations	**1**	ls	5,000.00	5,000		
	SUBTOTAL					34,000	
	TOTAL - FIRE PROTECTION						***$34,000***
	D50 ELECTRICAL						
	D5010 SERVICE & DISTRIBUTION						
	Power Equipment						
26000	Electrical Power and circuitry - Cost portion of switchboard, panels and misc equipment (located in central location)	**5,503**	sf	8.00	44,024		
	SUBTOTAL					$44,024	
	D5020 LIGHTING & POWER						
	Lighting & Branch Power						
26000	Lighting and branch circuitry	**5,503**	sf	5.00	27,515		
26000	Equipment power	**5,503**	sf	2.50	13,758		
	SUBTOTAL					41,273	

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADMIN/EMPLOYEE/SHOPS							
	D5030 COMMUNICATION & SECURITY SYSTEMS						
	Telecommunications System						
26000	Rough in allowance	**16**	drps	400.00	6,400		
	Fire Alarm						
26000	Fire alarm system	**5,503**	sf	2.75	15,133		
	Security System						
26000	Security roughin allowance	**5,503**	sf	0.50	2,752		
26000	***PA/Sound System***						
26000	PA system				NIC		
	SUBTOTAL					$24,285	
	D5040 OTHER ELECTRICAL SYSTEMS						
	Lightning protection						
26000	UL Master label lightning protection				NIC		
	Miscellaneous						
26000	Temp services	**5,503**	sf	0.40	2,201		
	SUBTOTAL					2,201	
	TOTAL - ELECTRICAL						***$111,783***
	E20 FURNISHINGS						
	E2010 FIXED FURNISHINGS						
12211	Horizontal Louver Blinds	**600**	sf	6.00	3,600		
11000	Kitchen appliances	**1**	ls	3,500.00	3,500		
11000	Break room appliances	**1**	ls	3,500.00	3,500		
	SUBTOTAL					$10,600	
	E2020 MOVABLE FURNISHINGS						
	All movable furnishings to be provided and installed by owner					NIC	
	SUBTOTAL						
	TOTAL - FURNISHINGS						***$10,600***
	G SITEWORK						
02200	Structural Excavation and backfill						
02200	Foundation Perimeter, footings and pit	**350**	lf	40.00	14,000		
02200	6" ADS Perf Perimeter Drain	**250**	lf	35.00	8,750		
	Special foundations						
02200	Allow for ground improvements				NIC		
	Underslab piping						
02200	E&B Trench	**400**	lf	8.88	3,552		
02200	Slab Prep						
02200	Slab Prep 9" Stone	**204**	cy	30.00	6,120		
02200	Fine Grade & Compact	**5,503**	sf	0.50	2,752		
	SUBTOTAL					35,174	
	TOTAL - SITE DEVELOPMENT						***35,174***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE MAINTENANCE							
	GROSS FLOOR AREA CALCULATION						
	Maintenance			**4,285**			
	TOTAL GROSS FLOOR AREA (GFA)				**4,285** ***sf***		
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Strip footings to exterior walls						
03300	Formwork	**438**	sf	15.00	6,570		
03300	Re-bar	**307**	lbs	2.00	614		
03300	Concrete material	**30**	cy	155.00	4,650		
03300	Placing concrete	**30**	cy	35.00	1,050		
	Foundation walls at exterior (4' above FFA)						
03300	Formwork	**2,920**	sf	15.00	43,800		
03300	Re-bar	**1,606**	lbs	2.00	3,212		
03300	Concrete material	**76**	cy	155.00	11,780		
03300	Placing concrete	**76**	cy	35.00	2,660		
07150	Dampproofing foundation wall and footing	**876**	sf	3.50	3,066		
07210	Insulation board to 4' above FFA on foundation walls	**876**	sf	6.00	5,256		
	Column footings						
03300	Formwork	**192**	sf	15.00	2,880		
03300	Re-bar	**171**	lbs	2.00	342		
03300	Concrete material	**7**	cy	155.00	1,085		
03300	Placing concrete	**7**	cy	35.00	245		
03300	Set anchor bolts grout plates	**8**	ea	125.00	1,000		
	Miscellaneous						
03300	Form key in footing	**146**	lf	4.00	584		
03300	Piers						
03300	Formwork	**160**	sf	15.00	2,400		
03300	Re-bar	**900**	lbs	2.00	1,800		
03300	Concrete material	**3**	cy	155.00	465		
03300	Placing concrete	**3**	cy	35.00	105		
	SUBTOTAL					93,564	
	A1030 LOWEST FLOOR CONSTRUCTION						
	Slab on grade						
07210	Vapor barrier	**4,285**	sf	0.50	2,143		
03300	Rebar reinforcing	**4,928**	sf	2.00	9,856		
03300	Concrete - 8" thick	**113**	cy	155.00	17,515		
03300	Placing concrete	**113**	cy	30.00	3,390		
03300	Finishing and curing concrete	**4,285**	sf	1.50	6,428		
