

Carla M. Moynihan
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029783.00002

June 29, 2020

VIA HAND DELIVERY

Franklin Planning Board
c/o Department of Public Works Building
257 Fisher Street
Franklin, MA 02038
Attention: Anthony Padula, Chair

Re: Special Permit Application – 164 Grove Street, Franklin, MA

Chair Padula,

My office represents NLCP 164 Grove Street MA LLC, a Massachusetts limited liability company, the property owner (“**Owner**”) of the approximately 1.5 acre parcel of vacant land located at 164 Grove Street, Franklin, Massachusetts 02038 (Map 14, Lots 39 and 40) (the “**Property**”) and PharmaCann Massachusetts, Inc.. (“**Licensee**”) On behalf of Owner and Licensee, please find enclosed a special permit application, a site plan application and supporting documents regarding a proposed non-medical marijuana establishment to be located at the Property (the “**Proposed Project**”). The Proposed Project will include the construction of a new building comprised of 4,150 square feet, located approximately 300 feet back from Grove Street, consisting of 66 standard and 4 HC Accessible parking spaces, and designed with impervious surface of 22,652 square feet, which represents 34.6% of the Property. Based on preliminary discussions with Town of Franklin (“**Town**”) officials, in order to avoid direct conflicts with customers accessing other Grove Street businesses, the access for the Proposed Project is shown on the enclosed Site Plans as utilizing an existing curb cut and driveway over the adjacent property located at 166 Grove Street, owned by Core Real Estate Holdings and operated as a Planet Fitness, which also serves as access for Franklin Tile and Carpet at 168 Grove Street (“**Existing Easement**”). The access for the Proposed Project from 166 Grove Street would extend the Existing Easement a bit further along its current 250 feet in length to provide a left hand turn entrance into our Property off of the 166 Grove Street driveway. The Owner has contacted Core Real Estate Holdings in connection with the foregoing and understands that Planning Board approvals for the Proposed Project as currently designed would be conditioned upon securing such easements.

In accordance with Section 185-49(4)(b)(iii) of the Town of Franklin Bylaws (the “**Bylaws**”), the Franklin Planning Board (the “**Board**”) requires a Special Permit to operate a

June 29, 2020
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Non-Medical Marijuana Retail Establishment and Section 185-31(1)(E) of the Bylaws requires site plan approval as part of the special permit approval process. Moreover, since the Proposed Project is located in the Water Resource Overlay District, which requires additional consideration as to impervious surface coverage during the Planning Board's special permit review process. The following documents are provided in support of the Proposed Project as submitted in electronic form as well as hard copy:

1. Application for Approval of a Site Plan and Special Permit(s) – 2 duplicate originals
2. Form P Application for Approval of a Site Plan – 2 duplicate originals
3. Certificate of Ownership – 2 duplicate originals w/ Quitclaim Deed
4. Certified Abutter List
5. Site Plans, prepared by Meridian Associates, dated May 8, 2020, consisting of 8 sheets
 - a. 17 sets of 11" x 17" prints of site plan set
 - b. 6 sets of 24" x 36" prints of site plan set (folded)
6. Special Permit Findings – set forth below and on a separate sheet
7. Filing Fees payable to the Town of Franklin – 3 separate checks:
 - a. \$750.00 special permit fee
 - b. \$2,500.00 site plan fee
 - c. \$50.00 fire department fee
8. Traffic Study – to be submitted under separate cover
9. Stormwater Analysis and Calculations Report, prepared by Meridian Associates, dated May 8, 2020

SPECIAL PERMIT FINDINGS

The Board should grant a special permit for the Proposed Project for the following reasons.

- a. Proposed project addresses or is consistent with neighborhood or Town need.

First, the Proposed Project is consistent with the neighborhood and Town's needs. Chapter 185 of the Bylaws were enacted to, *inter alia*: (A) promote the health, safety, convenience, morals, and welfare of the inhabitants of the Town; (B) lessen the danger from fire and congestion; and (C) encourage the most appropriate use of land. *See* Bylaws, §185-1. The Proposed Project promotes health, safety, convenience, morals, and welfare by providing the Town's residents with regulated access to recreational marijuana in a safe environment as

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located within the Marijuana Use Overlay District Section 185-49 of the Bylaws enacted in 2013, and amended in 2017. The Proposed Project's design, which consists of 1 principal building with associated parking, is also intended to lessen the danger of fire (as the building is set far back from the property line and is not located next to other buildings) and congestion (as the Property will utilize the existing curb cuts onto the abutting private way at 166 Grove Street to ensure cars coming into and out of the Property will not backup Grove Street). Additionally, the Proposed Project will encourage the most appropriate use of the lot because it would improve a currently vacant parcel of land into a productive retail operation providing services to residents of the Town and an increased tax base to the Town. The Board's grant of a special permit is consistent with the neighborhood and Town's needs.

b. Vehicular traffic flow, access and parking and pedestrian safety are properly addressed.

Second, vehicular traffic flow, access and parking, and pedestrian safety are properly addressed, with the utilization of the existing curb cuts onto the abutting private way at 166 Grove Street already serving two other businesses with no noticeable impact on the future traffic operations at nearby intersections. All customer access to the Property shall be regulated in such a manner so as no more than 100 are accessing the Property in any given hour. The Proposed Project's parking design including 66 standard and 4 HC Accessible parking spaces is more than sufficient to accommodate the required staff and customer parking on the Property. The traffic study for the Proposed Project to be shared in advance of the Planning Board's public hearing will further evidence the foregoing conclusions in greater detail.

c. Public roadways, drainage, utilities and other infrastructure are adequate or will be upgraded to accommodate development.

Third, public roadways, drainage, utilities, and other infrastructure are adequate or will be upgraded to accommodate development. The Proposed Project consists of using the curb cuts onto the existing private way at 166 Grove Street that connects with Grove Street, which will be sufficient for retail operations at the Property. Owner is currently working with the Town and surrounding property owners to connect the Property's drainage and sewer system with the existing utility lines to connect the proposed Project's water, gas and electrical lines into the access way at 166 Grove Street at the existing gas, lateral water line and utility pole, respectively. The Board's grant of a special permit will not materially impact the public roadways, drainage, utilities, or other infrastructure as they are currently adequate or are being upgraded to support the Proposed Project.

d. Neighborhood character and social structure will not be negatively impacted.

Fourth, the neighborhood character and social structure will not be negatively impacted. As mentioned above, the Property is located in an Industrial District and is surrounded by other retail operations. The Proposed Project is the same type of retail establishment that this area of the Town has been supporting and encouraging through its adoption of the Marijuana Use

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Overlay District. The Board's grant of a special permit will not negatively impact any residential neighborhood or the Town's social structure.

e. The Project will not destroy or cause substantial damage to any environmentally significant natural resource, habitat, or feature or, if it will, proposed mitigation, remediation, replication, or compensatory measures are adequate.

Fifth, the Proposed Project will not destroy or cause substantial damage to any environmentally significant natural resource, habitat, or feature. To Owner's knowledge, there are not any natural resources, habitats, or features located on the Property that will be substantially damaged or destroyed during construction or operation of the Proposed Project. The Board's grant of a special permit will not result in material environmental degradation.

f. Number, height, bulk, location and siting of building(s) and structure(s) will not result in abutting properties being deprived of light and fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates.

Sixth, the number, height, bulk, location, and siting of the building and structures at the Property will not result in abutting properties being deprived of light or fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates. The Proposed Project consists of 1 principal building and associated parking to be constructed on the currently vacant lot. The Proposed Project is consistent with the surrounding retail stores and properties. The Board's grant of a special permit will not negatively impact the surrounding properties' light or fresh air circulation.

g. Water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive.

Seventh, water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive. The Proposed Project's water consumption and sewer usage will be consistent with normal retail stores similar to those located in the immediate vicinity. The Proposed Project intends to secure a similar access to the manhole that contains a pump station within the existing ROW easement alongside Grove Street, which Franklin Carpet and Tile is also utilizing. To Owner's knowledge such pump station has more than sufficient capacity to address the minimal increase associated with the Proposed Project's use – being only a small breakroom and 2 bathrooms for staff and customer use. The Board's grant of a special permit will not materially impact water consumption or sewer usage in the neighborhood.

In conclusion, the Proposed Project's use will not have adverse effects which overbalance its beneficial effects on either the neighborhood or the Town, in view of the particular characteristics of the site and of the proposal in relation to that site. The Property is located in an Industrial District close to U.S. Interstate 495, directly abuts other retail stores, including, for

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example, a gym, tile and carpeting store, electrical supplies store, and brewery, and does not abut any residentially zoned properties. *See* Bylaws, Zoning Map. The Proposed Project is consistent with and fits into the Town's planning of the surrounding neighborhood as an industrial zoned and primarily detached retail-oriented neighborhood. The Board's grant of a special permit will not overbalance the beneficial effects on the surrounding neighborhood.

Pursuant to Section 185-36 of the Bylaws, Owner has provided the Board with documentation from a registered professional engineer to demonstrate the Proposed Project's compliance with the special permit criteria for impervious surface, as set forth in the Stormwater Analysis and Calculations Report, prepared by Meridian Associates, dated May 8, 2020, including without limitation the following:

1. Stormwater runoff from the Property will not be increased following the development of the Proposed Project by more than 10% in a 20-year storm;
2. Soil loss rate from the Property will not be increased above the existing rate by more than 10% following development of the Proposed Project.
3. Erosion control methods to be employed during construction of the Project will be adequate to prevent excessive soil loss.

For the above reasons, the Board should grant Owner's request for a special permits for the Proposed Project. Please do not hesitate to reach out should you have any questions.

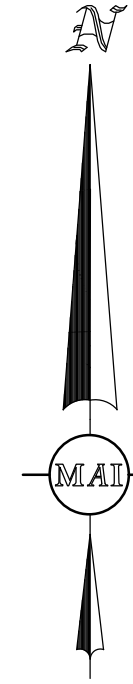
Sincerely



Carla M. Moynihan

Enclosures

cc: Amy Love, Town Planner (alove@franklinma.gov)
Matthew Crowley, P.E., Town Project Manager (overnight mail)
Andrew Bradford, PharmaCann LLC
Shelley Stormo, PharmaCann LLC



PERMIT SITE DEVELOPMENT PLANS

(TO ACCOMPANY A SITE PLAN REVIEW APPLICATION & ZONING APPROVAL APPLICATION)

164 GROVE STREET

(MAP: 306 LOT: 4)

LOCATED IN

FRANKLIN, MASSACHUSETTS

DATE: MAY 18, 2020

OWNER/APPLICANT:

NLCP 164 GROVE STREET MA, LLC

C/O NEWLAKE CAPITAL

549 W. RANDOLPH, SUITE 200

CHICAGO, IL 60661

PREPARED BY:



MERIDIAN ASSOCIATES

500 CUMMINGS CENTER SUITE 5950 BEVERLY, MASSACHUSETTS 01915
 69 MILK STREET, SUITE 302 WESTBOROUGH, MASSACHUSETTS 01581
 TELEPHONE: (978) 299-0447 TELEPHONE: (508) 871-7030
 WWW.MERIDIANASSOC.COM

DRAWING INDEX:

C0.0	COVER SHEET
C1.0	RECORD CONDITIONS & DEMOLITION PLAN
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C3.0	UTILITY PLAN
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C5.0	SITE DETAILS
C5.1	SITE DETAILS
C5.2	SITE DETAILS

APPROVED BY PLANNING BOARD

 DATE: _____

LOCUS CONTEXT MAP

GRAPHIC SCALE
 SCALE: 1"=100'



MERIDIAN ASSOCIATES
 500 CUMMINGS CENTER, SUITE 5950
 BEVERLY, MASSACHUSETTS 01915
 TELEPHONE: (978) 299-0447
 69 MILK STREET, SUITE 302
 WESTBOROUGH, MASSACHUSETTS 01581
 TELEPHONE: (508) 871-7030
 WWW.MERIDIANASSOC.COM

INTERFORM
 ARCHITECTURE + DESIGN

19 SOUTH LASALLE STREET
 SUITE 300 CHICAGO, IL 60603
 312/933.2701

PHARMACANN

NEW CONSTRUCTION OF
 RETAIL CANNABIS
 DISPENSARY

164 GROVE STREET
 FRANKLIN, MA 02038

ISSUED FOR PERMITTING
 ONLY NOT FOR
 CONSTRUCTION

NO.	DESCRIPTION	DATE

DATE 05/18/2020
 SCALE AS INDICATED
 DRAWN NB
 CHECKED DK
 PROJECT NO. 6120-2

SEAL



COVER SHEET

C0.0

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 5/5/2020 7:50:26 AM

UNOFFICIAL SOILS INFORMATION

DATE: OCTOBER 10, 2018
CONDUCTED BY: ANDREW RODRIGUEZ, SE (13890)

TEST PIT TP-1
ELEV.=252.0±
ASSUMED E.S.H.G.W. ELEV.=248.3±

0"-6" A HORIZON: SANDY LOAM
6"-13" B HORIZON: SANDY LOAM
13"-21" C LAYER: SAND AND GRAVEL, COBBLES
21"-32" C2 LAYER: FINE LOAMY SAND
32"-76" *C3 LAYER: COARSE SAND AND GRAVEL, COBBLES
REDOX @ 44"
WEEPING @ 46"
STANDING @ 74"
* POCKETS OF SANDY LOAM

TEST PIT TP-2
ELEV.=254.6±
ASSUMED E.S.H.G.W. ELEV.=251.5±

0"-15" HTM: SANDY LOAM
15"-23" B HORIZON: SANDY LOAM
23"-74" *C LAYER: COARSE SAND AND GRAVEL, COBBLES
LIGHT REDOX @ 37"
WEEPING @ 45"
STANDING @ 70"
* POCKETS OF SANDY LOAM

TEST PIT TP-3
ELEV.=257.6±
ASSUMED E.S.H.G.W. ELEV.=253.6±

0"-38" HTM: SANDY LOAM, BRICKS
38"-45" B HORIZON: SANDY LOAM
45"-68" *C LAYER: COARSE SAND AND GRAVEL, COBBLES
REDOX @ 48"
WEEPING @ 56"
STANDING @ 65"
* POCKETS OF SANDY LOAM

TEST PIT TP-4
ELEV.=260.2±
ASSUMED E.S.H.G.W. ELEV.=254.2±

0"-39" HTM: SANDY LOAM
39"-43" Ab HORIZON: SANDY LOAM
43"-60" B HORIZON: LOAMY SAND
60"-71" *C LAYER: COARSE SAND AND GRAVEL, COBBLES
WEEPING @ 48"
STANDING @ 69"
* POCKETS OF SANDY LOAM

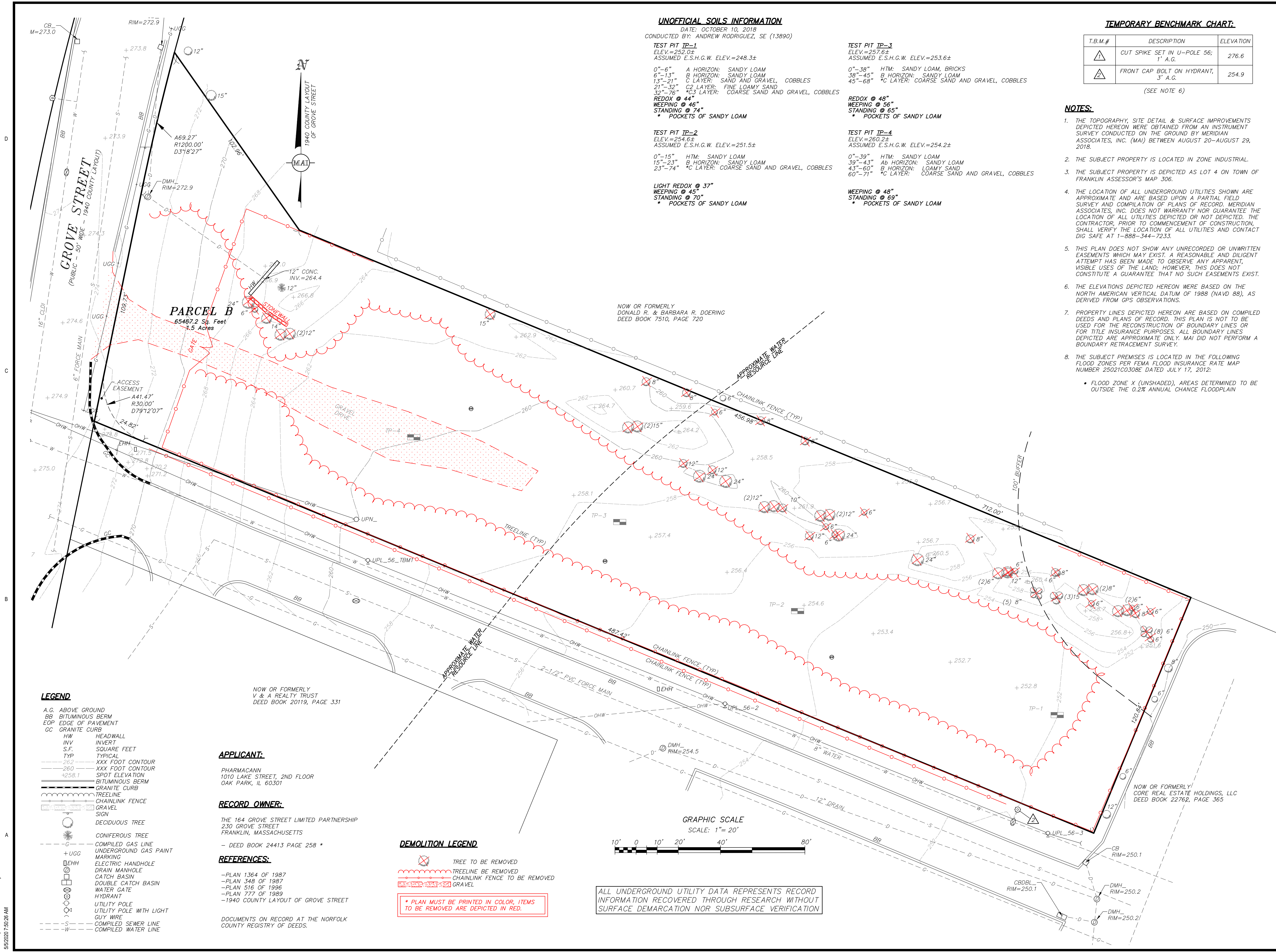
TEMPORARY BENCHMARK CHART:

Table with 3 columns: T.B.M.#, DESCRIPTION, ELEVATION. Includes entries for CUT SPIKE SET IN U-POLE 56' and FRONT CAP BOLT ON HYDRANT.

(SEE NOTE 6)

NOTES:

- 1. THE TOPOGRAPHY, SITE DETAIL & SURFACE IMPROVEMENTS DEPICTED HEREON WERE OBTAINED FROM AN INSTRUMENT SURVEY CONDUCTED ON THE GROUND BY MERIDIAN ASSOCIATES, INC. (MAI) BETWEEN AUGUST 20-AUGUST 29, 2018.
2. THE SUBJECT PROPERTY IS LOCATED IN ZONE INDUSTRIAL.
3. THE SUBJECT PROPERTY IS DEPICTED AS LOT 4 ON TOWN OF FRANKLIN ASSESSOR'S MAP 306.
4. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED UPON A PARTIAL FIELD SURVEY AND COMPILATION OF PLANS OF RECORD. MERIDIAN ASSOCIATES, INC. DOES NOT WARRANT NOR GUARANTEE THE LOCATION OF ALL UTILITIES DEPICTED OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT DIG SAFE AT 1-888-344-7233.
5. THIS PLAN DOES NOT SHOW ANY UNRECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. A REASONABLE AND DILIGENT ATTEMPT HAS BEEN MADE TO OBSERVE ANY APPARENT, VISIBLE USES OF THE LAND; HOWEVER, THIS DOES NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.
6. THE ELEVATIONS DEPICTED HEREON WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), AS DERIVED FROM GPS OBSERVATIONS.
7. PROPERTY LINES DEPICTED HEREON ARE BASED ON COMPILED DEEDS AND PLANS OF RECORD. THIS PLAN IS NOT TO BE USED FOR THE RECONSTRUCTION OF BOUNDARY LINES OR FOR TITLE INSURANCE PURPOSES. ALL BOUNDARY LINES DEPICTED ARE APPROXIMATE ONLY. MAI DID NOT PERFORM A BOUNDARY RETRACEMENT SURVEY.
8. THE SUBJECT PREMISES IS LOCATED IN THE FOLLOWING FLOOD ZONES PER FEMA FLOOD INSURANCE RATE MAP NUMBER 25021C0308E DATED JULY 17, 2012:
* FLOOD ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN



LEGEND

- A.G. ABOVE GROUND
BB BITUMINOUS BERM
EOP EDGE OF PAVEMENT
GC GRANITE CURB
HW HEADWALL
INV INVERT
S.F. SQUARE FEET
TYP TYPICAL
-262 XXX FOOT CONTOUR
-258.1 SPOT ELEVATION
BITUMINOUS BERM
GRANITE CURB
TREELINE
CHAINLINK FENCE
GRAVEL SIGN
DECIDUOUS TREE
CONIFEROUS TREE
COMPILED GAS LINE
UNDERGROUND GAS PAINT MARKING
ELECTRIC HANDHOLE
DRAIN MANHOLE
CATCH BASIN
DOUBLE CATCH BASIN
WATER GATE
HYDRANT
UTILITY POLE
UTILITY POLE WITH LIGHT
GUY WIRE
COMPILED SEWER LINE
COMPILED WATER LINE

NOW OR FORMERLY V & A REALTY TRUST DEED BOOK 20119, PAGE 331

APPLICANT:

PHARMACANN
1010 LAKE STREET, 2ND FLOOR
OAK PARK, IL 60301

RECORD OWNER:

THE 164 GROVE STREET LIMITED PARTNERSHIP
230 GROVE STREET
FRANKLIN, MASSACHUSETTS
- DEED BOOK 24413 PAGE 258 *

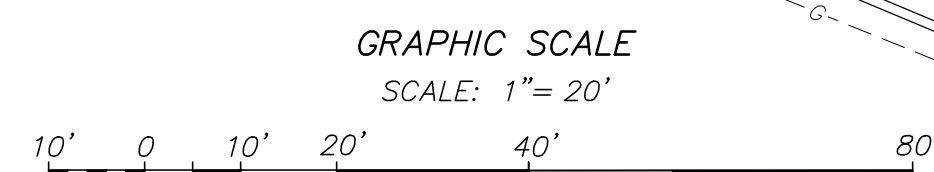
REFERENCES:

- PLAN 1364 OF 1987
-PLAN 348 OF 1987
-PLAN 516 OF 1996
-PLAN 777 OF 1989
-1940 COUNTY LAYOUT OF GROVE STREET
DOCUMENTS ON RECORD AT THE NORFOLK COUNTY REGISTRY OF DEEDS.