03300	Control joints - saw cut	**4,285**	sf	0.20	857		
	Miscellaneous						
03300	Column ties	**5**	ea	3,000.00	15,000		
03300	Misc pads and curbs	**1**	ls	5,000.00	5,000		
07100	SUBTOTAL					60,189	
	TOTAL - FOUNDATIONS						***$153,753***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	VEHICLE MAINTENANCE						
	B10 SUPERSTRUCTURE						
	B1020 ROOF CONSTRUCTION						
	Pre-fabricated Structure (includes steel, insulated metal panels walls and roof) :						
13000	Prefabricated metal building package	**4,285**	sf	42.00	179,970		
	Miscellaneous						
05120	Bridge crane rails and misc supports			Included w/ equipment budget			
05120	Overhead door frames	**4**	ea	2,200.00	8,800		
05120	Window frames	**4**	ea	2,000.00	8,000		
	SUBTOTAL					196,770	
	TOTAL - SUPERSTRUCTURE						***$196,770***
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS						
	Exterior skin						
04200	CMU veneer	**800**	sf	25.00	20,000		
07461	Metal Panel system with Prefabricated metal building package						
	SUBTOTAL					20,000	
	B2020 WINDOWS						
	Curtainwall and Aluminum windows						
07900	Translucent windows	**450**	sf	65.00	29,250		
07900	Aluminum windows	**80**	sf	80.00	6,400		
07900	Backer rod & double sealant	**400**	lf	5.00	2,000		
06100	Wood blocking at openings	**400**	lf	6.00	2,400		
	SUBTOTAL					40,050	
	B2030 EXTERIOR DOORS						
08300	14'x16' OH	**4**	ea	11,200.00	44,800		
08100	Ext single door	**3**	ea	1,500.00	4,500		
07900	Backer rod & double sealant	**310**	lf	5.00	1,550		
06100	Wood blocking at openings	**310**	lf	6.00	1,860		
	SUBTOTAL					$52,710	
	TOTAL - EXTERIOR CLOSURE						***$112,760***
	B30 ROOFING						
	B3010 ROOF COVERINGS						
07500	All roofing included with Prefabricated metal building						
	SUBTOTAL					-	
	B3020 ROOF OPENINGS						
08600	N/A						
	SUBTOTAL					$0	
	TOTAL - ROOFING						***$0***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE MAINTENANCE							
	C10 INTERIOR CONSTRUCTION						
	C1010 PARTITIONS						
04200	Interior cmu walls full ht	**2,048**	sf	22.00	45,056		
04200	Interior cmu walls under mezz	**840**	sf	20.00	16,800		
04200	Separation walls	**1,920**	sf	25.00	48,000		
10000	Storage screen walls and door	**50**	lf	420.00	21,000		
	SUBTOTAL					130,856	
	C1020 INTERIOR DOORS						
08140	Single doors	**3**	ea	1,500.00	4,500		
08140	Separation single doors	**1**	ea	1,600.00	1,600		
08140	Borrowed lights	**1**	ea	650.00	650		
08710	Hardware sets	**4**	ea	400.00	1,600		
09900	Paint doors and frames	**4**	ea	100.00	400		
07900	Sealants & caulking	**4**	ea	60.00	240		
	SUBTOTAL					8,990	
	C1030 SPECIALTIES / MILLWORK						
10475	Plywood backers	**1,000**	sf	3.00	3,000		
06100	Backer panels in electrical /tele/data closets	**1**	ls	1,200.00	1,200		
10475	Fire extinguisher cabinets	**2**	ea	250.00	500		
05500	Interior bollards	**9**	ea	450.00	4,050		
05500	Exterior bollards	**9**	ea	500.00	4,500		
	Lockers						
10800	Lockers				NIC		
	Restrooms						
10800	Soap disp	**1**	ea	18.00	18		
10800	Mirror	**1**	ea	233.00	233		
10800	Robe hook	**2**	ea	23.00	46		
10800	Grab bar	**2**	ea	85.00	170		
10800	TP holder	**1**	ea	45.00	45		
	SUBTOTAL					$13,762	
	TOTAL - INTERIOR CONSTRUCTION						***$153,608***
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
09900	Paint to interior CMU and gwb walls	**7,696**	sf	1.50	11,544		
09300	Tile to walls to 6' aff at restroom wet wall	**60**	sf	20.00	1,200		
	SUBTOTAL					$12,744	
	C3020 FLOOR FINISHES						
09700	Fluid storage - epoxy				NIC		
09700	Restroom tile floor and base	**81**	sf	20.00	1,620		
09700	Office VCT floor and rubber base	**160**	sf	5.00	800		
09700	Sealed concrete -shops, maintenance	**4,044**	sf	2.00	8,088		
09700	Line stripping	**1,000**	sf	0.25	250		
	SUBTOTAL					10,758	
	C3030 CEILING FINISHES						