DEMOLITION LEGEND

- TREE TO BE REMOVED
TREELINE TO BE REMOVED
CHAINLINK FENCE TO BE REMOVED
GRAVEL

* PLAN MUST BE PRINTED IN COLOR, ITEMS TO BE REMOVED ARE DEPICTED IN RED.



ALL UNDERGROUND UTILITY DATA REPRESENTS RECORD INFORMATION RECOVERED THROUGH RESEARCH WITHOUT SURFACE DEMARCATION NOR SUBSURFACE VERIFICATION



500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM



19 SOUTH LASALLE STREET
SUITE 300 CHICAGO, IL 60603
312/933.2701



NEW CONSTRUCTION OF RETAIL CANNABIS DISPENSARY

164 GROVE STREET
FRANKLIN, MA 02038

ISSUED FOR PERMITTING ONLY NOT FOR CONSTRUCTION

Table with 3 columns: NO., DESCRIPTION, DATE. Includes a grid for tracking permit status.

DATE 05/08/2020
SCALE AS INDICATED
DRAWN NB
CHECKED DK
PROJECT NO. 6120-2

SEAL



RECORD CONDITIONS & DEMOLITION PLAN

C1.0

SCHEDULE OF DIMENSIONAL CONTROLS

ZONING DISTRICT: INDUSTRIAL (MARIJUANA OVERLAY DISTRICT)

Table with 4 columns: REQUIREMENT, MINIMUM, EXISTING, PROPOSED. Rows include LOT AREA, FRONTAGE, LOT DEPTH, LOT WIDTH, FRONT YARD, SIDE YARD, REAR YARD, BUILDING LOT COVERAGE, TOTAL IMPERVIOUS COVERAGE, BUILDING HEIGHT.

PARKING TABLE:

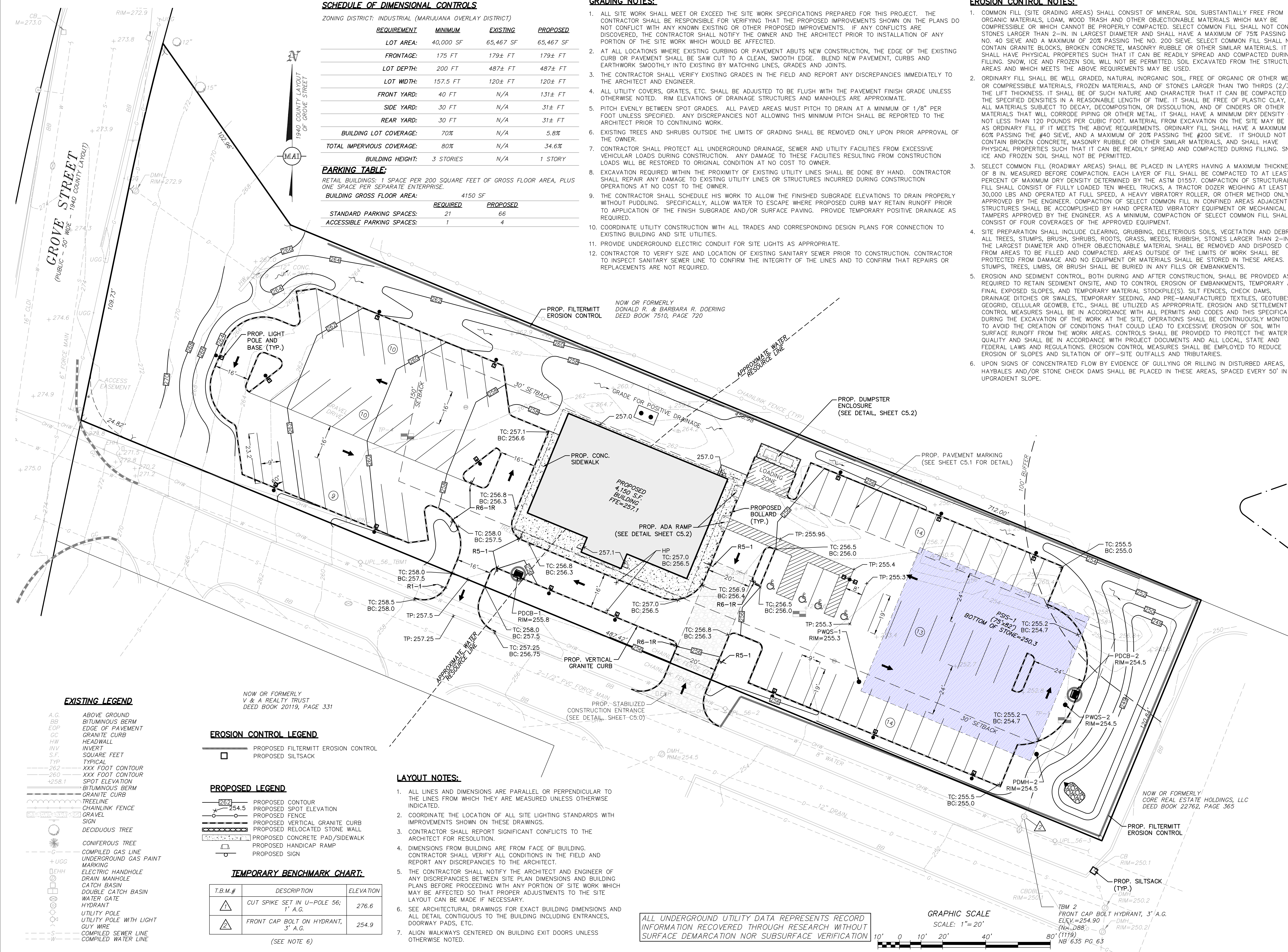
Table with 3 columns: REQUIREMENT, REQUIRED, PROPOSED. Rows include RETAIL BUILDINGS, BUILDING GROSS FLOOR AREA, STANDARD PARKING SPACES, ACCESSIBLE PARKING SPACES.

GRADING NOTES:

- 1. ALL SITE WORK SHALL MEET OR EXCEED THE SITE WORK SPECIFICATIONS PREPARED FOR THIS PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE ARCHITECT PRIOR TO INSTALLATION OF ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.

EROSION CONTROL NOTES:

- 1. COMMON FILL (SITE GRADING AREAS) SHALL CONSIST OF MINERAL SOIL SUBSTANTIALLY FREE FROM ORGANIC MATERIALS, LOAM, WOOD TRASH AND OTHER OBJECTIONABLE MATERIALS WHICH MAY BE COMPRESSIBLE OR WHICH CANNOT BE PROPERLY COMPACTED. SELECT COMMON FILL SHALL NOT CONTAIN STONES LARGER THAN 2-IN. IN LARGEST DIAMETER AND SHALL HAVE A MAXIMUM OF 75% PASSING THE NO. 40 SIEVE AND A MAXIMUM OF 20% PASSING THE NO. 200 SIEVE.



EXISTING LEGEND

- A.G. ABOVE GROUND
BB BITUMINOUS BERM
EOP EDGE OF PAVEMENT
GC GRANITE CURB
HW HEADWALL
INV INVERT
S.F. SQUARE FEET
TYP. TYPICAL
-262 XXX FOOT CONTOUR
+258.1 SPOT ELEVATION
BITUMINOUS BERM
GRANITE CURB
TREELINE
CHAINLINK FENCE
GRATE
SIGN
DECIDUOUS TREE
CONIFEROUS TREE
CG COMPILED GAS LINE
UGG UNDERGROUND GAS PAINT MARKING
EHH ELECTRIC HANDHOLE
DMH DRAIN MANHOLE
CB CATCH BASIN
DB CATCH BASIN
WATER GATE
HYDRANT
UTILITY POLE
UTILITY POLE WITH LIGHT
GUY WIRE
CS COMPILED SEWER LINE
CW COMPILED WATER LINE

EROSION CONTROL LEGEND

- PROPOSED FILTERMITT EROSION CONTROL
PROPOSED SILTSACK

PROPOSED LEGEND

- PROPOSED CONTOUR
PROPOSED SPOT ELEVATION
PROPOSED FENCE
PROPOSED VERTICAL GRANITE CURB
PROPOSED RELOCATED STONE WALL
PROPOSED CONCRETE PAD/SIDEWALK
PROPOSED HANDICAP RAMP
PROPOSED SIGN

TEMPORARY BENCHMARK CHART:

Table with 3 columns: T.B.M.#, DESCRIPTION, ELEVATION. Rows include CUT SPIKE SET IN U-POLE 56, FRONT CAP BOLT ON HYDRANT.

LAYOUT NOTES:

- 1. ALL LINES AND DIMENSIONS ARE PARALLEL OR PERPENDICULAR TO THE LINES FROM WHICH THEY ARE MEASURED UNLESS OTHERWISE INDICATED.
2. COORDINATE THE LOCATION OF ALL SITE LIGHTING STANDARDS WITH IMPROVEMENTS SHOWN ON THESE DRAWINGS.
3. CONTRACTOR SHALL REPORT SIGNIFICANT CONFLICTS TO THE ARCHITECT FOR RESOLUTION.
4. DIMENSIONS FROM BUILDING ARE FROM FACE OF BUILDING. CONTRACTOR SHALL VERIFY ALL CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE ARCHITECT.
5. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER OF ANY DISCREPANCIES BETWEEN SITE PLAN DIMENSIONS AND BUILDING PLANS BEFORE PROCEEDING WITH ANY PORTION OF SITE WORK WHICH MAY BE AFFECTED SO THAT PROPER ADJUSTMENTS TO THE SITE LAYOUT CAN BE MADE IF NECESSARY.
6. SEE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND ALL DETAIL CONTIGUOUS TO THE BUILDING INCLUDING ENTRANCES, DOORWAY PADS, ETC.
7. ALIGN WALKWAYS CENTERED ON BUILDING EXIT DOORS UNLESS OTHERWISE NOTED.

ALL UNDERGROUND UTILITY DATA REPRESENTS RECORD INFORMATION RECOVERED THROUGH RESEARCH WITHOUT SURFACE DEMARICATION NOR SUBSURFACE VERIFICATION

GRAPHIC SCALE
SCALE: 1" = 20'



MERIDIAN ASSOCIATES
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69 MILK STREET, SUITE 302
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19 SOUTH LASALLE STREET
SUITE 300 CHICAGO, IL 60603
312/933.2701

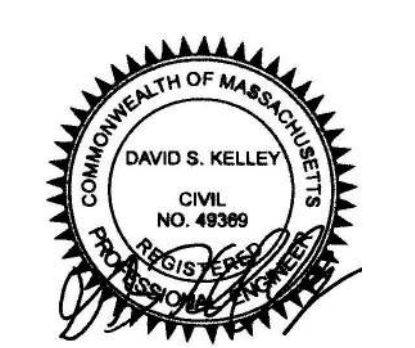
PHARMACANN

NEW CONSTRUCTION OF
RETAIL CANNABIS
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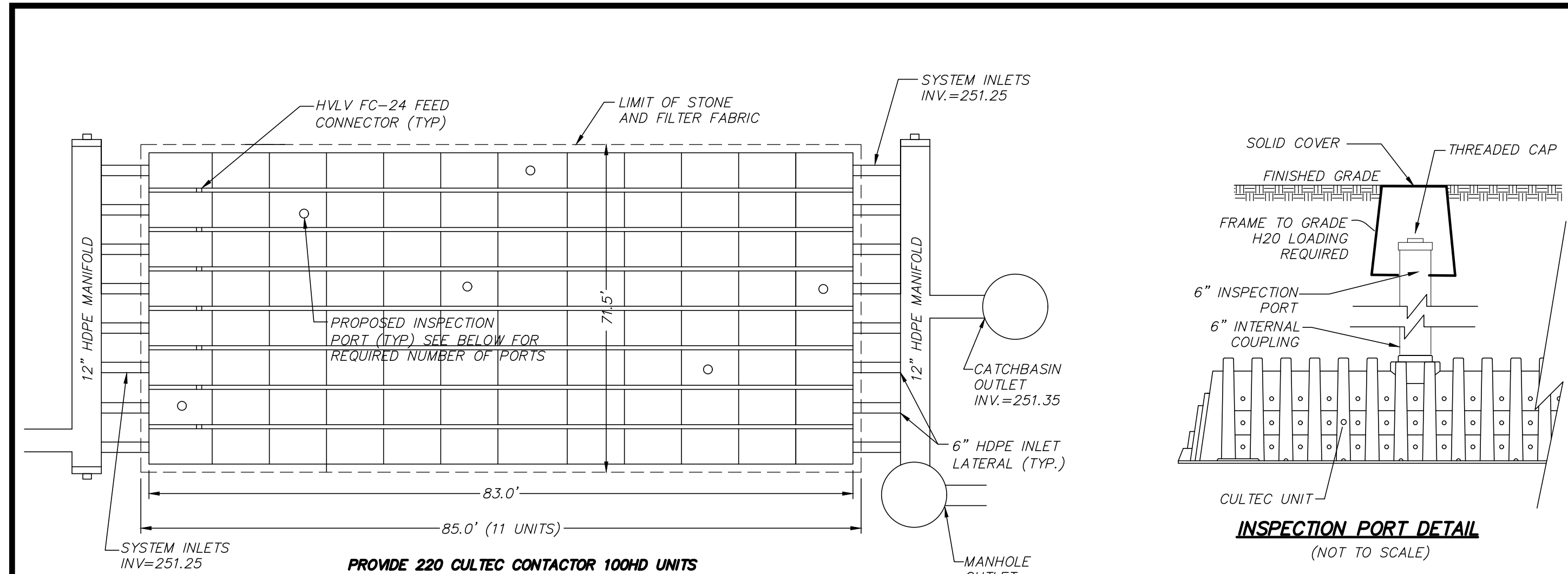
Table with 3 columns: NO., DESCRIPTION, DATE. Includes rows for DATE, SCALE, DRAWN, CHECKED, PROJECT NO.

SEAL

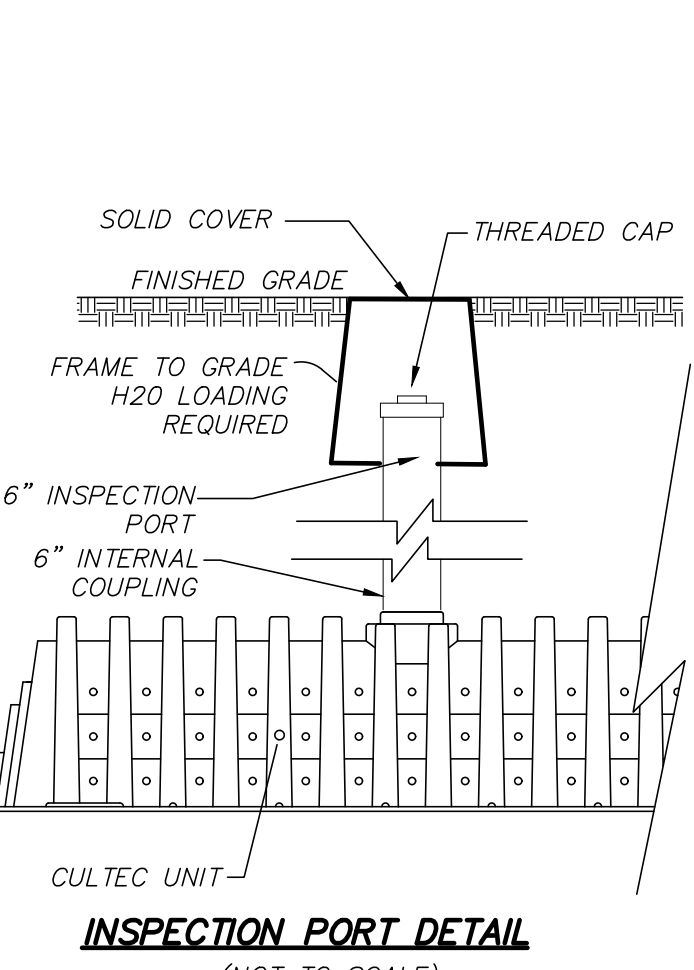


LAYOUT, GRADING & EROSION
CONTROL PLAN

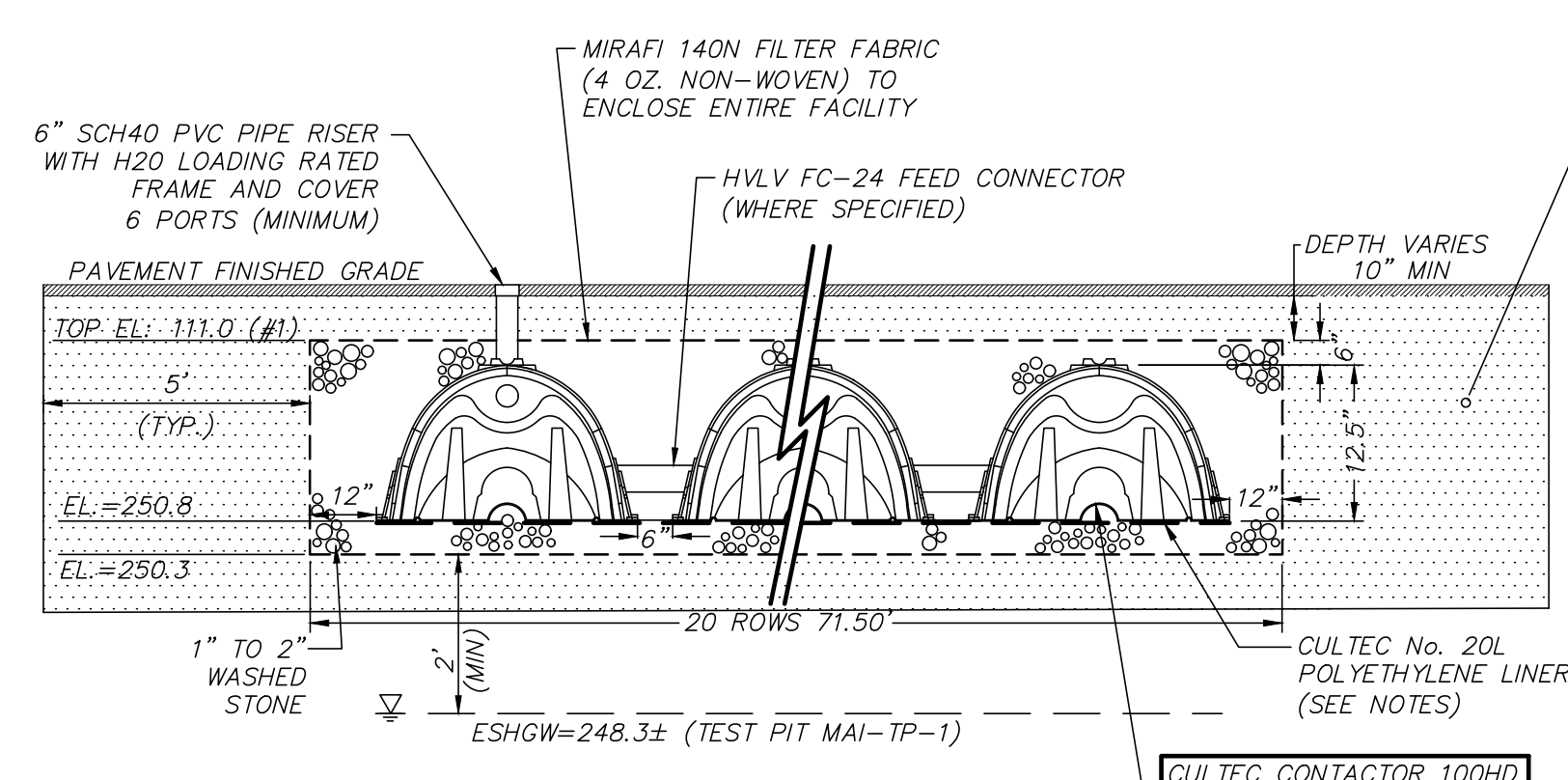
C2.0



PROVIDE 220 CULTEC CONTACTOR 100HD UNITS SCHEMATIC PLAN VIEW



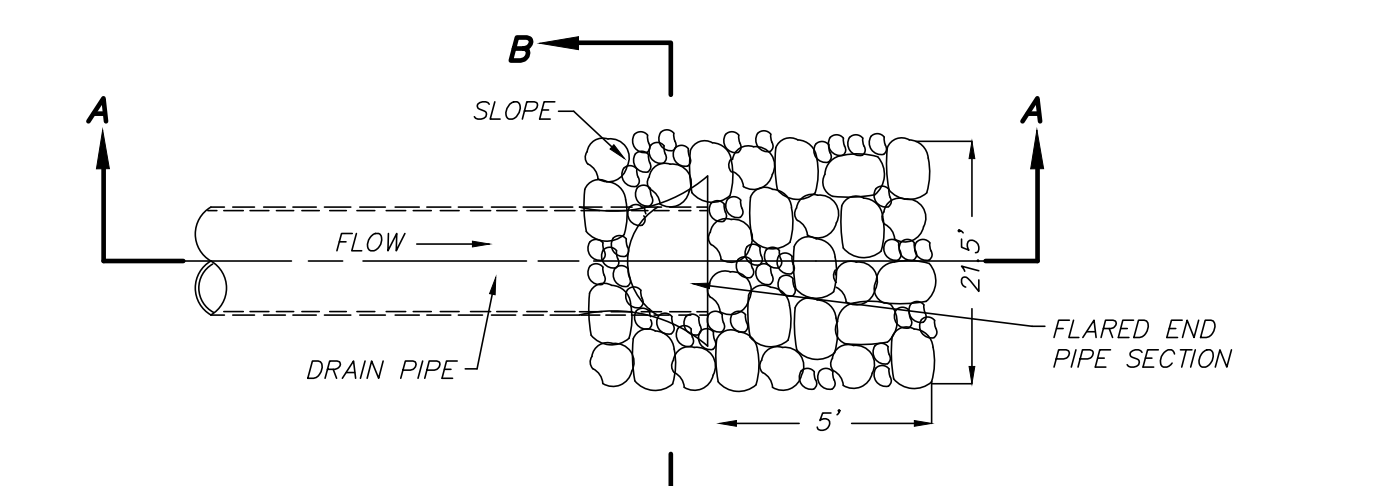
INSPECTION PORT DETAIL (NOT TO SCALE)