09510	ACT ceilings; 2' x 2' at office	**160**	sf	4.50	720		
09211	Rated GWB at fluid stor	**180**	sf	10.00	1,800		
09211	MR GWB at restroom	**81**	sf	8.00	648		
09900	Exposed prefab metal bldg package						
	SUBTOTAL					3,168	
	TOTAL - INTERIOR FINISHES						***$26,670***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE MAINTENANCE							
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
220000	WC	**1**	ea	4,000.00	4,000		
220000	WH sink	**1**	ea	3,850.00	3,850		
220000	Shop Sink	**1**	ea	3,000.00	3,000		
220000	Sub slab vent system	**4,285**	sf	3.00	12,855		
220000	Floor trench drains	**3**	ea	5,500.00	16,500		
220000	Seismic restraints	**1**	ls	2,500.00	2,500		
220000	Testing and sterilization	**1**	ls	1,500.00	1,500		
220000	Allow for compressed air systems and misc connections	**1**	ls	35,000.00	35,000		
	SUBTOTAL					79,205	
	TOTAL - PLUMBING						***$79,205***
	D30 HVAC						
	D30 HVAC, GENERALLY						
23000	HVAC system	**4,285**	sf	30.00	128,550		
	SUBTOTAL					$128,550	
	TOTAL - HVAC						***$128,550***
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
24000	Sprinkler heads	**39**	ea	150.00	5,850		
24000	Branch sprinkler piping with fittings & hangers	**390**	lf	22.00	8,580		
24000	Main sprinkler piping with fittings & hangers	**220**	lf	30.00	6,600		
24000	Hydraulic calculations	**1**	ls	5,000.00	5,000		
	SUBTOTAL					$26,030	
	TOTAL - FIRE PROTECTION						***$26,030***
	D50 ELECTRICAL						
	Power Equipment						
26000	Electrical Power and circuitry - Cost portion of switchboard, panels and misc equipment (located in central location)	**4,285**	sf	8.00	34,280		
	SUBTOTAL					$34,280	
	D5020 LIGHTING & POWER						
	Lighting & Branch Power						
26000	Lighting and branch circuitry	**4,285**	sf	5.00	21,425		
26000	Equipment power	**4,285**	sf	2.50	10,713		
	SUBTOTAL					32,138	
	D5030 COMMUNICATION & SECURITY SYSTEMS						
	Telecommunications System						
26000	Rough in allowance	**2**	drps	400.00	800		
	Fire Alarm						
26000	Fire alarm system	**4,285**	sf	2.50	10,713		
	Security System						
26000	Security roughin allowance	**4,285**	sf	0.50	2,143		
26000	***PA/Sound System***						
26000	PA system				NIC		
	SUBTOTAL					$13,656	

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE MAINTENANCE							
	D5040 OTHER ELECTRICAL SYSTEMS						
	Lightning protection						
26000	UL Master label lightning protection				NIC		
	Miscellaneous						
26000	Temp services	**4,285**	sf	0.40	1,714		
	SUBTOTAL					1,714	
	TOTAL - ELECTRICAL						***$81,788***
	G SITEWORK						
02200	Structural Excavation and backfill						
02200	Foundation Perimeter, footings and tie beams	**400**	lf	40.00	16,000		
02200	6" ADS Perf Perimeter Drain	**150**	lf	35.00	5,250		
	Special foundations						
02200	Allow for ground improvements				NIC		
	Underslab piping						
02200	E&B Trench	**285**	lf	8.88	2,531		
02200	Slab Prep						
02200	Slab Prep 9" Stone	**159**	cy	30.00	4,770		
02200	Fine Grade & Compact	**4,285**	sf	0.50	2,143		
	SUBTOTAL					30,694	
	TOTAL - SITE DEVELOPMENT						***30,694***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
WASH BAY							
	GROSS FLOOR AREA CALCULATION						
	Wash Bay			**1,390**			
	TOTAL GROSS FLOOR AREA (GFA)				**1,390** ***sf***		
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Strip footings to exterior walls						
03300	Formwork	**312**	sf	15.00	4,680		
03300	Re-bar	**218**	lbs	2.00	436		
03300	Concrete material	**18**	cy	155.00	2,790		
03300	Placing concrete	**18**	cy	35.00	630		
	Foundation walls at exterior (4' above FFA)						
03300	Formwork	**2,080**	sf	15.00	31,200		
03300	Re-bar	**1,144**	lbs	2.00	2,288		
03300	Concrete material	**54**	cy	155.00	8,370		
03300	Placing concrete	**54**	cy	35.00	1,890		
07150	Dampproofing foundation wall and footing	**624**	sf	3.50	2,184		
07210	Insulation board to 4' above FFA on foundation walls	**624**	sf	6.00	3,744		