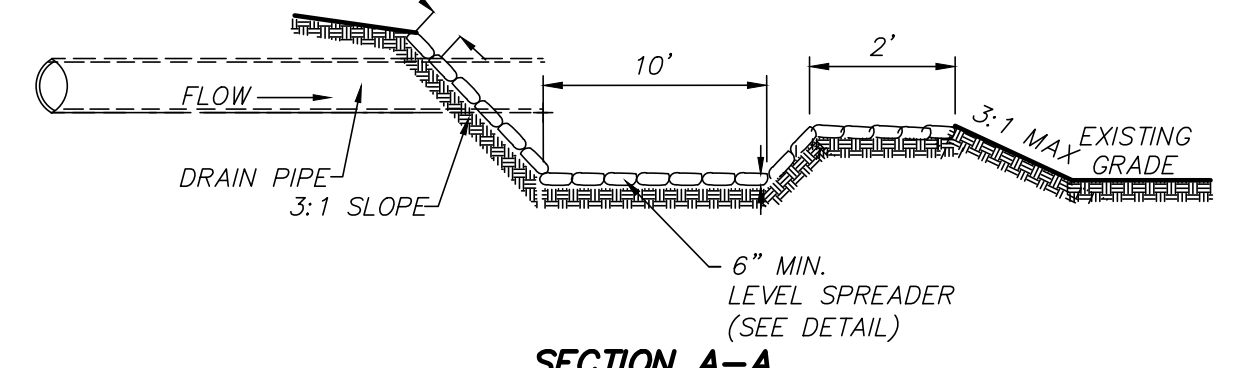
CROSS SECTION

- NOTES:**
1. PROVIDE MINIMUM 2 FEET SEPARATION BETWEEN BOTTOM OF THE 6 INCH DOUBLE WASHED STONE LAYER AND SEASONAL HIGH GROUNDWATER TABLE.
 2. REMOVE ALL TOPSOIL, SUBSOIL AND UNSUITABLE MATERIAL BENEATH THE INFILTRATION SYSTEM AND WITHIN 5' HORIZONTALLY OF PROPOSED INFILTRATION FACILITIES AND REPLACE WITH SAND CONFORMING TO 310 CMR 15.255(3), MASSACHUSETTS STATE ENVIRONMENTAL CODE, TITLE V.
 3. CULTEC No. 20L POLYETHYLENE LINER TO BE PLACED BENEATH CHAMBERS UTILIZING INTERNAL MANIFOLD ONLY.
 4. A BOTTOM OF BED INSPECTION SHALL BE CONDUCTED PRIOR TO INSTALLATION OF FILTER FABRIC, STONE AND DRAINAGE CHAMBERS. THIS INSPECTION SHALL BE CONDUCTED BY THE DESIGN ENGINEER AND SOILS EVALUATOR, AND SHALL BE WITNESSED BY THE TOWN OF FRANKLIN.

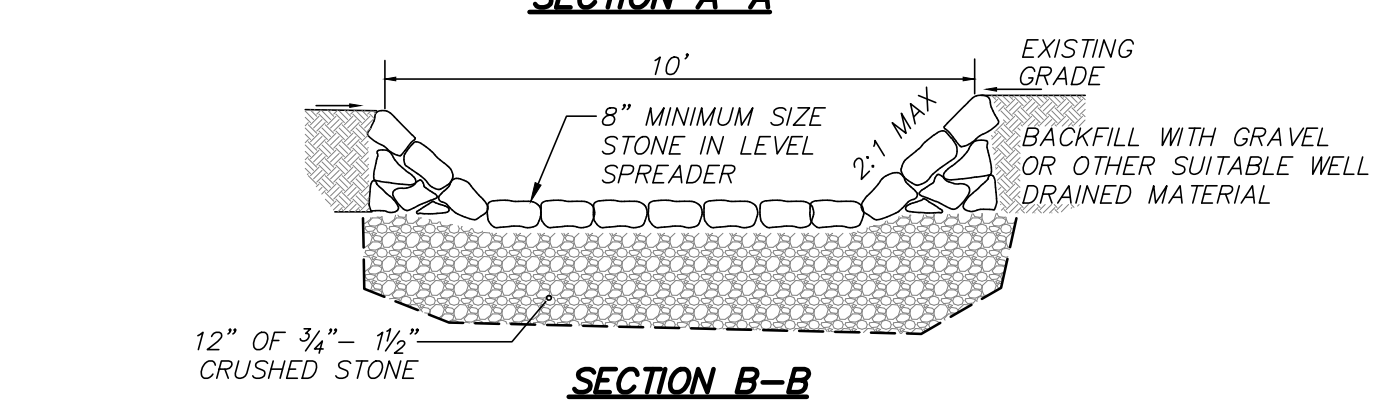
SUBSURFACE INFILTRATION FACILITY DETAILS (SYSTEMS #1 AND #3) (NOT TO SCALE)



PLAN VIEW

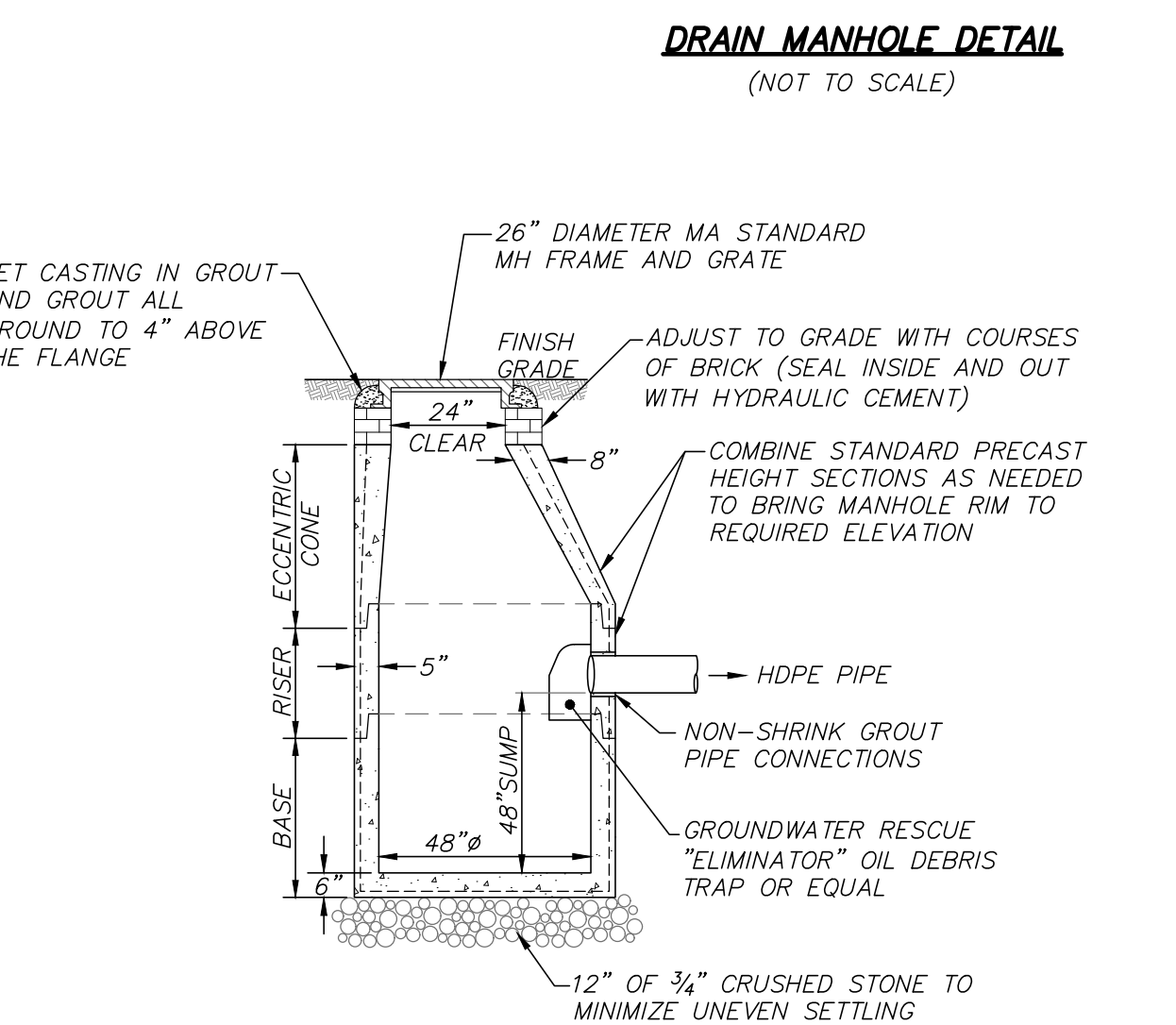


SECTION A-A



SECTION B-B

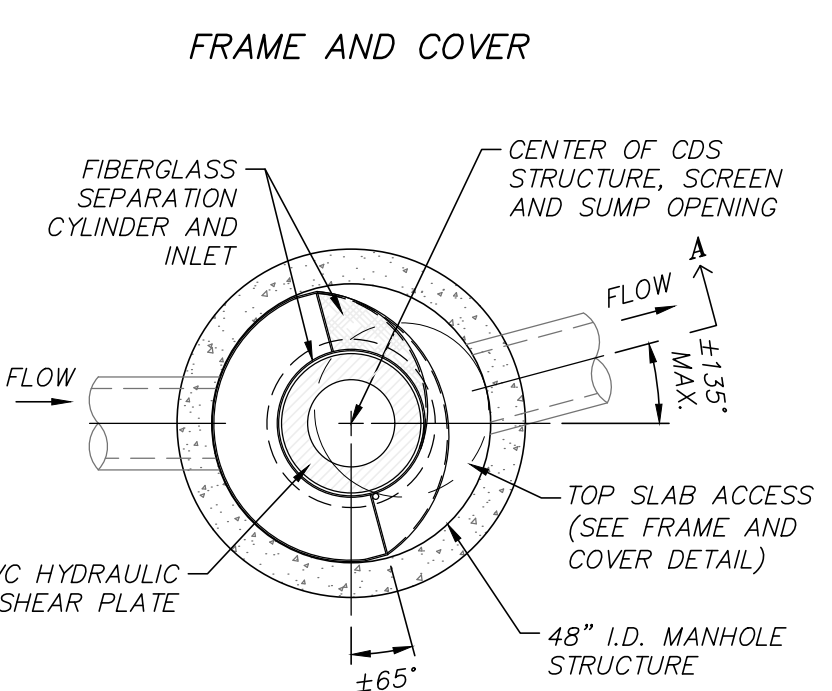
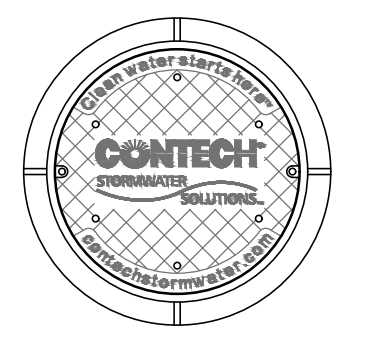
TYPICAL LEVEL SPREADER (NOT TO SCALE)



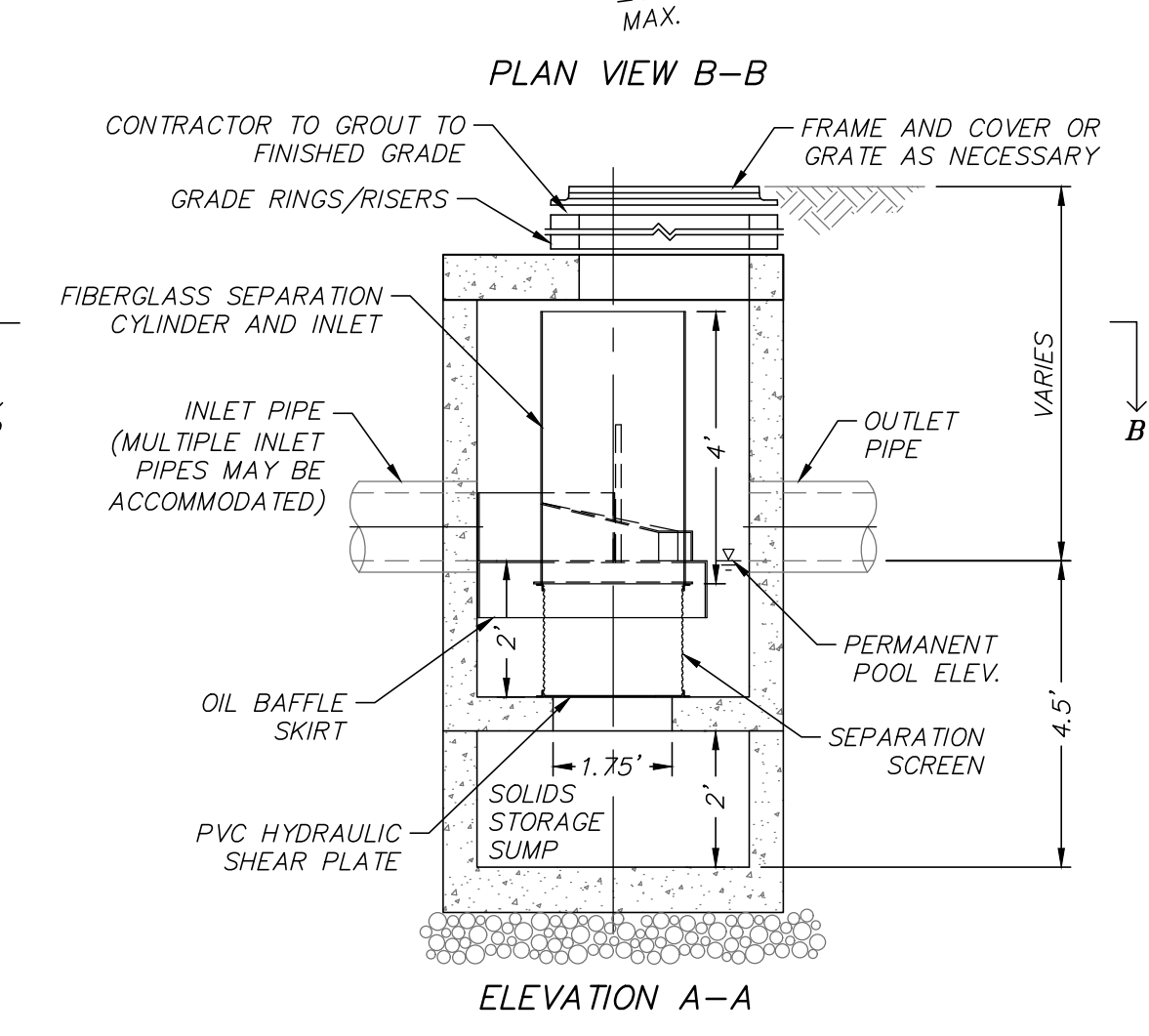
CATCHBASIN WITH OIL DEBRIS TRAP (NOT TO SCALE)

- NOTES:**
1. 48" DIAMETER CATCHBASIN MANHOLE AS MANUFACTURED BY SHEA CONCRETE PRODUCTS OR EQUAL.
 2. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
 3. REINFORCED STEEL CONFORMS TO LATEST ASTM A185 SPEC. 0.12 SQ IN/LINEAL FT AND 0.12 SQ IN (BOTH WAYS) BASE BOTTOM.
 4. H=20 DESIGN LOADING PER AASHTO HS-20-44; ASTM C478 SPEC FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS.
 5. PROVIDE EXTERIOR DAMPPROOFING AS REQUIRED.

CATCHBASIN WITH OIL DEBRIS TRAP (NOT TO SCALE)

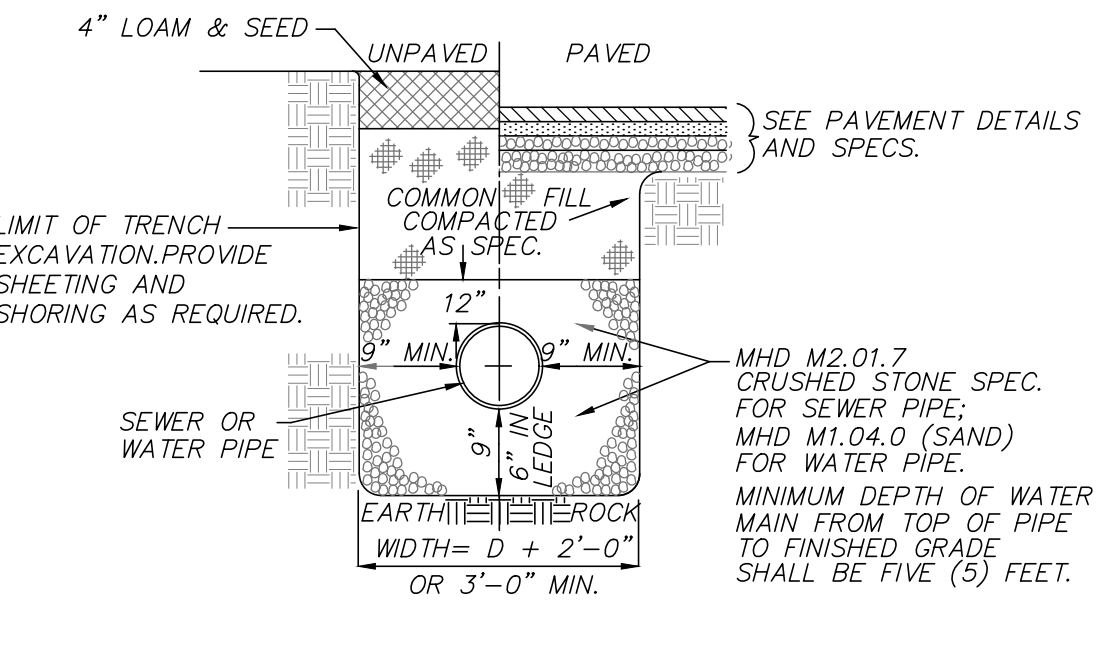


FRAME AND COVER

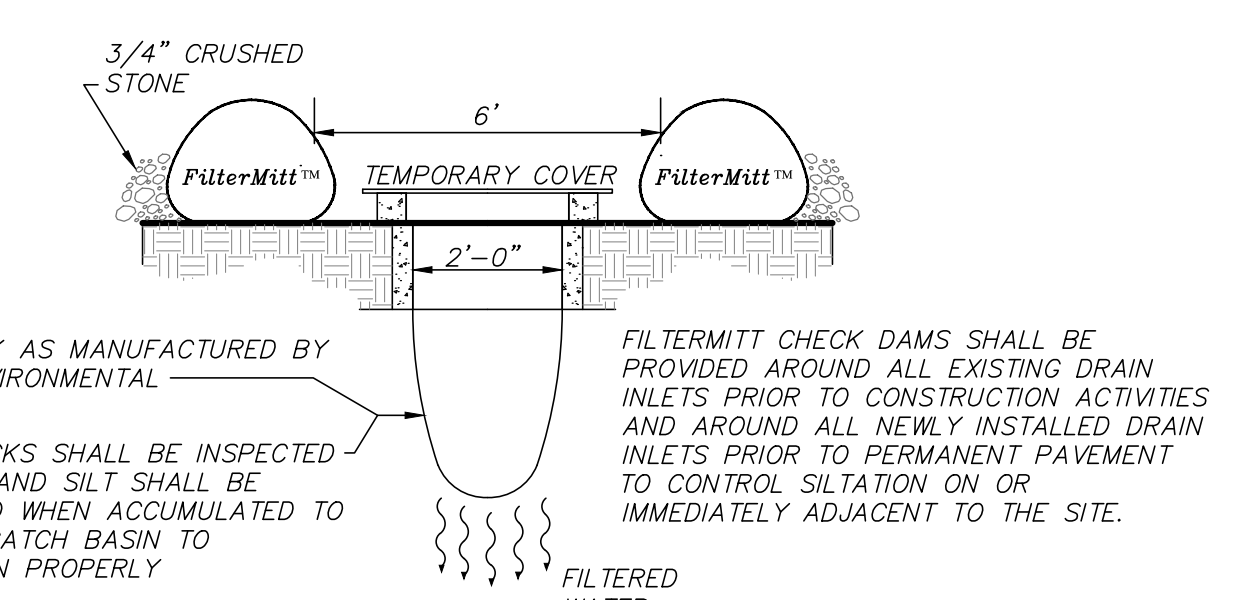


CONTECH CDS DETAIL (NOT TO SCALE)

- NOTES:**
1. PROVIDE CDS 2015-4-C AS MANUFACTURED BY CONTECH ENGINEERED SOLUTIONS OR EQUAL.
 2. UNIT CAN BE CONFIGURED WITH GRATED COVER AS NECESSARY.

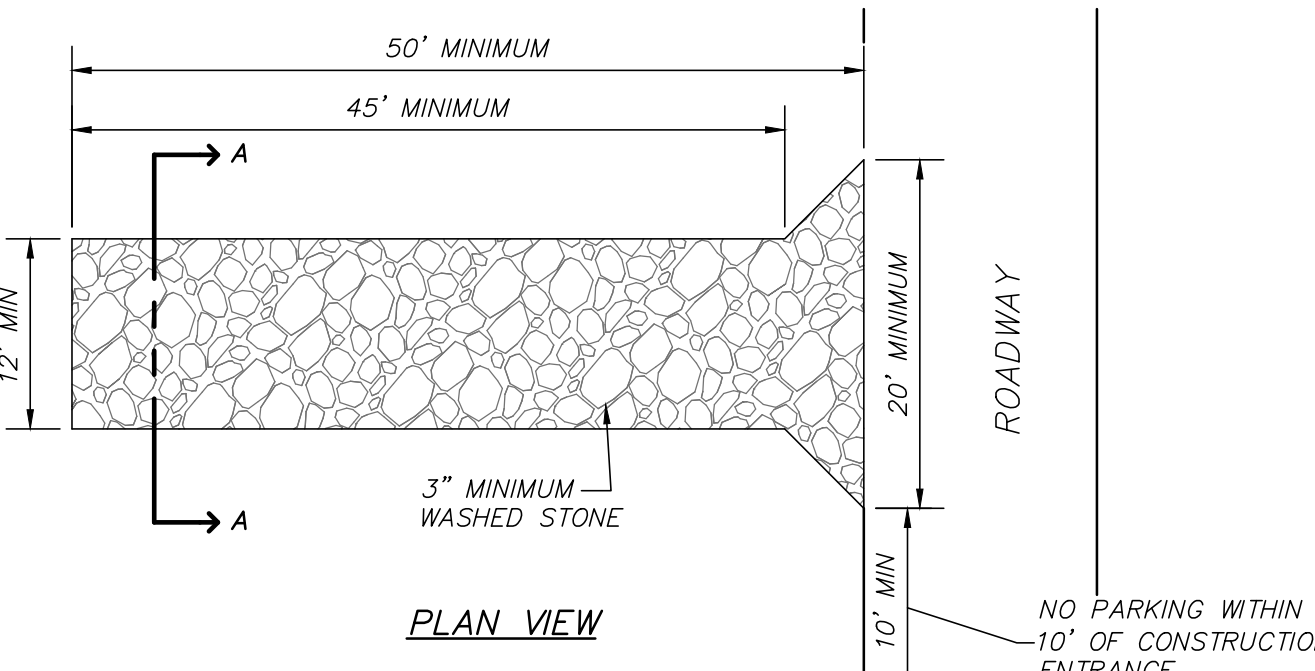


WATER TRENCH DETAIL (NOT TO SCALE)

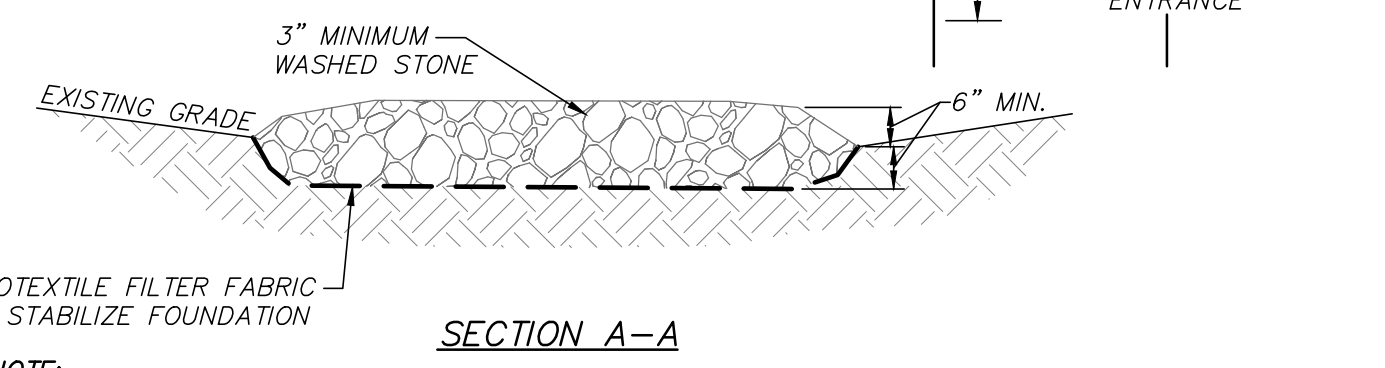


CATCH BASIN FILTER DETAIL (NOT TO SCALE)

- NOTE:**
1. CONTRACTOR TO VISUALLY INSPECT CATCH BASIN FILTERS WEEKLY AND AFTER ANY STORM EVENT TO ENSURE PROPER FUNCTION.



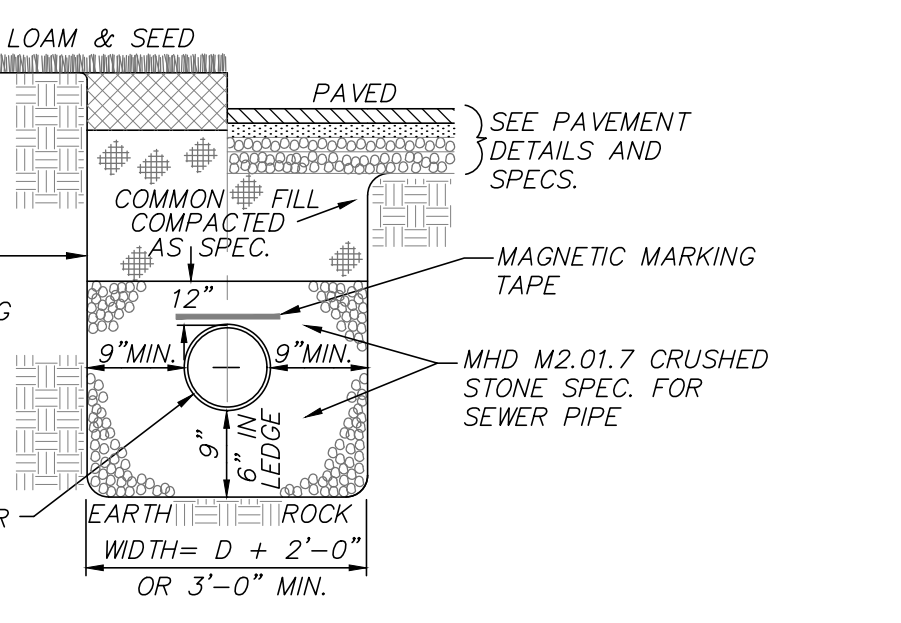
PLAN VIEW



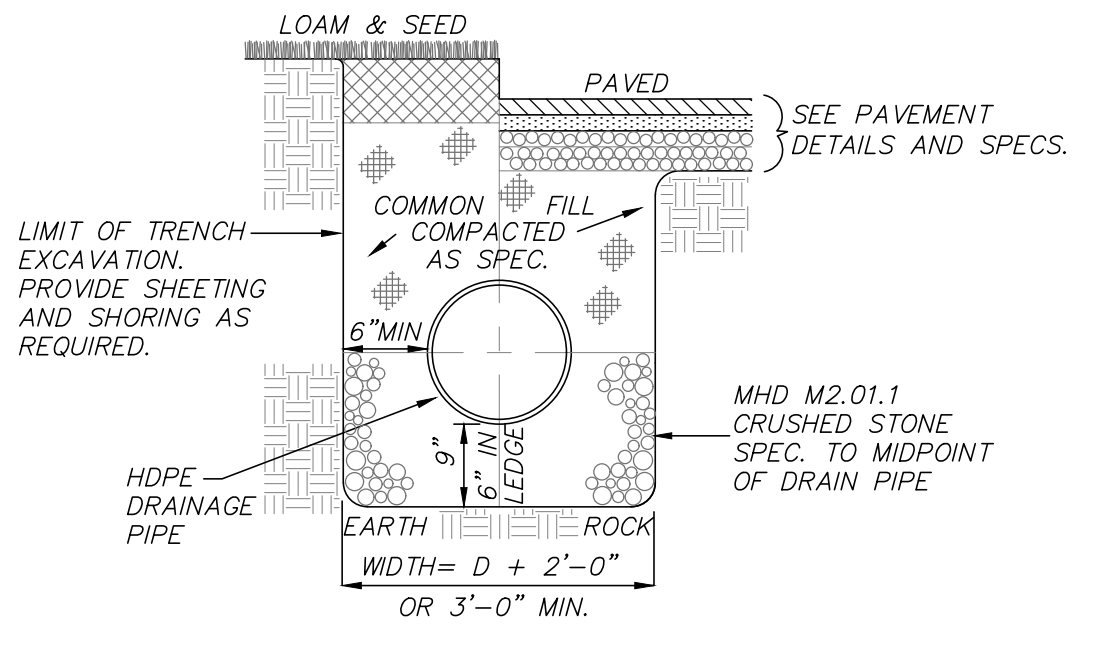
SECTION A-A

- NOTE:**
1. LOCATION OF STABILIZED CONSTRUCTION ENTRANCE TO BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO START OF CONSTRUCTION ACTIVITIES.

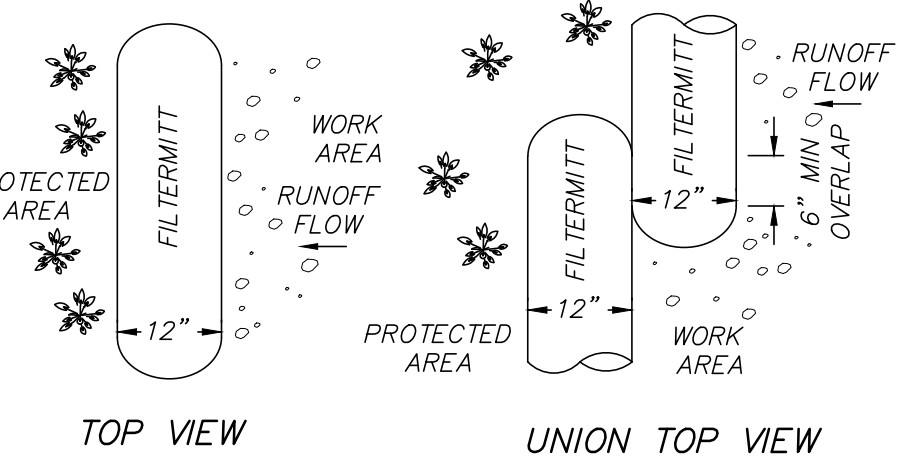
TEMPORARY STABILIZED CONSTRUCTION ENTRANCE (NOT TO SCALE)



SEWER TRENCH DETAIL (NOT TO SCALE)

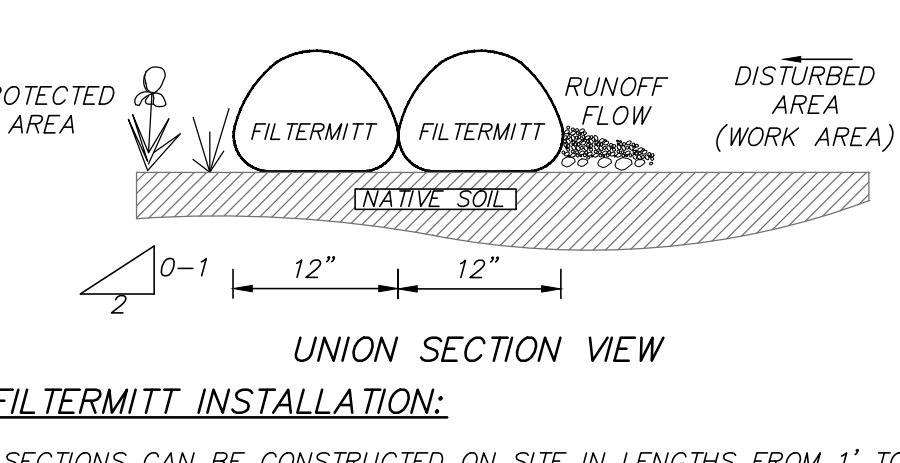


DRAIN TRENCH (NOT TO SCALE)



TOP VIEW

UNION TOP VIEW



UNION SECTION VIEW

- NOTE:**
1. PROVIDE CDS 2015-4-C AS MANUFACTURED BY CONTECH ENGINEERED SOLUTIONS OR EQUAL.
 2. UNIT CAN BE CONFIGURED WITH GRATED COVER AS NECESSARY.

EROSION CONTROL SOCK - FILTERMITT DETAIL (NOT TO SCALE)

MERIDIAN ASSOCIATES
 500 CUMMINGS CENTER, SUITE 5950
 BEVERLY, MASSACHUSETTS 01915
 TELEPHONE: (978) 299-0447
 69 MILK STREET, SUITE 302
 WESTBOROUGH, MASSACHUSETTS 01581
 TELEPHONE: (508) 871-7030
 WWW.MERIDIANASSOC.COM

INTERFORM ARCHITECTURE + DESIGN
 19 SOUTH LASALLE STREET
 SUITE 300 CHICAGO, IL 60603
 312/933.2701

PHARMACANN
 NEW CONSTRUCTION OF
 RETAIL CANNABIS
 DISPENSARY
 164 GROVE STREET
 FRANKLIN, MA 02038

ISSUED FOR PERMITTING ONLY NOT FOR CONSTRUCTION

NO.	DESCRIPTION	DATE

DATE	DESCRIPTION	DATE
05/08/2020		

SEAL

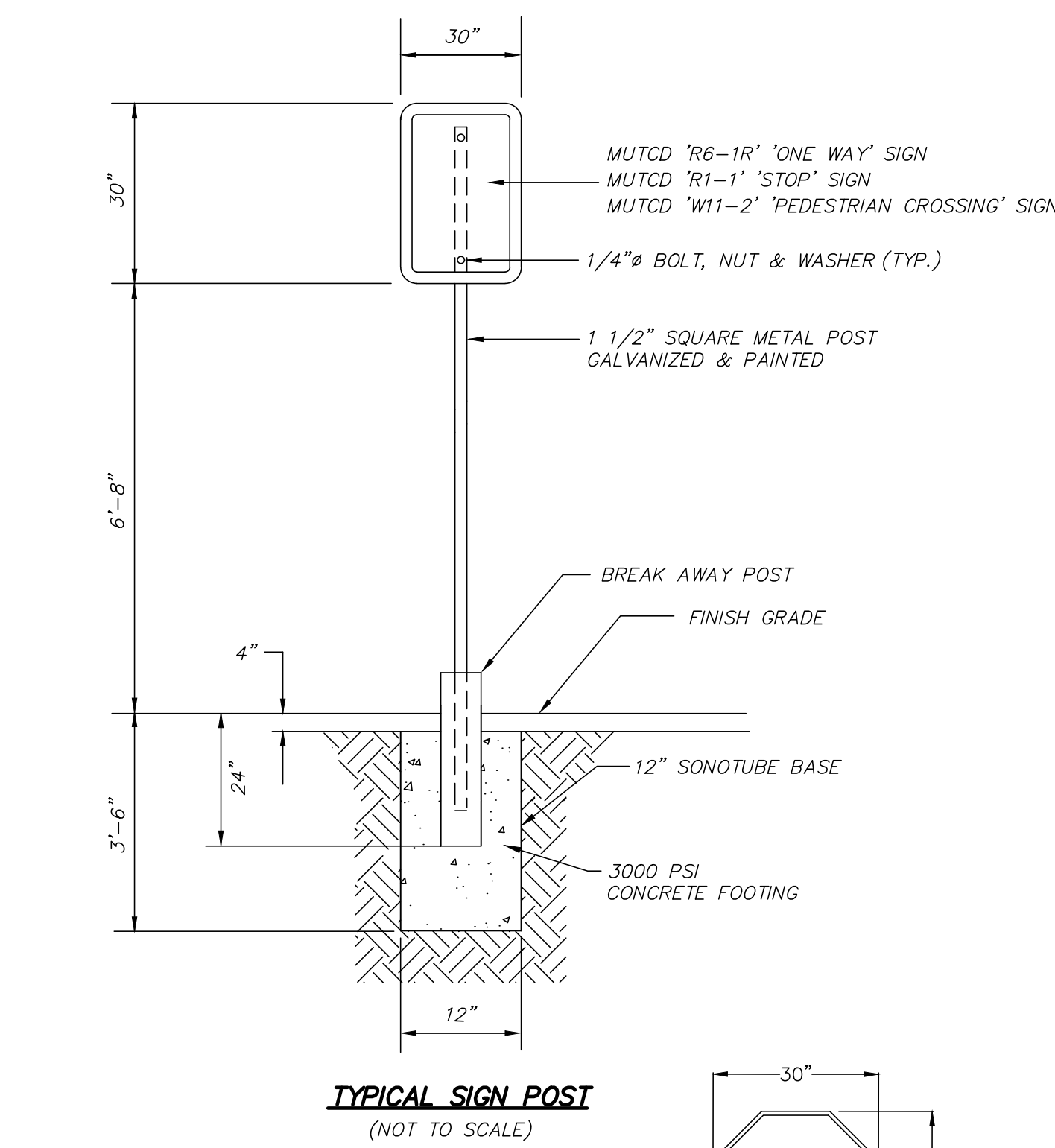
 DAVID S. KELLEY
 CIVIL
 NO. 49399
 STATE OF MASSACHUSETTS

SITE DETAILS

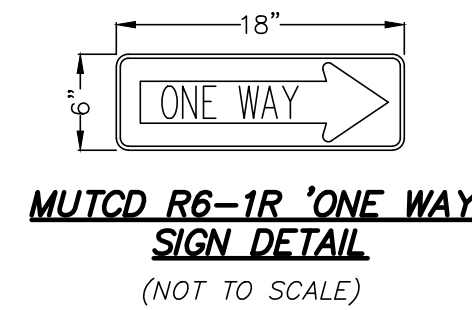
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 5/6/2020 10:26 AM

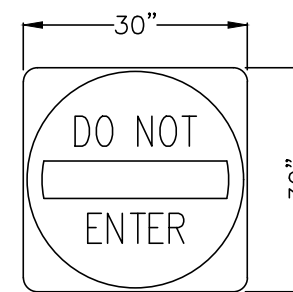
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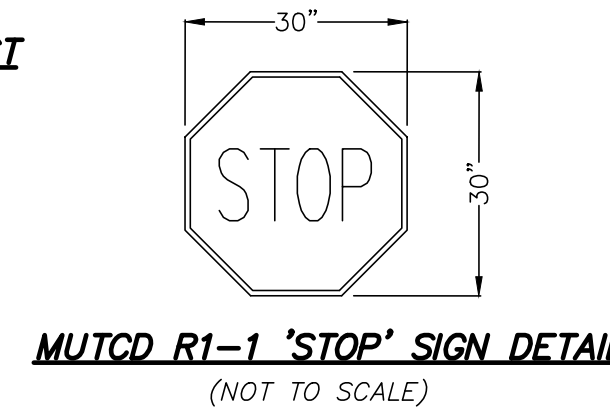
TYPICAL SIGN POST
(NOT TO SCALE)