	Column footings						
03300	Formwork	**96**	sf	15.00	1,440		
03300	Re-bar	**86**	lbs	2.00	172		
03300	Concrete material	**4**	cy	155.00	620		
03300	Placing concrete	**4**	cy	35.00	140		
03300	Set anchor bolts grout plates	**4**	ea	125.00	500		
	Miscellaneous						
03300	Form key in footing	**104**	lf	4.00	416		
03300	Piers						
03300	Formwork	**64**	sf	15.00	960		
03300	Re-bar	**360**	lbs	2.00	720		
03300	Concrete material	**1**	cy	155.00	155		
03300	Placing concrete	**1**	cy	35.00	35		
	SUBTOTAL					63,370	
	A1020 SPECIAL FOUNDATIONS						
	No Work in this section						
	SUBTOTAL					$0	
	A1030 LOWEST FLOOR CONSTRUCTION						
	Slab on grade						
07210	Vapor barrier	**1,390**	sf	0.50	695		
03300	Rebar reinforcing	**1,599**	sf	2.00	3,198		
03300	Concrete - 8" thick; 4,000 psi	**37**	cy	155.00	5,735		
03300	Placing concrete	**37**	cy	30.00	1,110		
03300	Finishing and curing concrete	**1,390**	sf	1.50	2,085		
03300	Control joints - saw cut	**1,390**	sf	0.20	278		
	Miscellaneous						
03300	Column ties	**2**	ea	2,500.00	5,000		
03300	Trench drain encasements	**1**	ls	1,500.00	1,500		
	SUBTOTAL					$19,601	
	TOTAL - FOUNDATIONS						***$82,971***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
WASH BAY							
	B10 SUPERSTRUCTURE						
	B1020 ROOF CONSTRUCTION						
	Pre-fabricated Structure (includes steel, insulated metal panels walls and roof) :						
13000	Prefabricated metal building package (galv steel, 4" metal panels and metal roof)	**1,390**	sf	42.00	58,380		
	Miscellaneous						
05120	Overhead door frames	**2**	ea	2,200.00	4,400		
	SUBTOTAL					$62,780	
	TOTAL - SUPERSTRUCTURE						***$62,780***
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS						
	Interior skin						
07210	PVC walls - washbay	**3,250**	sf	10.00	32,500		
	Exterior skin						
04200	CMU veneer	**450**	sf	25.00	11,250		
07461	Metal Panel system with Prefabricated metal building package						
	SUBTOTAL					$43,750	
	B2020 WINDOWS						
07900	Translucent windows	**140**	sf	65.00	9,100		
07900	Backer rod & double sealant	**100**	lf	5.00	500		
06100	Wood blocking at openings	**100**	lf	6.00	600		
07900	N/A						
	SUBTOTAL					10,200	
	B2030 EXTERIOR DOORS						
08300	16'x14' OH at wash bay	**1**	ea	13,440.00	13,440		
08300	12'x14' OH at wash bay	**1**	ea	10,080.00	10,080		
08100	3x7 ext galv doors with vision glass	**1**	ea	1,500.00	1,500		
07900	Backer rod & double sealant	**120**	lf	5.00	600		
06100	Wood blocking at openings	**120**	lf	6.00	720		
	SUBTOTAL					$26,340	
	TOTAL - EXTERIOR CLOSURE						***$80,290***
	B30 ROOFING						
	B3010 ROOF COVERINGS						
07500	All roofing included with Prefabricated metal building						
	SUBTOTAL					$0	
	B3020 ROOF OPENINGS						
08600	N/A						
	SUBTOTAL					$0	
	TOTAL - ROOFING						**$0**

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
WASH BAY							
	C10 INTERIOR CONSTRUCTION						
	C1010 PARTITIONS						
09250	Interior wall between washbay and Maintenance (CMU below, metal stud, densglass and FRP above)	**2,100**	sf	22.00	46,200		
	SUBTOTAL					$46,200	
	C1020 INTERIOR DOORS						
08140	HM door and frame at washbay equipment room	**1**	lvs	1,250.00	1,250		
08710	Hardware sets	**1**	ea	400.00	400		
09900	Paint doors and frames	**1**	ea	100.00	100		
07900	Sealants & caulking	**1**	ea	60.00	60		
	SUBTOTAL					1,810	
	C1030 SPECIALTIES / MILLWORK						
10475	Fire extinguisher cabinets	**1**	ea	250.00	250		
05500	Interior SS bollards	**4**	ea	600.00	2,400		
05500	Exterior bollards	**2**	ea	450.00	900		
	SUBTOTAL					$3,550	
	TOTAL - INTERIOR CONSTRUCTION						***$51,560***
	C20 STAIRCASES						
	C20 STAIRCASES						
05000	Glav stair/platform				NIC		
	SUBTOTAL					$0	
	TOTAL - STAIR CASES						***$0***
	C30 INTERIOR FINISHES						
	C3020 FLOOR FINISHES						
09650	Sealed concrete	**1,390**	sf	2.00	2,780		