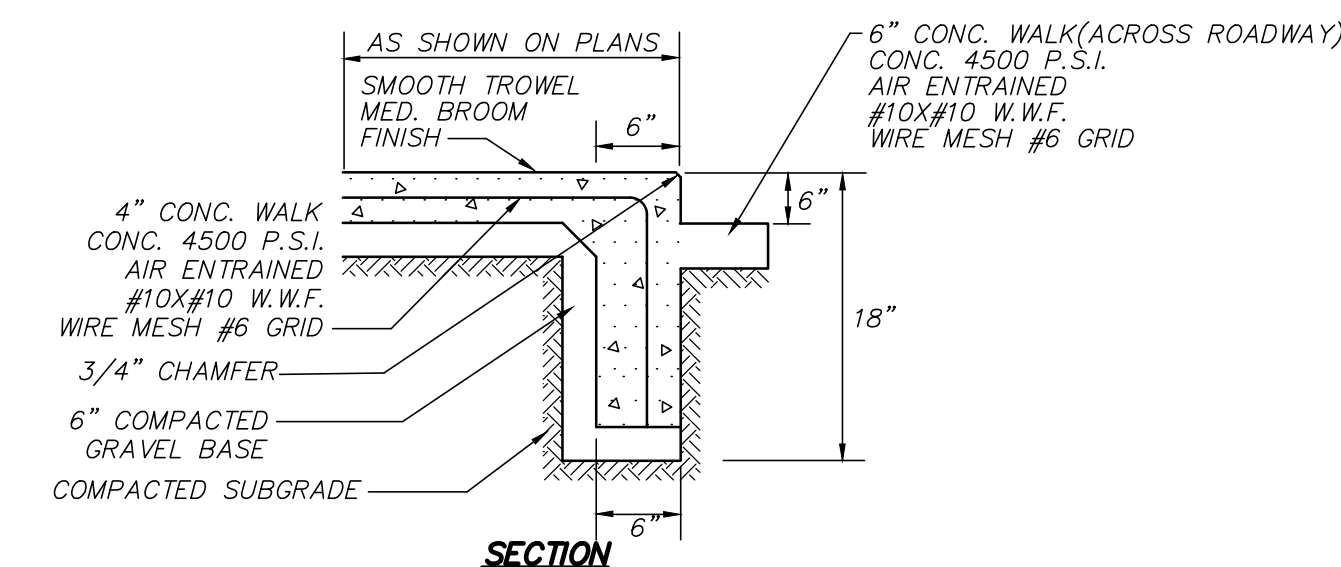
MUTCD R6-1R 'ONE WAY' SIGN DETAIL
(NOT TO SCALE)



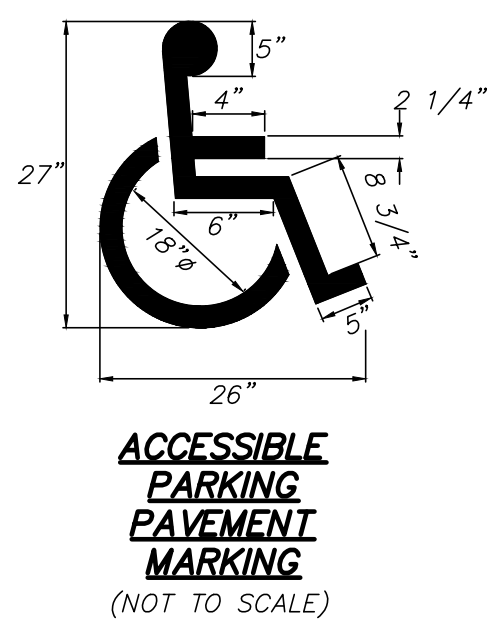
MUTCD R5-1 'DO NOT ENTER' SIGN DETAIL
(NOT TO SCALE)



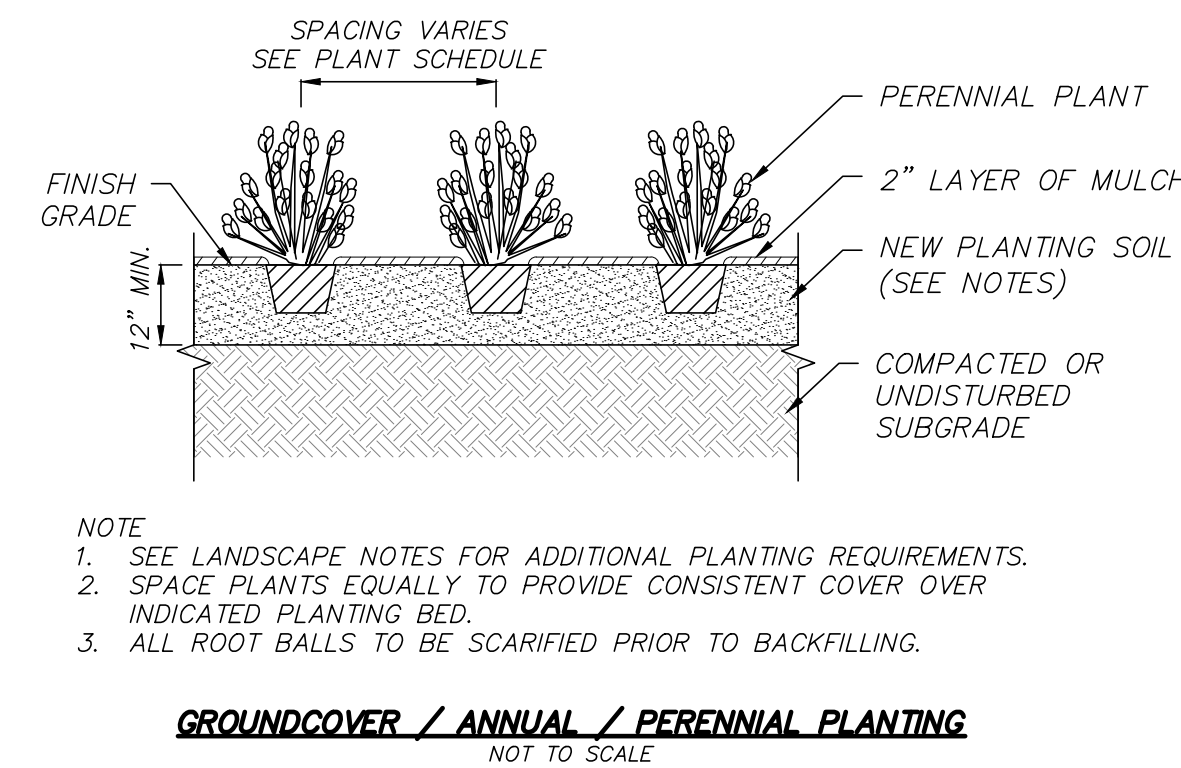
MUTCD R1-1 'STOP' SIGN DETAIL
(NOT TO SCALE)



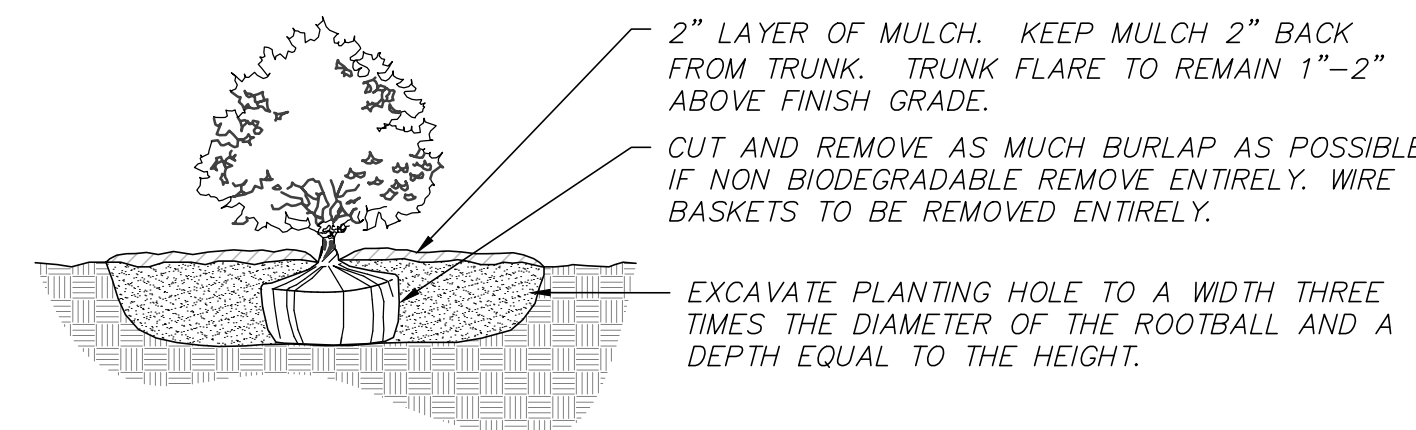
CONCRETE WALKWAY DETAIL
(NOT TO SCALE)



ACCESSIBLE PARKING PAVEMENT MARKING
(NOT TO SCALE)

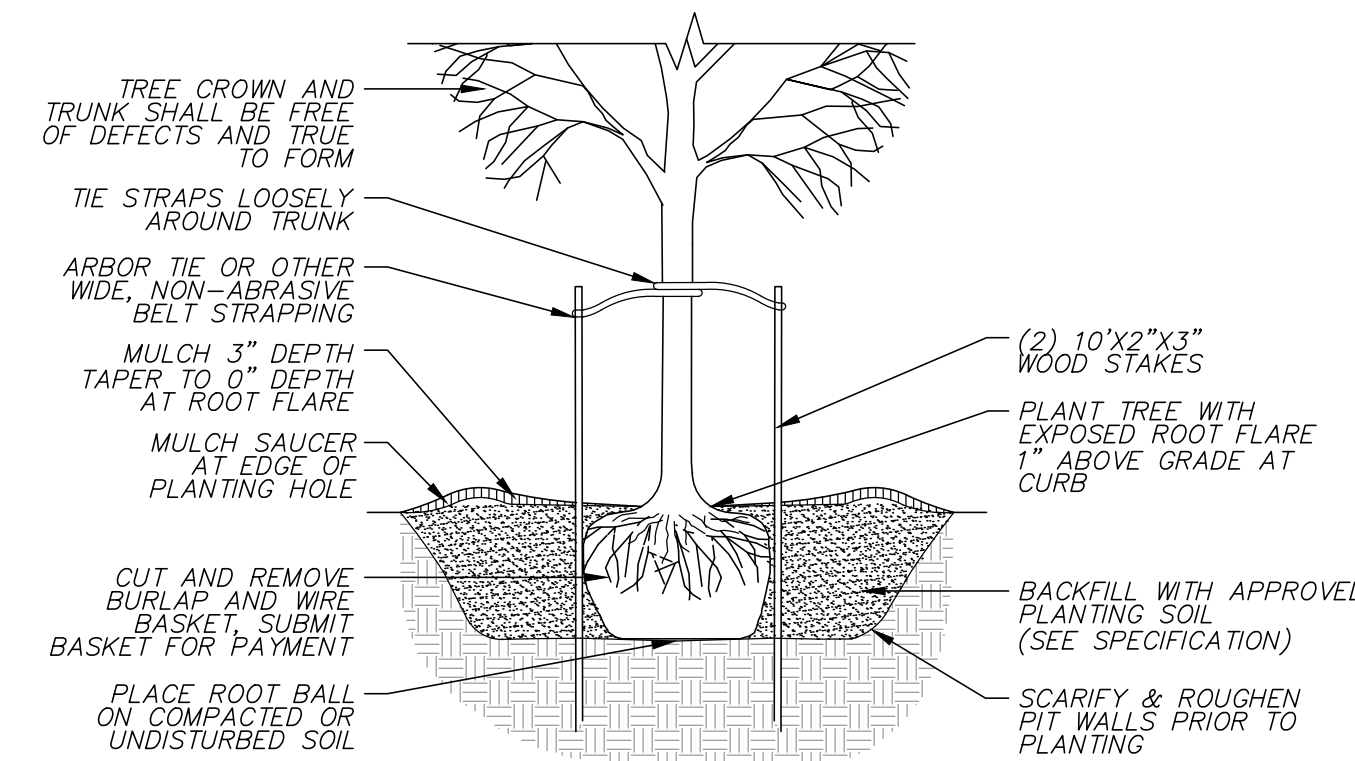


GROUNDCOVER / ANNUAL / PERENNIAL PLANTING
(NOT TO SCALE)

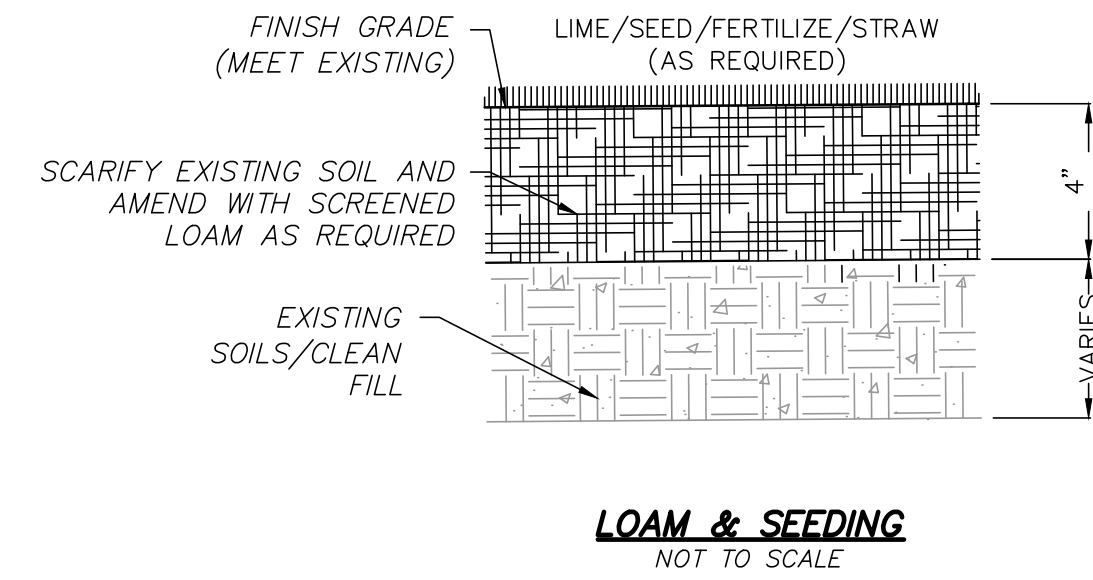


SHRUB PLANTING
(NOT TO SCALE)

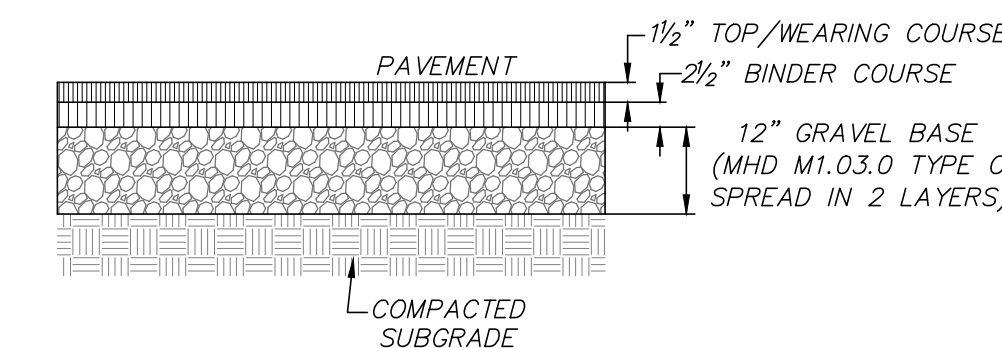
- NOTES:
- BACKFILL PLANTING HOLE WITH NEW PLANTING SOIL.
 - BACKFILL HALF THE SOIL AND WATER TO SETTLE OUT AIR POCKETS, COMPLETE BACKFILLING AND REPEAT WATERING.
 - IF ROOTS ARE CIRCLING THE ROOTBALL EXTERIOR, CUT ROOTS VERTICALLY IN SEVERAL PLACES PRIOR TO PLANTING.



TREE PLANTING
(NOT TO SCALE)



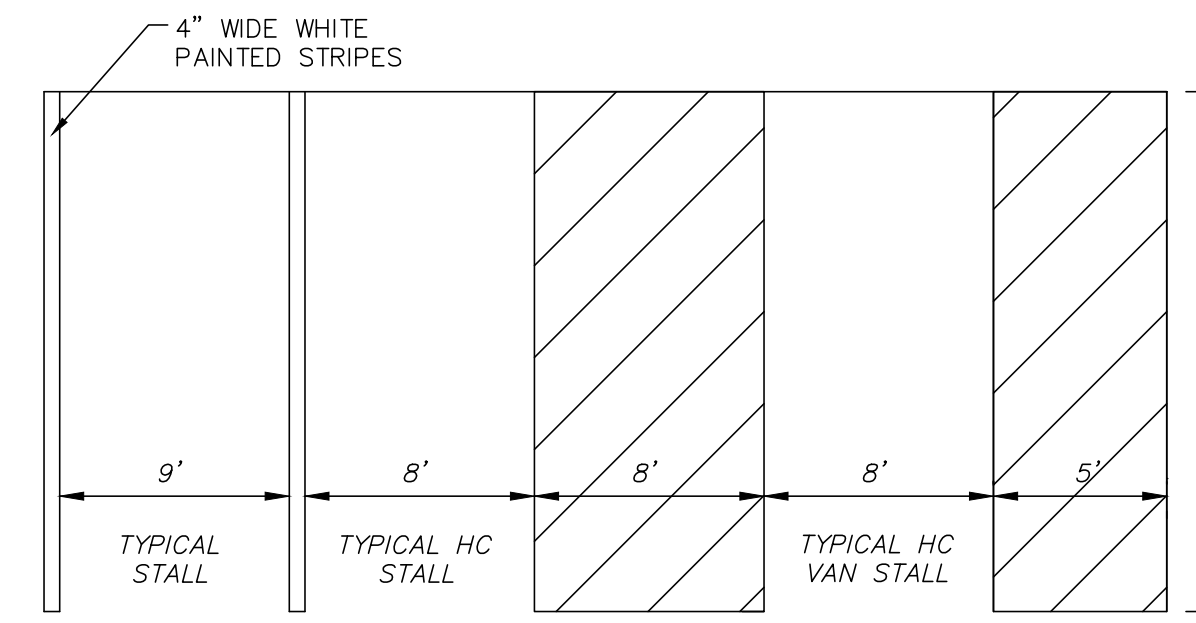
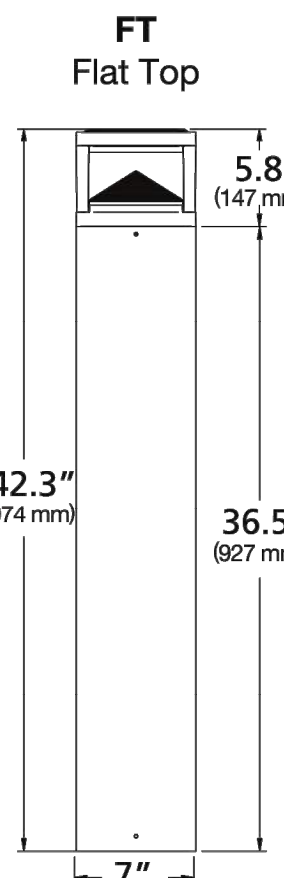
LOAM & SEEDING
(NOT TO SCALE)



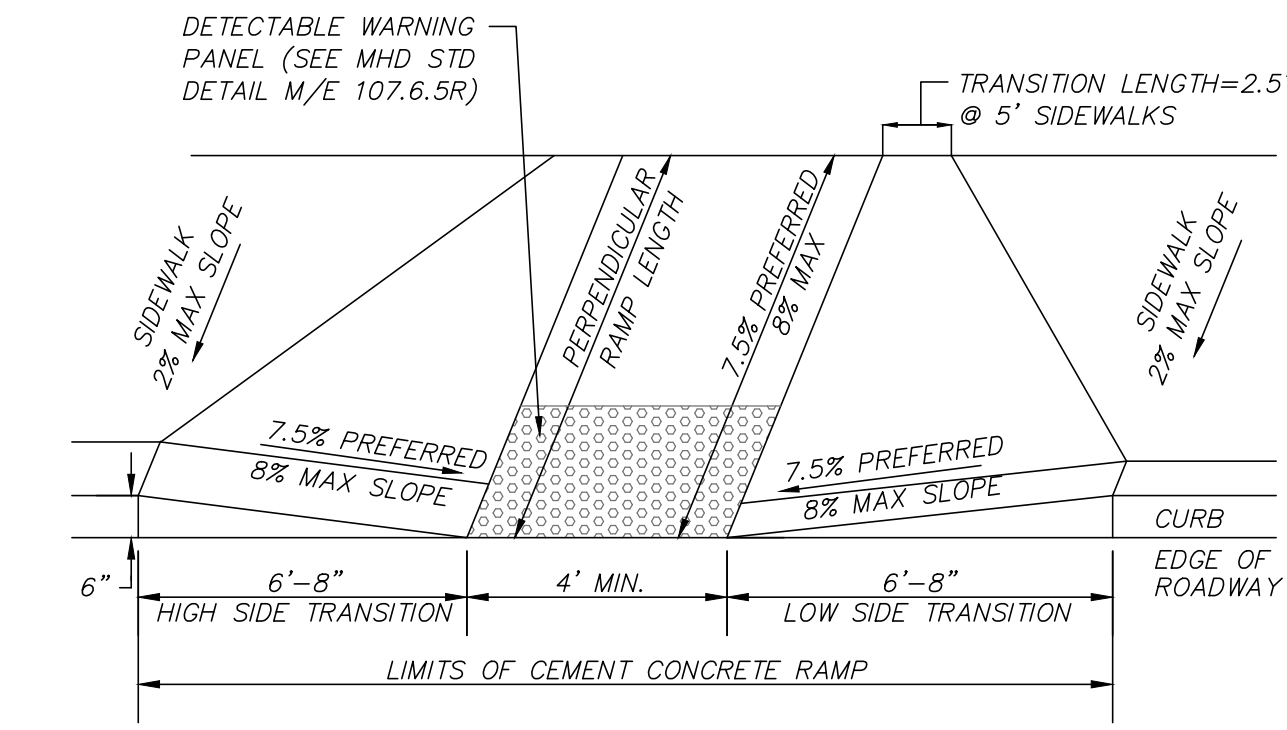
BITUMINOUS CONCRETE PAVEMENT
(NOT TO SCALE)



BOLLARD
(NOT TO SCALE)

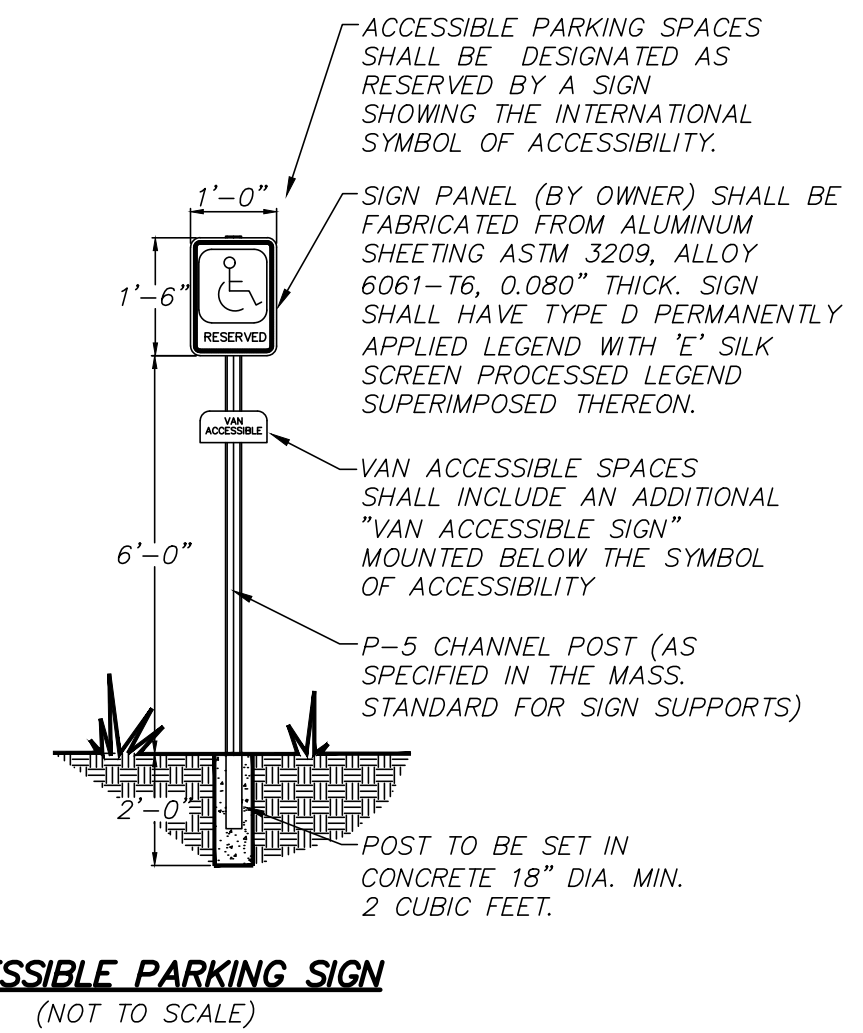


PAVEMENT MARKING DETAIL
(NOT TO SCALE)

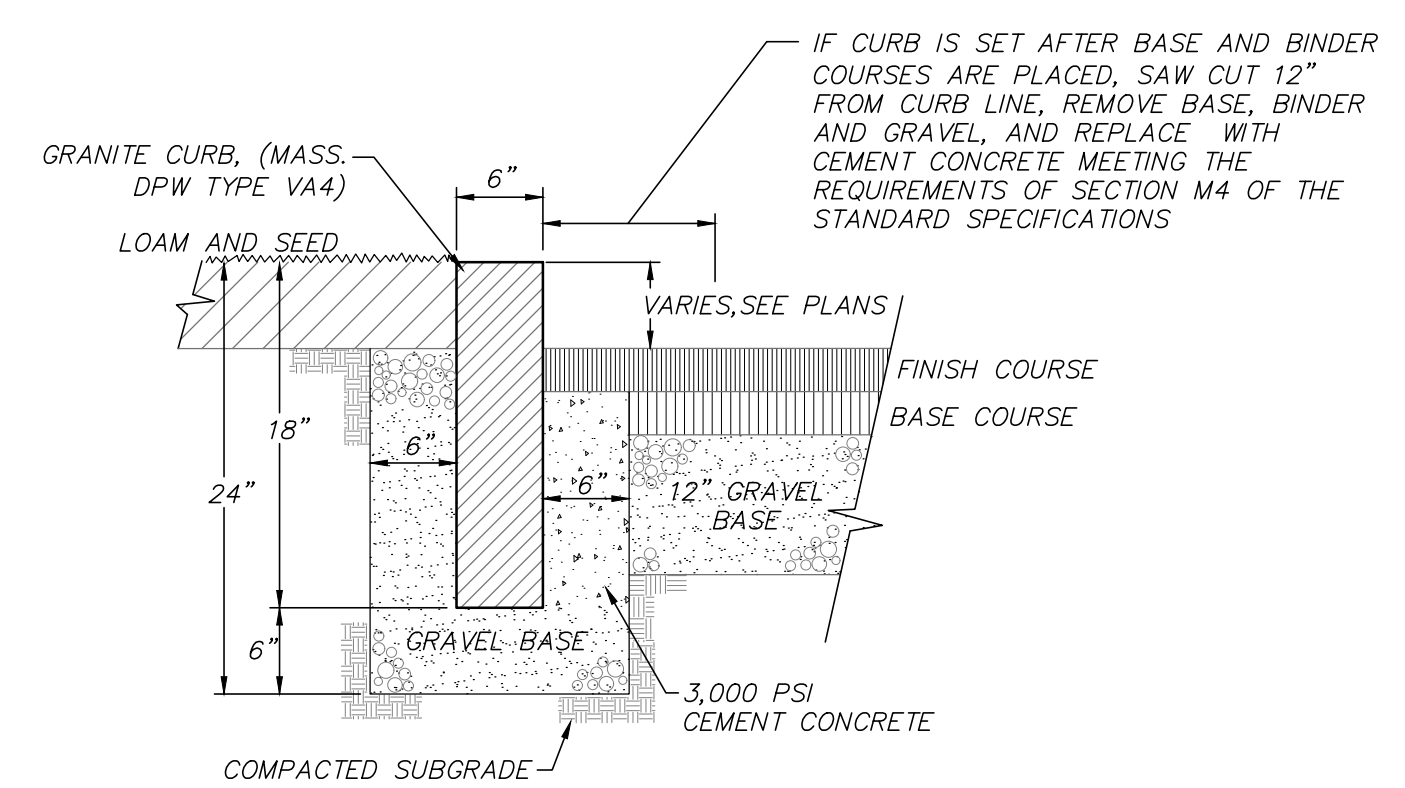


ACCESSIBLE RAMP DETAIL
(NOT TO SCALE)

NOTE:
THE WEARING AND BINDER COURSES SHALL CONSIST OF CLASS I TYPE I-1 BITUMINOUS CONCRETE (HOT MIX ASPHALT)



ACCESSIBLE PARKING SIGN
(NOT TO SCALE)

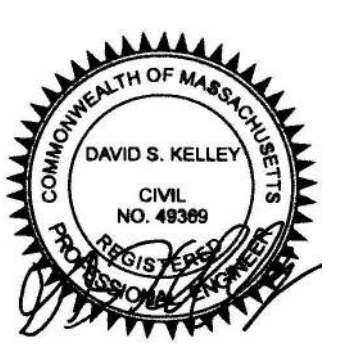


VERTICAL GRANITE CURB
(NOT TO SCALE)

NO.	DESCRIPTION	DATE

DATE	05/08/2020
SCALE	AS INDICATED
DRAWN	NB
CHECKED	DK
PROJECT NO.	6120-2

SEAL



SITE DETAILS



WIRELESS CONTROL APP

SCL2 Series

SOLAR LED INTEGRATED COMMERCIAL AREA LIGHT

Project: _____
Type: _____ Quantity: _____

The SCL2 Series solar LED luminaire is a great fit for commercial, parking lot, recreational bikeway/pathway and public space lighting applications. The self-contained, unobtrusive design integrates its solar power, adaptive control and LED technologies into a compact and efficient form. With robust construction and unequalled performance, the SCL2 series is an excellent fit wherever cost effective, full cutoff lighting is required.

Using solar power and LEDs, the SCL2 series is completely self-contained and offers significant benefits:

- Cost effective design ships fully assembled and installs in minutes
- Smart Connect provides wireless control & communication with your light
- Low installation cost and minimal site impact with no trenching, cabling or wiring
- Minimal ongoing costs with no electrical bills or bulbs to change
- Operates entirely independent from the grid and is immune to power outages
- A sustainable choice without recurring carbon emissions

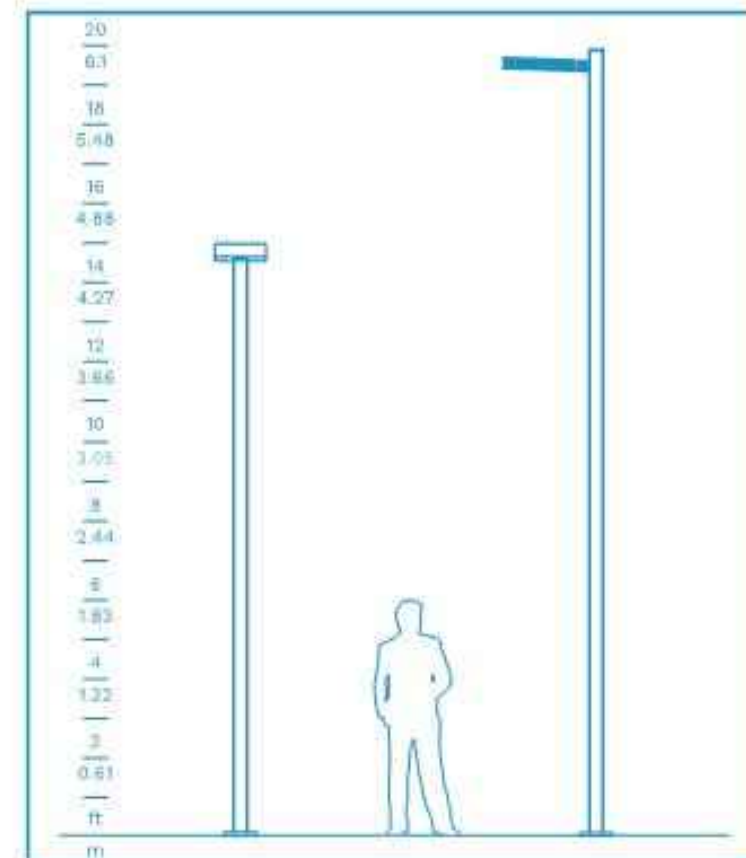
All of our solar powered lights are enabled by our innovative Solar Lighting Controller (SLC). The SLC in each light is "self-learning" and allows the lights to predictively adapt to their surroundings, providing a level of lighting performance and reliability unavailable in other solar lighting products.

TECHNICAL SPECIFICATIONS

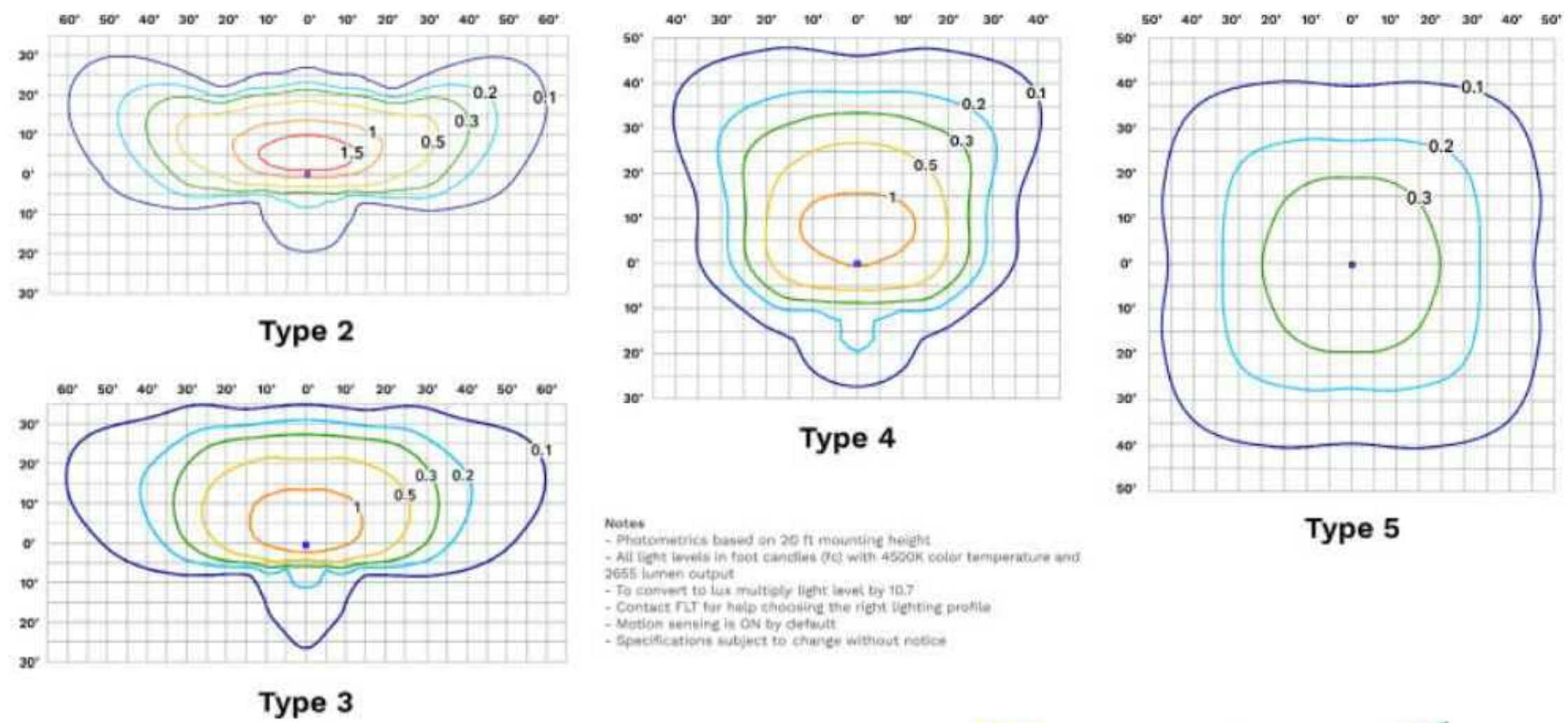
Solar Module:	<ul style="list-style-type: none"> • High-efficiency monocrystalline cells • Inconspicuously integrated into the top of luminaire • Used for day/night detection (no photocell required)
Solar Lighting Controller (SLC):	<ul style="list-style-type: none"> • Microcontroller-based technology • High-efficiency, Maximum Power Point Tracking (MPPT) battery charger • Built-in high-efficiency LED driver • Multiyear data logging • Automatically manages lighting performance based on environmental conditions and lighting requirements • Integrated into luminaire housing
Battery:	<ul style="list-style-type: none"> • High performance lithium (LiFePO₄) • Exceptional 8 – 10 year lifecycle • High temperature tolerance • Contained within luminaire housing • Designed for easy battery changes when required

LEDs and Optics:	<ul style="list-style-type: none"> • 100,000 hour L70 lifetime LED • Warm (3000K) and neutral (4000K) white color temperatures available • High-efficiency type 2, 3, 4 and 5, full cutoff optics • Typical lumen output from 2696 to 2930 lumens
Mechanical Construction:	<ul style="list-style-type: none"> • Extruded and formed, low copper aluminum enclosure and mounting arm • Stainless fasteners with security fastener option • Architectural grade, super durable, TGIC powder coat • Four standard colors with custom colors available
Factory Set Lighting Profiles:	<ul style="list-style-type: none"> • 11 standard duration profiles available • Real-time lighting profile options available • See lighting profile sheet for all options • Lighting profiles and motion sensing options are field configurable with app • Motion sensing capabilities optimize performance based on usage
Wireless Controls:	<ul style="list-style-type: none"> • Easy-to-use interface via iOS smartphone app • Configure and control lighting profiles • Adjust dusk and dawn thresholds • Motion sensing capabilities optimize performance based on usage

First Light Technologies Ltd. | www.firstlighttechnologies.com | info@firstlighttechnologies.com | 1.844.279.8754
SCL2: 70-0038 10 January 2020 © First Light Technologies Ltd.



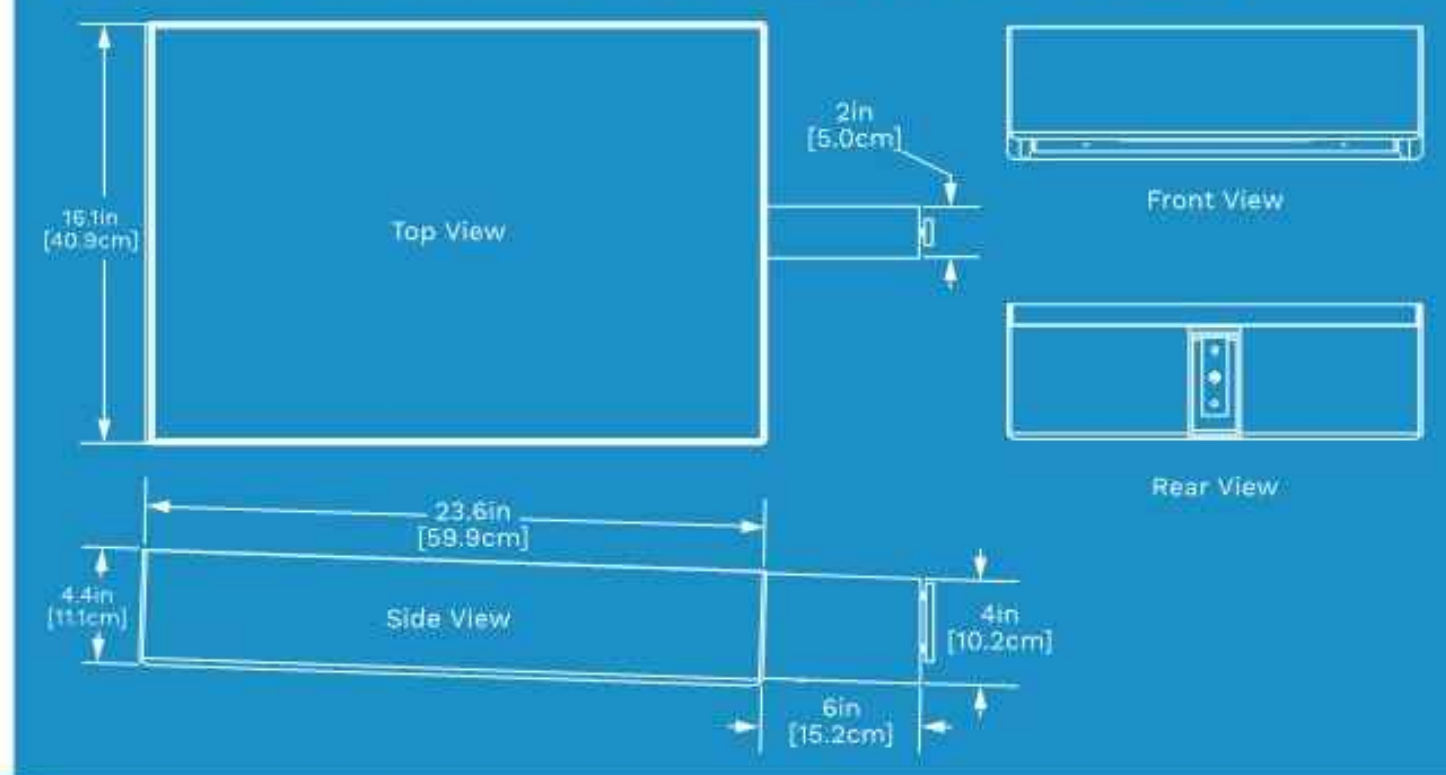
PHOTOMETRICS (IES files available on our website)



SCL2 Series

SOLAR LED INTEGRATED COMMERCIAL AREA LIGHT

EPA: 0.99ft² (0.09m²) | Weight: 34 lbs (15.4kg) including battery



ORDER MATRIX

Series	Mounting	Finish	Distribution	LED Color	Lighting Profiles (See Profile Sheet)	Options
SCL2	SPMS - Side Pole Mount Square	BK - Black	T2 - Type 2	WW - 3000K	D0 - Dusk till dawn	SEC - Security Fasteners
	SPMR - Side Pole Mount Round	BZ - Bronze	T3 - Type 3	NW - 4000K	D9 - On at dusk, 100% for 3 hours, dim to 30%, brighten to 100% one hour before dawn, off at dawn (DEFAULT)	MISO - Motion Sensor Off
		SV - Silver	T4 - Type 4	TX0000 - On at dusk until time between 1800 & 0600. X = 0 (Off) or D (Dim). 0000 = time to dim or turn off.		
		WH - White	T5 - Type 5			
	NMNT - No Mount	CC - Custom				

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SCL2: 70-0038 10 January 2020 © First Light Technologies Ltd.