	SUBTOTAL					$2,780	
	C3030 CEILING FINISHES						
09900	PVC ceiling - washbay	**1,275**	sf	15.00	19,125		
	SUBTOTAL					$19,125	
	TOTAL - INTERIOR FINISHES						***$21,905***
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
220000	Plumbing Waste	**50**	lf	44.00	2,200		
220000	Plumbing Vent	**50**	lf	40.00	2,000		
220000	Plumbing Distribution - 3/4"	**100**	lf	26.00	2,600		
220000	Plumbing Gas Piping to HVAC equip	**200**	lf	35.00	7,000		
220000	Plumbing Oil and Gas Seps				Included w/ site		
220000	Sub slab vent system	**1,390**	sf	3.00	4,170		
220000	Trench floor drains	**1**	ea	6,500.00	6,500		
220000	4x4 center drain	**1**	ea	2,000.00	2,000		
220000	Floor Clean out	**2**	ea	400.00	800		
220000	WH	**2**	ea	1,100.00	2,200		
220000	Testing and sterilization	**1**	ls	800.00	800		
	SUBTOTAL					30,270	
	TOTAL - PLUMBING						***$30,270***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
WASH BAY							
	D30 HVAC						
	D30 HVAC, GENERALLY						
23000	HVAC system	**1,390**	sf	38.00	52,820		
	SUBTOTAL					$52,820	
	TOTAL - HVAC						***$52,820***
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
02400	Galv dry sprinkler head	**12**	ea	175.00	2,100		
02400	Galv branch sprinkler piping with fittings & hangers	**120**	lf	28.00	3,360		
02400	Galv main sprinkler piping with fittings & hangers	**60**	lf	40.00	2,400		
24000	Dry valves and equipment	**1**	ls	6,500.00	6,500		
02400	Hydraulic calculations	**1**	ls	2,500.00	2,500		
	SUBTOTAL					16,860	
	TOTAL - FIRE PROTECTION						***$16,860***
	D50 ELECTRICAL						
	Power Equipment						
26000	Electrical Power and circuitry - Cost portion of switchboard, panels and misc equipment (located in central location)	**1,390**	sf	8.00	11,120		
	SUBTOTAL					$11,120	
	D5020 LIGHTING & POWER						
	Lighting & Branch Power						
26000	Lighting and power	**1,390**	sf	6.75	9,383		
	SUBTOTAL					$9,383	
	D5030 COMMUNICATION & SECURITY SYSTEMS						
	Telecommunications System						
26000	N/A						
	Fire Alarm						
26000	Fire alarm system	**1,390**	sf	2.50	3,475		
	Security System						
26000	N/A						
26000	***PA/Sound System***						
26000	PA system				NIC		
	Misc						
26000	Responder Radio Allowance				NIC		
	SUBTOTAL					$3,475	
	D5040 OTHER ELECTRICAL SYSTEMS						
	Lightning protection						
26000	UL Master label lightning protection				NIC		
	Miscellaneous						
26000	Temp services	**1,390**	sf	0.40	556		
	SUBTOTAL					556	
	TOTAL - ELECTRICAL						***$24,534***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
WASH BAY							
	G SITEWORK						
	Structural Excavation and backfill						
02200	Foundation Perimeter, footings and tie beams	**120**	lf	40.00	4,800		
02200	6" ADS Perf Perimeter Drain	**100**	lf	35.00	3,500		
	Special foundations						
02200	Allow for ground improvements				NIC		
	Underslab piping						
02200	E&B Trench	**80**	lf	8.88	710		
	Slab Prep						
02200	Slab Prep 9" Stone	**51**	cy	30.00	1,530		
02200	Fine Grade & Compact	**1,390**	sf	0.50	695		
	SUBTOTAL					11,235	
	TOTAL - SITE DEVELOPMENT						***11,235***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
MEZZANINES							
	GROSS FLOOR AREA CALCULATION						
	Mezzanines			**2,134**			
	TOTAL GROSS FLOOR AREA (GFA)				**2,134** ***sf***		
	B10 SUPERSTRUCTURE						
	B1030 FLOOR CONSTRUCTION						
	Mezzanine Structure - Steel:						
05120	Structural steel beams, columns and bracing	**10**	tns	5,600.00	56,000		
05120	Floor deck	**2,241**	sf	3.05	6,835		
03300	Concrete deck	**29**	cy	250.00	7,250		
03300	Finish slab	**2,241**	sf	0.80	1,793		
	SUBTOTAL					$71,878	
	TOTAL - SUPERSTRUCTURE						***$71,878***
	C10 INTERIOR CONSTRUCTION						
	C1010 PARTITIONS						
09250	Interior wall at mech/compressor rooms	**720**	sf	15.00	10,800		
	SUBTOTAL					$10,800	
	C1020 INTERIOR DOORS						
08140	HM door and frame at mech/elec room and separation wall	**2**	ea	1,250.00	2,500		
08710	Hardware sets	**2**	ea	400.00	800		
09900	Paint doors and frames	**2**	ea	200.00	400		
07900	Sealants & caulking	**2**	ea	120.00	240		
	SUBTOTAL					3,940	
	TOTAL - INTERIOR CONSTRUCTION						***$14,740***
	C20 STAIRCASES						
	C20 STAIRCASES						
05000	Stair systems	**3**	flt	7,800.00	23,400		
05000	Guard rails	**180**	lf	145.00	26,100		
05000	Access at guard rails	**3**	ea	800.00	2,400		
09900	Paint guardrails	**180**	lf	15.00	2,700		
09900	Paint stair and rails	**3**	flt	2,200.00	6,600		
	SUBTOTAL					$61,200	
	TOTAL - STAIR CASES						***$61,200***
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
09900	Exposed, walls and panels and steel by Prefabricated metal bldg						
	SUBTOTAL					$0	
	C3020 FLOOR FINISHES						
09680	Seal concrete	**2,134**	sf	1.50	3,201		
	SUBTOTAL					$3,201	
	C3030 CEILING FINISHES						
09250	Exposed deck and steel by Prefabricated metal bldg						
	SUBTOTAL					$0	
	TOTAL - INTERIOR FINISHES						***$3,201***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
MEZZANINES							
	D30 HVAC						
	D30 HVAC, GENERALLY						
23000	HVAC system portion for area allowance	**2,134**	sf	5.00	10,670		
	SUBTOTAL					$10,670	
	TOTAL - HVAC						***$10,670***
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
02400	Wet upright sprinkler head	**16**	ea	150.00	2,400		
02400	Branch sprinkler piping with fittings & hangers	**160**	lf	22.00	3,520		
02400	Main sprinkler piping with fittings & hangers	**200**	lf	30.00	6,000		
02400	Hydraulic calculations	**1**	ls	3,000.00	3,000		
	SUBTOTAL					$14,920	
	TOTAL - FIRE PROTECTION						***$14,920***
	D50 ELECTRICAL						
	Power Equipment						
26000	Electrical Power and circuitry - Cost portion of switchboard, panels and misc equipment (located in central location)	**2,134**	sf	4.00	8,536		
	SUBTOTAL					$8,536	
	D5020 LIGHTING & POWER						
	Lighting & Branch Power						
26000	Lighting and power	**2,134**	sf	2.00	4,268		
	SUBTOTAL					$4,268	
	D5030 COMMUNICATION & SECURITY SYSTEMS						
	Telecommunications System						
26000	N/A						
	Fire Alarm						
26000	Fire alarm system	**2,134**	sf	1.00	2,134		
	Security System						
26000	N/A						
26000	***PA/Sound System***						
26000	PA system				N/A		
	SUBTOTAL					$2,134	
	D5040 OTHER ELECTRICAL SYSTEMS						
	Miscellaneous						
26000	Temp services	**2,134**	sf	0.40	854		
	SUBTOTAL					854	
	TOTAL - ELECTRICAL						***$15,792***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE CANOPY							
	GROSS FLOOR AREA CALCULATION						
	Vehicle Canopy Storage			**4,625**			
	TOTAL GROSS FLOOR AREA (GFA)				**4,625** ***sf***		
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Strip footings to exterior walls						
03300	Formwork	**240**	sf	15.00	3,600		
03300	Re-bar	**168**	lbs	2.00	336		
03300	Concrete material	**16**	cy	160.00	2,560		
03300	Placing concrete	**16**	cy	40.00	640		
	Foundation walls at exterior (4' above FFA)						
03300	Formwork	**1,600**	sf	15.00	24,000		
03300	Re-bar	**880**	lbs	2.00	1,760		
03300	Concrete material	**41**	cy	160.00	6,560		
03300	Placing concrete	**41**	cy	40.00	1,640		
07150	Dampproofing foundation wall and footing	**480**	sf	3.50	1,680		
	Column footings						
03300	Formwork	**144**	sf	15.00	2,160		
03300	Re-bar	**128**	lbs	2.00	256		
03300	Concrete material	**6**	cy	160.00	960		
03300	Placing concrete	**6**	cy	40.00	240		
03300	Set anchor bolts grout plates	**6**	ea	125.00	750		
	Miscellaneous						
03300	Form key in footing	**80**	lf	4.00	320		
03300	Piers						
03300	Formwork	**96**	sf	15.00	1,440		
03300	Re-bar	**540**	lbs	2.00	1,080		
03300	Concrete material	**2**	cy	160.00	320		
03300	Placing concrete	**2**	cy	40.00	80		
	SUBTOTAL					50,382	
	A1030 LOWEST FLOOR CONSTRUCTION						
	Slab on grade						
07210	Vapor barrier	**4,625**	sf	0.50	2,313		