500 CUMMINGS CENTER, SUITE 5950
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WWW.MERIDIANASSOC.COM



19 SOUTH LASALLE STREET
SUITE 300 CHICAGO, IL 60603
312/933.2701



NEW CONSTRUCTION OF
RETAIL CANNABIS
DISPENSARY

164 GROVE STREET
FRANKLIN, MA 02038

ISSUED FOR PERMITTING
ONLY NOT FOR
CONSTRUCTION

NO.	DESCRIPTION	DATE

DATE	05/08/2020
SCALE	AS INDICATED
DRAWN	NB
CHECKED	DK
PROJECT NO.	6120-2

SEAL



SITE DETAILS

C5.2

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5/8/2020 7:50:26 AM

July 23, 2020

Mr. Anthony Padula, Chairman
Franklin Planning Board
355 East Central Street
Franklin, MA 02038

**Re: 164 Grove Street
Site Plan Peer Review**

Dear Mr. Padula:

BETA Group, Inc. has reviewed documents for the proposed Site Plan Approval application, "**Permit Site Development Plans - 164 Grove Street, Franklin, Massachusetts.**" This letter is provided to outline findings, comments, and recommendations.

BASIS OF REVIEW

BETA received the following items:

- **Site Plan & Special Permit Application**, including the following:
 - *Cover Letter*
 - *Application for Approval of a Site Plan and Special Permits*
 - *Exhibit 5: Special Permit Findings*
 - *Form P*
 - *Certificate of Ownership*
 - *Filing Fees*
- Plans (8 Sheets) entitled **Permit Site Development Plans** dated May 5, 2020 and prepared by Meridian Associates of Beverly, MA.
- **Stormwater Analysis and Calculations**, dated May 8, 2020 and prepared by Meridian Associates of Beverly, MA.

Review by BETA will include the above items along with the following, as applicable:

- Site Visit
- **Zoning Chapter 185 From the Code of the Town of Franklin**, current through October 2019
- **Zoning Map of the Town of Franklin, Massachusetts**, attested to April 30, 2019
- **Stormwater Management Chapter 153 From the Code of the Town of Franklin**, Adopted May 2, 2007
- **Subdivision Regulations Chapter 300 From the Code of the Town of Franklin**, current through January 1, 2016
- **Wetlands Protection Chapter 181 From the Code of the Town of Franklin**, dated August 20, 1997
- **Town of Franklin Best Development Practices Guidebook**, dated September 2016

INTRODUCTION

The project site consists of 164 Grove Street, a vacant lot developed with a small cleared area and gravel driveway (the "Site"). The parcel contains an area of 1.5 Acres and is located along the eastern side of Grove Street. The Town of Franklin Assessor's Office identifies the parcel as Map 306 Lot 4. The Site and all surrounding properties are located within the Industrial Zoning District.

The existing Site includes a gravel driveway connecting to Grove Street which extends into the center of the Site. This central area is an undeveloped area surrounded by small trees. A bar gate located along the driveway restricts access into the Site. A chain link fence connects to this gate and surrounds the perimeter of the Site. Topography at the Site is generally sloped towards the east, and grades are typically 4% or flatter with the exception of several steeper areas (10% +/-) on the western side of the Site.

The Applicant proposes to remove the existing fence, driveway, and vegetation and construct a new 4,150 sq. ft. Non-Medical Marijuana Retail Establishment. Associated site developments will include two new paved parking lots, two driveway aprons connecting to the existing driveway to the south, grading, utilities (water, sewer, underground electric), lighting, and landscaping. Stormwater management is proposed through deep sump catch basins, water quality units, and a subsurface infiltration system.

A portion of the project is located within an approved wellhead protection area (Zone II) and therefore the Water Resource District. No wetland resource areas are depicted within the project limits; however, the northeastern portion of the site is shown to be within the 100-foot buffer zone. The project is not located within a FEMA mapped 100-year flood zone or a NHESP mapped estimated habitat area of rare or endangered species. NRCS maps primarily indicate the presence of Sudbury fine sandy loam, rated in hydrologic soil group (HSG) B, at the site. A small area of Merrimac fine sandy loam (HSG A) is depicted along the west side of the site near Grove Street.

FINDINGS, COMMENTS AND RECOMMENDATIONS

GENERAL COMMENTS

- G1. Provide detail for proposed dumpster pad and enclosure (with screening).
- G2. Confirm access rights and utility easements are being acquired from the adjacent property to the south.
- G3. Clarify the disposition of the existing fences and gate surrounding the property.
- G4. Recommend revising snow storage areas to maintain clear flow path within swale along the northerly property line. Consider providing additional snow storage along the southerly curb line.
- G5. Provide a note to indicate that tree species shall be from the Town of Franklin Best Development Practices Guidebook. Also confirm the proposed plantings meet this requirement.

ZONING

The Site is located within the Industrial (I) Zoning District and the Marijuana Use Overlay District. The proposed use of the Site is identified as Non-Medical Marijuana Retail Establishment. The proposed uses are allowed in the District via a Special Permit from the Planning Board.

SCHEDULE OF LOT, AREA, FRONTAGE, YARD AND HEIGHT REQUIREMENTS (§185 ATTACHMENT 9)

The project site will meet the requirements for lot area, frontage, lot depth, yards, height, and impervious coverage. The project does not meet the requirements for lot width; however, per §185-3 Lot Width C.(2) any lot shown on a recorded plan prior to May 21, 1998 is exempt from this definition. The Quitclaim Deed provided as part of the submission documents indicates the subject parcel is depicted on a plan of land recorded in the Norfolk Registry of Deeds, dated August 25, 1987 and is therefore exempt.

PARKING, LOADING AND DRIVEWAY REQUIREMENTS (§185-21)

The existing Site includes one access driveway from Grove Street to the west. The project proposes to remove this access route and construct two new paved access driveways (1 entrance, 1 exit) from the 166 Grove Street site to the south.

Section §185-21.B.(3) describes the number of parking spaces required for residential and nonresidential buildings in the Industrial Zoning District. The required parking for a retail use is one space per 200 sq. ft. of gross floor area plus one space per separate enterprise. For the proposed 4,150 sq. ft. building, the required parking is thus 21 spaces and a total of 66 spaces are proposed. With the understanding that retail marijuana uses have specific parking demands, additional commentary will be provided as part of the Traffic Review, to be provided under separate cover.

Proposed 90° parking spaces are depicted as 19' long and 9' wide. Proposed angled (60°) parking spaces are 18' long (usable stall) and 9' wide. Access route widths vary between 16 ft. and 24 ft, and all driveways are designated to be one-way. In accordance with Massachusetts Architectural Access Board (MAAB) requirements, four parking spaces have been designed to be handicap accessible, two of which are also van accessible.

In compliance with §185-21.C.(5), one tree must border the parking lot per every 10 parking spaces. A total of 31 trees, supplemented by shrubs, are proposed in the vicinity of the parking lot.

- P1. The angled parking layout conforms to industry standards; however, the usable stall length is only 18 feet. Revise the usable stall length to be 19 feet §185-21.C.(9)(a).
- P2. The accessible route is located within the 24' driveway aisle and vehicles backing out of spaces will encroach into the striped walkway. Evaluate alternatives to eliminate pedestrian/vehicle conflicts.
- P3. Clarify if additional parking/site layouts have been evaluated, such as relocating the proposed building to the west end of the site and providing a continuous parking area. The current layout requires vehicles to circulate in a "figure 8" pattern with a number of vehicle conflict points.
- P4. Provide turning movements on Site Plan to demonstrate that passenger, delivery, and waste collection vehicles can safely maneuver throughout the site. It is anticipated that the Fire Chief will review turning movements for fire apparatus throughout the site.
- P5. Confirm the number of trees provided in the Plant Schedule (31) vs. the Landscape Table (10).

SIDEWALKS (§185-28)

The project is located within the Industrial Zoning District and is not required to provide sidewalks along the street frontage. There are no existing sidewalks on Grove Street in proximity to the project.

CURBING (§185-29)

The project proposes the use of vertical granite curbing along paved areas.

- S11. Clarify limits of vertical granite curb as it relates to the concrete walkway. The Concrete Walkway Detail depicts monolithic concrete curb.

SITE PLAN REVIEW (§185-31)

The proposed development is subject to Site Plan Review and must comply with the requirements of this section.

- S1. Include abutting land uses and zoning information on the Locus Map (§185-31.C.(3)(d)).
- S2. Provide photometric plan (§185-31.C.(3)(l)).
- S3. Depict proposed limits of clearing on the plans, as applicable, including areas of existing vegetation to be retained (§185-31.C.(3)(u)).

SCREENING (§185-35)

The project proposes outdoor parking for 10 or more cars, which must be screened from adjacent residential districts or uses from which they would otherwise be visible. The Site is surrounded by lots zoned as Industrial, and it does not appear that the project will be visible from any residential use; therefore, screening is likely unnecessary.

WATER RESOURCES DISTRICT (§185-40)

The Site is partially located within the Water Resources District due to the presence of a Zone II Wellhead Protection Area. This portion of the Site includes the eastern parking lot and the majority of the proposed building.

- WR1. Clarify if the proposed sewer force main will connect to an off-site sewage disposal system of Town Sewer. If necessary, confirm the estimated sewage flow for the existing sewage disposal system will not exceed 110 gallons per 10,000 sq. ft. of lot area if located within the Water Resources District (§185-40.D.(1)(i)).
- WR2. Section §185-40.D.(1)(l)(ii) requires that the proposed groundwater recharge efforts must be approved by a hydrogeologist; however, provided that the stormwater management system is revised to fully comply with the Massachusetts Stormwater Management Standards no adverse impacts to groundwater are anticipated as a result of the project. BETA defers to the preference of the Board to require approval by a hydrogeologist.
- WR3. Note that any fill placed in quantity greater than 15 yards must be certified in accordance with §185-40.E.(5).
- WR4. In conjunction with comment SW12, it is anticipated that minimal flow is directed from the project site to the paved area in proximity to DP2. BETA notes that to fully comply with (§185-40.E.(4)), all stormwater runoff from impervious surfaces must be recharged unless following consultation with, and approval from the Conservation Commission and the Building Inspector that recharge is determined to be infeasible.

UTILITIES

Proposed utilities include drainage, electric, sanitary sewer, and domestic water services. Detailed review of water and sewer utilities is anticipated to be provided by the DPW and Fire Chief (e.g. for fire hydrants), as applicable.

- U1. Provide a note that all water and sewer utility installations shall be done in accordance with the Town of Franklin Department of Public Works Standards for Sewer and Water Materials and Installation (Town Standards). Also note that where utility installation details conflict with the Town Standards that the Town Standards shall govern.
- U2. Provide size and material information for proposed sewer force main and water line(s).
- U3. Indicate how water for fire protection will be supplied, if at all.
- U4. Confirm the proposed solar lighting is capable of providing adequate illumination for the site throughout the night during adverse conditions (e.g. multiple cloudy/rainy days).

STORMWATER MANAGEMENT

The project proposes to direct runoff from impervious areas into a new subsurface infiltration system via catch basin connections and proprietary water quality units (Contech CDS). Overflows from the proposed infiltration system will be directed into a low-lying basin area on the eastern side of the lot.

GENERAL

- SW1. As part of the MS4 regulations, the Town is proposing revisions to Chapter 153, Stormwater Management. Once the revisions are approved (date not yet determined) they will be applicable to any project that is subject to the Bylaw and has not yet been approved. BETA recommends the designer review the proposed Bylaw revisions to evaluate if additional stormwater provisions or treatment may be required.
- SW2. Provide a stamped Stormwater Management Checklist.
- SW3. Revise proposed HDPE pipe to be RCP. Where cover is less than 42" provide Class V RCP (§300-11.B.(2)(a)). BETA notes that with a waiver request, the Board may consider allowing the use of the 4" HDPE overflow from the subsurface infiltration system.
- SW4. In coordination with the Town, provide an easement for the existing outfall at the northwest end of the site.
- SW5. Revise the diameter of the proposed catch basins to a minimum of 5 feet to accommodate the proposed double grates.
- SW6. Consider providing periodic check dams in the northerly swale to minimize flow velocities and promote infiltration.
- SW7. Clarify where the Typical Level Spreader is proposed.

MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS:

The proposed development will disturb greater than one acre and is subject to Chapter 153: Stormwater Management of the Town of Franklin Bylaws and MassDEP Stormwater Management Standards.

No untreated stormwater (Standard Number 1): *No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

The project does not propose any new untreated stormwater discharges to wetlands. An outfall is proposed from the subsurface infiltration system which discharges to a low-lying area. A riprap apron is proposed for erosion control.

SW8. Although the existing outfall at the northwest corner of the site is not the responsibility of the project proponent, it is recommended to provide a rip rap pad at the outlet.

Post-development peak discharge rates (Standard Number 2): *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

The project proposes an increase in impervious area and will use subsurface infiltration systems to mitigate increases in post-development peak discharge rates and total runoff volumes.

SW9. Provide summary table comparing pre-development and post-development runoff volumes. Runoff volumes may not increase per §300-11.A.(3) and the Best Development Practices Guidebook.

SW10. Revise HydroCAD model to include subwatershed SC100, as depicted on the Post-Development Drainage Plan, and show the boundary between Watershed SC100 and SC200.

SW11. Label the Post-Development subwatershed located in the south-central portion of the Site.

SW12. Based on a review of the site there appears to be a low-lying area on the east of the site in proximity to DP2. Additional spot grades from the initial survey should be provided on the plan to clarify this topography and if the low area is confirmed it should be included in the HydroCAD model as a pond.

SW13. Recommend including the proposed infiltration overflow area in the HydroCAD model as an additional infiltration area.

SW14. Revise limits of watershed SC101. Based on the proposed grading, the majority of this area will drain to the western parking area (Design Point 2) instead of Design Point 1.

SW15. Clarify how roof runoff will be conveyed. Consider providing a direct connection from the roof leaders to the subsurface infiltration system.

Recharge to groundwater (Standard Number 3): *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to maximum extent practicable.*

NRCS maps indicate the presence of Sudbury fine sandy loam, rated in hydrologic soil group (HSG) B, primarily at the site. A small area of Merrimac fine sandy loam (HSG A) is depicted along the west side of the site near Grove Street. The infiltration systems have been designed to provide a recharge volume in excess of that required.

SW16. Clarify the Schematic Plan View of the Subsurface Infiltration Facility Details to indicate it is a typical layout and the dimensions are 20 rows of 11 chambers. Revise detail name, as necessary, to reflect the number of systems proposed.

SW17. The proposed bottom of the infiltration system is at elevation 250.30 and will not provide the required 2' minimum separation to groundwater based upon the soils analysis for Test Pit 2 (ESHGW @ 251.5)

SW18. Revise the top elevation of the stone in the infiltration system on the Cross Section detail to be consistent with other elevations.

SW19. Provide mounding analysis for proposed infiltration systems as separation to groundwater is less than 4 feet.

SW20. Test pit data indicates pockets of sandy loam within the C layer of coarse sand and gravel, which are more restrictive than the design exfiltration rate of 8.27 in/hr. Provide additional clarification to justify the design exfiltration rate or lower the rate, if appropriate.

80% TSS Removal (Standard Number 4): *For new development, stormwater management systems must be designed to remove 80% of the annual load of Total Suspended Solids.*

The project proposes to direct runoff from new impervious areas to a treatment train consisting of deep sump catch basins with hoods, proprietary water quality units (Contech CDS), and a subsurface infiltration system. Calculations are provided that demonstrate the required 80% TSS removal and 1" Water Quality Volume can be provided with the deep sump catch basin and infiltration basin treatment train.

Higher Potential Pollutant Loads (Standard Number 5): *Stormwater discharges from Land Uses with Higher Potential Pollutant Loads require the use of specific stormwater management BMPs.*

SW21. Provide the total number of estimated trips per day for the site. If the number exceeds 1,000 the site is considered a high-intensity-use parking area and is therefore LUHPPL.

Critical Areas (Standard Number 6): *Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas.*

The project includes discharges to a Zone II Wellhead Protection Area, a critical area, and 44% pretreatment is required prior to infiltration. The proposed treatment trains are consistent with the recommendations of MassDEP for discharges to Zone II wellhead protection areas.

SW22. Revise narrative to correctly indicate the presence of a critical area.

SW23. Provide calculation based upon MassDEP's "Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices" to demonstrate the Contech Structures are capable of treating the calculated discharge rate and will remove a minimum of 44% TSS prior to infiltration.

Redevelopment (Standard Number 7): *Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable.*

The project does not qualify as redevelopment – not applicable.

SW24. Revise narrative to remove references to "70 Frank Mossberg Drive" and that the project qualifies as a redevelopment.

Construction Period Erosion and Sediment Controls (Standard Number 8): *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

The project as currently depicted will disturb greater than one acre of land; therefore, a Notice of Intent with EPA and a Stormwater Pollution Prevention Plan (SWPPP) is required. The project plans indicate the use of a stabilized construction entrance, silt sacks, and perimeter erosion controls (Filtermitt).

SW25. Provide perimeter controls along the southwestern border of the Site (e.g. where existing flows are directed to DP1).

Mr. Anthony Padula, Chairman

July 23, 2020

Page 8 of 8

SW26. Revise Temporary Stabilized Construction Entrance Detail to be a continuous width of 20 feet as depicted on the Layout, Grading, and Erosion Control Plan.

Operations/maintenance plan (Standard Number 9): *A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

A Long-Term Operation and Maintenance (O&M) Plan has been provided.

SW27. Provide long-term maintenance measures for catch basins and Contech water quality units.

SW28. Provide a plan that shows the location of all stormwater BMPs as part of the O&M Plan.

SW29. Provide an estimated O&M budget.

Illicit Discharges (Standard Number 10): *All illicit discharges to the stormwater management systems are prohibited.*

The Stormwater Management Report indicates that no illicit discharges are proposed, and a signed Illicit Discharge Compliance Statement will be provided prior to construction.

SW30. Provide a signature on the Illicit Discharge Compliance Statement.

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,

BETA Group, Inc.



Matthew J. Crowley, PE
Project Manager



Stephen Borgatti
Staff Engineer

cc: Amy Love, Planner
Jen Delmore, Conservation Agent



TOWN OF FRANKLIN

DEPARTMENT OF PUBLIC WORKS

Franklin Municipal Building
257 Fisher Street
Franklin, MA 02038-3026

July 23, 2020

Mr. Anthony Padula, Chairman
Members of the Franklin Planning Board
355 East Central Street
Franklin, MA 02038

RE: Special Permit & Site Plan – 164 Grove St, Dispensary

Dear Mr. Chairman and Members:

We have reviewed the submitted materials for the subject project and offer the following comments:

1. Applications that will need to be filed with the Franklin Department of Public Works may include, but are not necessarily limited to a Water and Sewer Service Permit, Trench Permit, and a Soil Erosion and Sediment Control Permit.
2. The proposed project calls for site access and utility connections from the adjacent Planet Fitness site. While we don't have any issues with this configuration, the applicant should provide documentation that the adjacent property owner will provide an easement for this access.
3. There is an existing curb cut along Grove St for this property that will not be used. The existing berm along Grove St should be continued in order to close off the existing opening.
4. There is an existing headwall and drainage outfall on the site coming from Grove St. We have not been able to find any easement that was granted to the Town for this infrastructure but would like to include that into the plan so the Town will be able to access and maintain this pipe in the future.
5. We note that the designer has taken this outfall into account in their design and will grade a swale to a drainage basin at the rear of the property. However, no design calculations have been provided for this basin as to its sizing or potential overflow.
6. In addition no increase in runoff rates, the Town requires no increase in total runoff volume from the site. Please include this data in the Summary of Flows chart.

7. The stormwater report indicates that Standard 6 doesn't apply, however the proposed site is within the Water Resource District, therefore this standard does need to be addressed, including achieving 44% TSS removal prior to infiltration.
8. The Post-development watershed map shows sub-catchment 100 which does not appear to be accounted for in the model.
9. The invert for the infiltration system outlet control varies between the plan view and detail view. The invert should be consistent although we note that in each case the invert is higher than the 100 yr elevation.

Should you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'M Maglio', written in a cursive style.

Michael Maglio, P.E.
Town Engineer



**FRANKLIN PLANNING & COMMUNITY
DEVELOPMENT**

355 EAST CENTRAL STREET, ROOM 120
FRANKLIN, MA 02038-1352
TELEPHONE: 508-520-4907

MEMORANDUM

DATE: July 22, 2020
TO: Franklin Planning Board
FROM: Department of Planning and Community Development
RE: 164 Grove Street – PharmaCann
Special Permit & Site Plan

The DPCD has reviewed the above referenced Special Permit & Site Plan Modification application for the Monday, July 27, 2020 Planning Board meeting and offers the following commentary:

General:

1. The site is approximately 1.5 acres and is located at 164 Grove Street in the Industrial Zoning and Marijuana Overlay District; Assessor's Map 306 Lot 004.
2. Applicant has filed for a Special Permit: To allow Non-medical retail marijuana facility under 185 Attachment 3, Part II Section 2.23
3. The Applicant is proposing to construct a 4,150 square foot building with 70 parking spaces. The main use of the building is for retail Marijuana. There will be no product manufacturing, testing or research operations at the Facility.
4. Letters were received from the Fire Department, Town Engineer and BETA.
5. Applicant will need to file with the Conservation Commission.