03300	Rebar reinforcing	**5,319**	sf	2.00	10,638		
03300	Concrete - 8" thick	**122**	cy	160.00	19,520		
03300	Placing concrete	**122**	cy	35.00	4,270		
03300	Finishing and curing concrete	**4,625**	sf	1.50	6,938		
03300	Control joints - saw cut	**4,625**	sf	0.20	925		
	Miscellaneous						
03300	Column ties	**5**	ea	3,000.00	15,000		
03300	Misc pads and curbs	**1**	ls	5,000.00	5,000		
	SUBTOTAL					64,604	
	TOTAL - FOUNDATIONS						***$114,986***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE CANOPY							
	B10 SUPERSTRUCTURE						
	B1020 ROOF CONSTRUCTION						
	Pre-fabricated Structure (includes steel, insulated metal panels walls and roof) :						
13000	Prefabricated metal building package (two end walls and open front)	**4,625**	sf	30.00	138,750		
	SUBTOTAL					138,750	
	TOTAL - SUPERSTRUCTURE						***$138,750***
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS						
	Exterior skin						
04200	CMU veneer at end walls	**480**	sf	25.00	12,000		
07461	Metal Panel system with Prefabricated metal building package						
	SUBTOTAL					12,000	
	B2020 WINDOWS						
	Curtainwall and Aluminum windows						
07900	Translucent windows at end walls				NIC		
07900	Backer rod & double sealant				NIC		
06100	Wood blocking at openings				NIC		
	SUBTOTAL					-	
	B2030 EXTERIOR DOORS						
08100	Ext single door	**2**	ea	1,500.00	3,000		
07900	Backer rod & double sealant	**84**	lf	5.00	420		
06100	Wood blocking at openings	**84**	lf	6.00	504		
	SUBTOTAL					$3,924	
	TOTAL - EXTERIOR CLOSURE						***$15,924***
	B30 ROOFING						
	B3010 ROOF COVERINGS						
07500	All roofing included with Prefabricated metal building						
	SUBTOTAL					-	
	B3020 ROOF OPENINGS						
08600	N/A						
	SUBTOTAL					$0	
	TOTAL - ROOFING						***$0***
	C10 INTERIOR CONSTRUCTION						
	C1010 PARTITIONS						
04200	N/A						
	SUBTOTAL					-	
	C1020 INTERIOR DOORS						
07900	N/A						
	SUBTOTAL					-	
	C1030 SPECIALTIES / MILLWORK						
05500	Interior bollards				NIC		
05500	Exterior bollards				NIC		
	SUBTOTAL					$0	
	TOTAL - INTERIOR CONSTRUCTION						***$0***

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE CANOPY							
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
09900	N/A						
	SUBTOTAL					$0	
	C3020 FLOOR FINISHES						
09700	Sealed concrete	**4,625**	sf	1.50	6,938		
	SUBTOTAL					6,938	
	C3030 CEILING FINISHES						
09900	Exposed prefab metal bldg package						
	SUBTOTAL					-	
	TOTAL - INTERIOR FINISHES						***$6,938***
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
220000	Sub slab vent system		sf	2.50	44,472		
220000	Trench floor drains	**1**	ea	6,500.00	6,500		
220000	Floor Clean out	**2**	ea	400.00	800		
220000	WH	**2**	ea	1,100.00	2,200		
220000	Testing and sterilization	**1**	ls	800.00	800		
	SUBTOTAL					54,772	
	TOTAL - PLUMBING						***$54,772***
	D30 HVAC						
	D30 HVAC, GENERALLY						
23000	N/A						
	SUBTOTAL					$0	
	TOTAL - HVAC						***$0***
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
24000	Dry sprinkler heads	**42**	ea	150.00	6,300		
24000	Branch sprinkler piping with fittings & hangers	**420**	lf	22.00	9,240		
24000	Main sprinkler piping with fittings & hangers	**240**	lf	30.00	7,200		
24000	Dry valves and equipment	**1**	ls	6,500.00	6,500		
24000	Hydraulic calculations	**1**	ls	5,000.00	5,000		
	SUBTOTAL					$34,240	
	TOTAL - FIRE PROTECTION						***$34,240***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
VEHICLE STORAGE CANOPY							
	D50 ELECTRICAL						
	Power Equipment						
26000	Electrical Power and circuitry - Cost portion of switchboard, panels and misc equipment (located in central location)	**4,625**	sf	10.00	46,250		
	SUBTOTAL					$46,250	
	D5020 LIGHTING & POWER						
	Lighting & Branch Power						
26000	Exterior lighting and branch circuitry	**4,625**	sf	5.00	23,125		
26000	Equipment power	**4,625**	sf	1.00	4,625		
	SUBTOTAL					27,750	
	D5030 COMMUNICATION & SECURITY SYSTEMS						
	Telecommunications System						
26000	Rough in allowance				N/A		
	Fire Alarm						
26000	Fire alarm system	**4,625**	sf	2.25	10,406		
	Security System						
26000	Security roughin allowance	**4,625**	sf	0.50	2,313		
26000	***PA/Sound System***						
26000	PA system				NIC		
	SUBTOTAL					$12,719	
	D5040 OTHER ELECTRICAL SYSTEMS						
	Lightning protection						
26000	UL Master label lightning protection				NIC		
	Miscellaneous						
26000	Temp services	**4,625**	sf	0.40	1,850		
	SUBTOTAL					1,850	
	TOTAL - ELECTRICAL						***$88,569***
	G SITEWORK						
02200	Structural Excavation and backfill						
02200	Foundation Perimeter, footings and tie beams	**230**	lf	45.00	10,350		
02200	6" ADS Perf Perimeter Drain	**235**	lf	35.00	8,225		
	Special foundations						
02200	Allow for ground improvements				NIC		
	Paving						
02200	Slab Prep 9" Stone	**171**	cy	30.00	5,130		
02200	Fine Grade & Compact	**4,625**	sf	0.50	2,313		
	SUBTOTAL					26,018	
	TOTAL - SITE DEVELOPMENT						***26,018***

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	INDUSTRIAL EQUIPMENT						
	A INDUSTRIAL EQUIPMENT						
	Fixed Equipment						
	Maintenance						
13000	75K Lb. Scissor Lift	**1**	ea	83,000	83,000		
13000	2-Post Lift				NIC		
13000	1-4post mobile lift w/lawnmower attachment	**1**	ea	7,500	7,500		
13000	5-Ton Bridge Crane	**1**	ea	50,000	50,000		
13000	Vehicle Exhaust Fans & Reels	**1**	ea	7,500	7,500		
13000	Waste Oil Caddie	**1**	ea	330	330		
13000	Steel Workbench w/ Casters & Elec. Shelf	**1**	ea	811	811		
13000	Bench Vise (1 for each work bench)	**1**	ea	135	135		
13000	heavy duty bench vice anchored on floor	**1**	ea	1,135	1,135		
13000	Flammable Cabinets - 45 Gal	**1**	ea	625	625		
13000	Existing Parts Washer	**1**	ea	300	300		
13000	Band Saw-portable	**1**	ea	430	430		
13000	Tire Maintenance machine				NIC		
13000	Tire Inflation Cage				NIC		
13000	Fork lift				NIC		
13000	2000lbs table lift				NIC		
	Parts Storage						
13000	Parts Shelving - 6'	**1**	ea	600	600		
13000	Small Bin Shelving	**1**	ea	265	265		
13000	Large Bin Shelving	**1**	ea	1,400	1,400		
13000	Tire storage rack (small Tires)	**1**	ea	330	330		
	Welding						
13000	Portable Weld Fume Extractor	**1**	ea	6,000	6,000		
13000	10-Ton Anchor Pots				NIC		
13000	Bench Grinder	**1**	ea	725	725		
13000	Portable Welding Screens	**1**	ea	150	150		
13000	Drill Press -Heavy Duty	**1**	ea	3,400	3,400		
13000	Cantilever Rack	**1**	ea	1,101	1,101		
	Sign Shop						
13000	Vertical sign storage rack (rolled up signs)	**1**	ea	240	240		
13000	Sign Storage Rack	**1**	ea	200	200		
	Shared Shops						
13000	Steel Work Benches w/ casters & elec Shelf	**1**	ea	811	811		
13000	2000lbs table lift				NIC		
13000	New Drill Press	**1**	ea	1,050	1,050		
13000	New Chop Saw	**1**	ea	350	350		
13000	Dust Collection System				NIC		
13000	Paint Booth				NIC		
13000	Heavy duty Shelving	**1**	ea	600	600		
13000	Flammable Cabinet	**1**	ea	625	625		
13000	Waste oil pump out station	**1**	ea	1,760	1,760		
13000	2-Ton Mono Rail	**1**	ea	15,000	15,000		

CSI CODE		DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
INDUSTRIAL EQUIPMENT								
		Tire Storage						
13000		Work Benches w/ caster & elec. Shelf	**1**	ea	811	811		
13000		Bench Mounted Floor Sweep	**1**	ea	800	800		
13000		Flammable cabinet	**1**	ea	625	625		
13000		Light Duty wall mounted shelves	**1**	ea	210	210		
13000		Bench Grinder	**1**	ea	630	630		
13000		Bench Vise	**1**	ea	135	135		
		Fluid Storage and Maintenance						
13000		Lubrication dispensing system (Includes Install)				NIC		
		SUBTOTAL					189,584	
	2	**Washbay Equipment**						
13000		Vehicle wash EQ	**1**	ls	50,000.00	50,000		
		SUBTOTAL					50,000	
		TOTAL - INDUSTRIAL EQUIPMENT						***$239,584***