Records on File:

1. Application for Site Plan and Special Permit
2. Certificate of Ownership
3. Special Permit Criteria
4. Abutters certified mailing
5. Overview of Proposed project and Special Permit Findings
6. Site Plans
7. Stormwater Management Plans

Comments:

1. The Applicant is in the process of submitting a revised Special Permit application to reference the correct section of the Zoning By-Law.
2. The applicant has not shown on the plans if there will be any signage on Grove Street or color renderings of the building. If any signage is installed, the Applicant is required to submit to Design Review Commission.
3. The Applicant is providing 70 parking spaces for site to include employee and customer parking, where 22 spaces are required.
4. Due to COVID-19 regulations, is there an entrance only and exit only doors provided? Show on the plans how the customers will enter and exit the building.
5. The applicant may want to consider adding a queuing line outside the building. Is there an area outside the building where customers can wait?
6. DPCD is still waiting for a traffic study to be submitted. Once we have received the submittal, BETA will review the traffic study.
7. The applicant is proposing to enter the site from a driveway owned by the abutting property. The Applicant will need to provide an easement agreement prior to the Planning Board vote.
8. Fire has expressed concern about the entrance width.

DPCD has no further comments.



FRANKLIN FIRE DEPARTMENT

To : DPCD

FROM : J. S. BARBIERI, DEPUTY FIRE CHIEF

DATE : 6 JULY 2020

RE : SPECIAL PERMIT & SITE PLAN – 164 GROVE ST.

Thank you for the opportunity to review the above referenced plan.

The Fire Department has an issue with the proposed access for the project. Per our state fire code (527 CMR 1) the access must be a minimum of 20 feet wide, not 16 feet wide as presented on the front driveway (South) and left driveway (West).

Please contact me should you have any question or require any additional information.

cc: file

SPECIAL PERMIT FINDINGS

164 Grove Street, Franklin, MA

The Board should grant a special permit for the Proposed Project for the following reasons.

a. Proposed project addresses or is consistent with neighborhood or Town need.

First, the Proposed Project is consistent with the neighborhood and Town's needs. Chapter 185 of the Bylaws were enacted to, *inter alia*: (A) promote the health, safety, convenience, morals, and welfare of the inhabitants of the Town; (B) lessen the danger from fire and congestion; and (C) encourage the most appropriate use of land. See Bylaws, §185-1. The Proposed Project promotes health, safety, convenience, morals, and welfare by providing the Town's residents with regulated access to recreational marijuana in a safe environment as located within the Marijuana Use Overlay District Section 185-49 of the Bylaws enacted in 2013, and amended in 2017. The Proposed Project's design, which consists of 1 principal building with associated parking, is also intended to lessen the danger of fire (as the building is set far back from the property line and is not located next to other buildings) and congestion (as the Property will utilize the existing curb cuts onto the abutting private way at 166 Grove Street to ensure cars coming into and out of the Property will not backup Grove Street). Additionally, the Proposed Project will encourage the most appropriate use of the lot because it would improve a currently vacant parcel of land into a productive retail operation providing services to residents of the Town and an increased tax base to the Town. The Board's grant of a special permit is consistent with the neighborhood and Town's needs.

b. Vehicular traffic flow, access and parking and pedestrian safety are properly addressed.

Second, vehicular traffic flow, access and parking, and pedestrian safety are properly addressed, with the utilization of the existing curb cuts onto the abutting private way at 166 Grove Street already serving two other businesses with no noticeable impact on the future traffic operations at nearby intersections. All customer access to the Property shall regulated in such a manner so as no more than 100 are accessing the Property in any given hour. The Proposed Project's parking design including 66 standard and 4 HC Accessible parking spaces is more than sufficient to accommodate the required staff and customer parking on the Property. The traffic study for the Proposed Project to be shared in advance of the Planning Board's public hearing will further evidence the foregoing conclusions in greater detail.

c. Public roadways, drainage, utilities and other infrastructure are adequate or will be upgraded to accommodate development.

Third, public roadways, drainage, utilities, and other infrastructure are adequate or will be upgraded to accommodate development. The Proposed Project consists of using the curb cuts onto the existing private way at 166 Grove Street that connects with Grove Street, which will be sufficient for retail operations at the Property. Owner is currently working with the Town and surrounding property owners to connect the Property's drainage and sewer system with the existing utility lines to connect the proposed Project's water, gas and electrical lines into the access way at 166 Grove Street at the existing gas, lateral water line and utility pole, respectively. The Board's grant of a special permit will not materially impact the public roadways, drainage, utilities, or other infrastructure as they are currently adequate or are being upgraded to support the Proposed Project.

d. Neighborhood character and social structure will not be negatively impacted.

Fourth, the neighborhood character and social structure will not be negatively impacted. As mentioned above, the Property is located in an Industrial District and is surrounded by other retail operations. The Proposed Project is the same type of retail establishment that this area of the Town has been supporting and encouraging through its adoption of the Marijuana Use Overlay District. The Board's grant of a special permit will not negatively impact any residential neighborhood or the Town's social structure.

e. The Project will not destroy or cause substantial damage to any environmentally significant natural resource, habitat, or feature or, if it will, proposed mitigation, remediation, replication, or compensatory measures are adequate.

Fifth, the Proposed Project will not destroy or cause substantial damage to any environmentally significant natural resource, habitat, or feature. To Owner's knowledge, there are not any natural resources, habitats, or features located on the Property that will be substantially damaged or destroyed during construction or operation of the Proposed Project. The Board's grant of a special permit will not result in material environmental degradation.

f. Number, height, bulk, location and siting of building(s) and structure(s) will not result in abutting properties being deprived of light and fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates.

Sixth, the number, height, bulk, location, and siting of the building and structures at the Property will not result in abutting properties being deprived of light or fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates. The Proposed Project consists of 1 principal building and associated parking to be constructed on the currently vacant lot. The Proposed Project is consistent with the surrounding retail stores and properties. The Board's grant of a special permit will not negatively impact the surrounding properties' light or fresh air circulation.

g. Water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive.

Seventh, water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive. The Proposed Project's water consumption and sewer usage will be consistent with normal retail stores similar to those located in the immediate vicinity. The Proposed Project intends to secure a similar access to the manhole that contains a pump station within the existing ROW easement alongside Grove Street, which Franklin Carpet and Tile is also utilizing. To Owner's knowledge such pump station has more than sufficient capacity to address the minimal increase associated with the Proposed Project's use – being only a small breakroom and 2 bathrooms for staff and customer use. The Board's grant of a special permit will not materially impact water consumption or sewer usage in the neighborhood.

In conclusion, the Proposed Project's use will not have adverse effects which overbalance its beneficial effects on either the neighborhood or the Town of Franklin, in view of the particular characteristics of the site and of the proposal in relation to that site. The Property is located in an Industrial District close to U.S. Interstate 495, directly abuts other retail stores, including, for example, a gym, tile and carpeting store, electrical supplies store, and brewery, and does not abut any residentially zoned properties. *See* Bylaws, Zoning Map. The Proposed Project is consistent

with and fits into the Town's planning of the surrounding neighborhood as an industrial zoned and primarily detached retail-oriented neighborhood. The Board's grant of a special permit will not overbalance the beneficial effects on the surrounding neighborhood.

For the above reasons, the Board should grant Owner's request for a special permit for the Proposed Project.

Town of Franklin



Planning Board

The following notice will be published in the Milford Daily Newspaper once on Monday, July 13, 2020 and again on July 20, 2020

FRANKLIN PLANNING BOARD PUBLIC HEARING NOTICE

In accordance with the Town of Franklin Zoning By-Laws, the Franklin Planning Board will hold a Remote Public Hearing on **Monday, July 27, 2020 at 7:10 PM**, for a Special Permit and Site Plan application titled “Permit Site Development Plan, 164 Grove Street” Franklin, MA prepared by Meridien Associates, Beverly, MA, and submitted to the Department of Planning & Community Development on June 30, 2020, by PharmaCann Massachusetts, 109 South LaSalle, Chicago, IL.

The property is located in the Industrial Zoning District and Marijuana Overlay District (Assessors Map 306 Lot 004) at 164 Grove Street. The applicant is proposing to construct a 4,150sq/ft building for non-medical retail marijuana. The purpose of the Special Permit and Site Plan Modification is to allow non-medical marijuana facility under 185 Attachment 3, Part II Section 2.23 of Franklin’s Zoning By-Law regulations.

Please note: This will be your only written notice of this public hearing. Should the Planning Board vote to continue this Public Hearing, the date and time will be posted on the Planning Board’s website under Agendas.

This meeting will be done remotely via “ZOOM” platform. Residents can view the Town Website and click on the Town Calendar for up to date information on access to the meeting.

Please contact the Department of Planning & Community Development at (508) 520-4907 if you require further information or if you need to make arrangements to provide translation services for the hearing impaired, or for persons with language barriers.

To access records and files for this project, please go to <https://www.franklinma.gov/planning-board/pages/164-grove-street>

Anthony Padula, Chairman

Executed as a sealed instrument this 29th day of June 2020.

Corka M. Moynihan
Signature of Applicant

Corka M. Moynihan
Print name of Applicant

By: New Lake Capital Partners Operating Partnership, LP

[Signature]
Signature of Owner

By: Jarrett Annenberg, as authorized signatory

NLCP 164 Grove Street MA LLC
Print Name of Owner

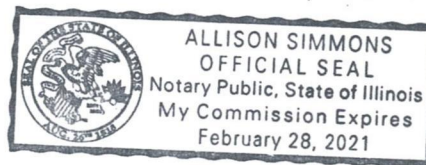
STATE OF ILLINOIS

Cook ss.

2020

On this 25th day of June 2020, before me, the undersigned notary public, personally appeared Jarrett Annenberg as authorized signatory for NewLake Capital Partners as authorized signatory for NLCP 164 Grove Street MA LLC (name of owner), proved to me through satisfactory evidence of identification, which were Driver's License to be the person whose name is signed on the preceding document in my presence.

[Signature]
(Official signature and seal of notary)
Notary Public: Allison Simmons
My Commission Expires: 2/28/21



**APPLICATION FOR APPROVAL OF A SITE PLAN
AND SPECIAL PERMIT(S)**

To the Franklin Planning Board:

The undersigned, herewith, submits the accompanying Site Plan entitled “Permit Site Development Plans – 164 Grove Street, Franklin, MA” and Special Permit(s) for Non-Medical Marijuana Establishment and requests approval for under the provisions of the Zoning By-Laws of the Town of Franklin covering Site Plans and Special Permits.

1. Name of Applicant: PharmaCann Massachusetts, Inc.
Address of Applicant: 190 South LaSalle, 29th Floor, Chicago, IL 60603
Phone No.: 847-602-7648 Email: chris.atkinson@pharmacann.com
2. Name of Owner (if not the Applicant): NLCP 164 Grove Street MA LLC
Address of Owner: c/o NewLake Capital, 549 Randolph Street, Ste 200, Chicago, IL 60661
Phone No.: 847-602-7648 Email: chris.atkinson@pharmacann.com
3. Name of Engineer: David E. Kelley of Meridian Associates
Address of Engineer: 500 Cummings Center, Suite 5950, Beverly, MA 01915
Phone No.: 978-614-0653 Email: dkelley@meridianassoc.com
1. Deed of Property recorded with Norfolk Registry of Deeds in Book 37633, Page 557, (or Certificate of Title No.)
2. Location and Description of Property:
164 Grove Street, Franklin, MA 02038 (Parcel 306-004-000-000)

Zoning District: Industrial
Assessor’s Map: 306 Lot: 4
Square Footage of Building(s): Vacant / 4,150sf of new construction
Impervious Coverage of Existing Upland: None / Designed for 22,652 square feet / 34.6%
3. Purpose of Site Plan:
To allow construction of a new 4,150 sf building on vacant property and approval pursuant to Section 185-31(1)(C) and to allow improvements within Water Resource Overlay District Section 185-40(D)(1)(i)(ii)
4. Special Permit(s) Requested:
Non-Medical Marijuana Establishment – Section 185 Attachment 3 Section 2.23

5. Special Permit Criteria: please provide on a separate document, written findings for special permit criteria a-g for each special permit being requested. Criteria are listed below. Applications will not be accepted until findings are submitted. **See Attached Chapter 185, Section 45.E**

(3). Findings. Special permits shall be granted by the special permit granting authority only upon its written determination that the proposed use will not have adverse effects which overbalance its beneficial effects on either the neighborhood or the Town, in view of the particular characteristics of the site and of the proposal in relation to that site. This determination shall be in addition to the following specific findings:

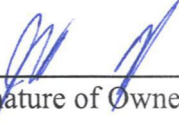
- (a) Proposed project addresses or is consistent with neighborhood or Town need.
 - (b) Vehicular traffic flow, access and parking and pedestrian safety are properly addressed.
 - (c) Public roadways, drainage, utilities and other infrastructure are adequate or will be upgraded to accommodate development.
 - (d) Neighborhood character and social structure will not be negatively impacted.
 - (e) Project will not destroy or cause substantial damage to any environmentally significant natural resource, habitat, or feature or, if it will, proposed mitigation, remediation, replication, or compensatory measures are adequate.
 - (f) Number, height, bulk, location and siting of building(s) and structure(s) will not result in abutting properties being deprived of light or fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates.
 - (g) Water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive.
6. Other issues requiring Planning Board Consideration: Approval for improvements in Water Resource District – rendering impervious up to 80% upland area of a non-residential lot
 7. A certified list (by Office of the Assessors) of abutters within 300 feet of the site is also submitted with the application.
 8. Certificate of Ownership.



Signature of Applicant

Carla M. Moynihan

Print Name of Applicant



Signature of Owner

NLCP 164 Grove Street MA LLC

Print Name of Owner

By: NewLake Capital Partners Operating
Partnership, LP, as authorized signatory

By: Jarrett Annenberg, as authorized signatory

UNITED STATES OF AMERICA
696 VIRGINIA ROAD
CONCORD, MA 01742

HENNEP PROPERTIES LLC
200 BROOKLINE AVE #508
BOSTON, MA 02215

CHARLEY2017 LLC
7 MYRTLE ST
NORFOLK, MA 02056

NLCP 164 GROVE STREET MA
C/O NEW LAKE CAPITAL
549 W RANDOLPH STE 200
CHICAGO, IL 60661

CORE REAL ESTATE HOLDINGS
166 GROVE ST
FRANKLIN, MA 02038

YERGATIAN VERNON C
V & A REALTY TRUST AVEDIS
168 GROVE STREET
FRANKLIN, MA 02038

170 GROVE STREET LLC
170 GROVE ST
FRANKLIN, MA 02038

BATISTA ANTERO
BATISTA DONNA M
P O BOX 668
FRANKLIN, MA 02038

TRPF 157 165 GROVE ST LLC
C/O NUVEEN
PO BOX 30428
CHARLOTTE, NC 28230

TRPF 157 165 GROVE STREET
C/O NUVEEN
PO BOX 30428
CHARLOTTE, NC 28230

PLAN 348 OF 1987

SITE PLAN 162 GROVE STREET

ZONING:

162 GROVE STREET SITE IS LOCATED WITHIN AN INDUSTRIAL ZONE.

INDUSTRIAL ZONE	REQUIREMENTS:	EXISTING	PROPOSED
AREA:	40,000 S.F.	174,351± S.F.	174,351± S.F.
FRONTAGE:	175'	175.00'	175.00'
DEPTH:	200'	757'	757'
HEIGHT:	3 STORIES *6	2 STORIES	2 STORIES
WIDTH:	157.5'	220'	220'

COVERAGE - STRUCTURES:	70%	8.1%	9.8%
STRUC. & PAVING:	80%	31.5%	50.0%

SETBACKS-		69.1'	69.1'
FRONT:	40'	69.1'	69.1'
RIGHT SIDE:	30' *5	107.1'	85.3'
LEFT SIDE:	30' *5	31.7'	31.7'
REAR:	30' *5	476.9'	476.9'

*5 - INCREASE BY THE COMMON BUILDING HEIGHT OF THE STRUCTURE, WHEN ABUTTING A RESIDENTIAL USE
*6 - BUILDINGS UP TO 60 FEET IN HEIGHT MAY BE PERMITTED BY A SPECIAL PERMIT FROM THE PLANNING BOARD.

LOT COVERAGE CALCULATION AREA BASED ON UPLAND AREA

A PORTION OF THE PROPERTY IS LOCATED WITHIN A FRANKLIN WATER RESOURCE DISTRICT. THE SITE AREA PROPOSED FOR DEVELOPMENT IS LOCATED IN A ZONE X BASED ON FEMA FIRM MAP 25021C0308E DATED JULY 17, 2012.

AREA WITHIN THE WATER RESOURCE DISTRICT - 94,477± SQ. FT.
UPLAND AREA WITHIN THE WATER RESOURCE DISTRICT - 72,907± SQ. FT.
IMPERVIOUS AREA WITHIN THE WATER RESOURCE DISTRICT - 21,764± SQ. FT.
COVERAGE WITHIN THE WATER RESOURCE DISTRICT - 21,764 / 72,907 = 29.9%

162 GROVE STREET:
EXISTING BUILDING USE TRUCK TERMINAL.
PROPOSED BUILDING USE MEDICAL AND NON MEDICAL MARIJUANA DISPENSARY.

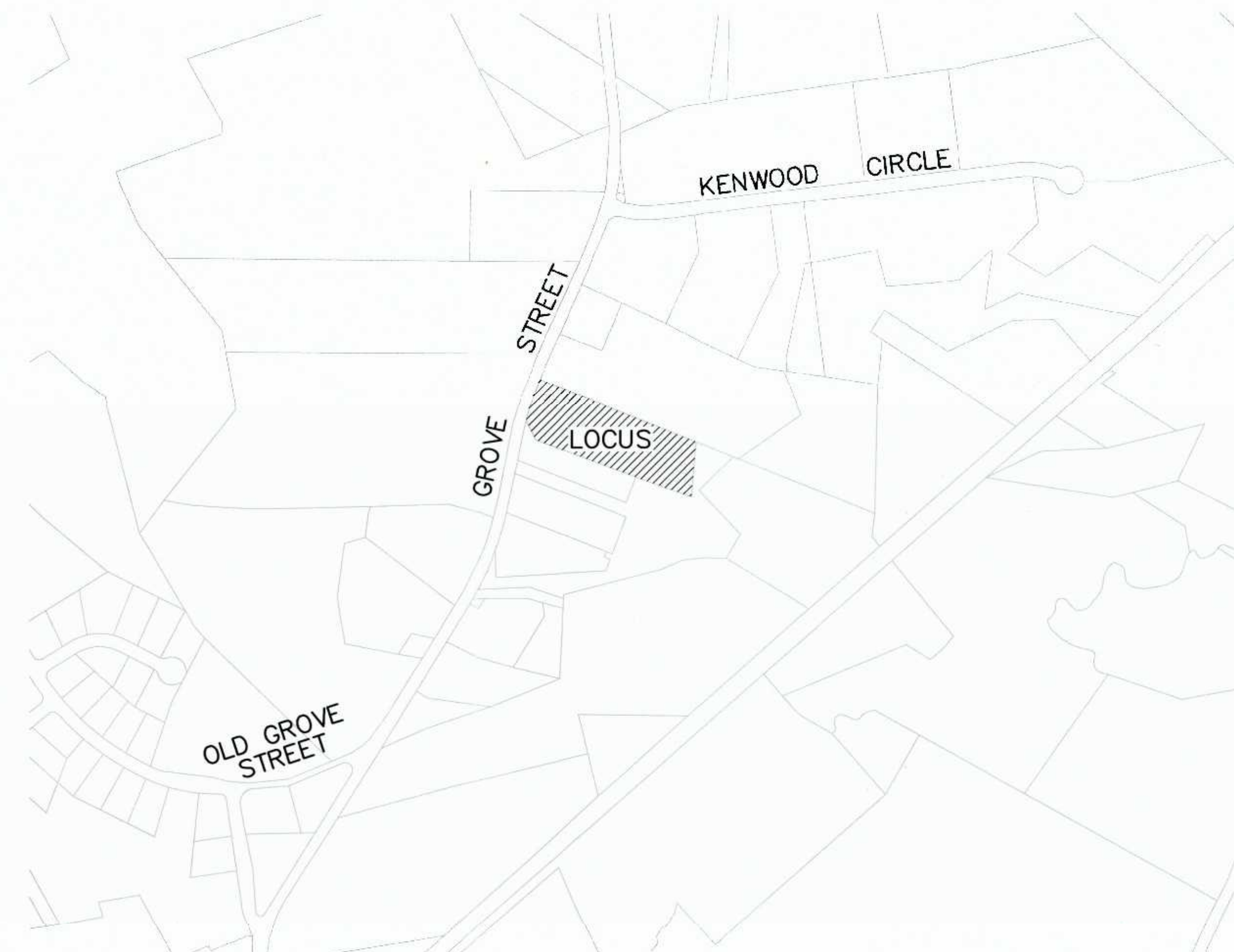
DRAWING INDEX:

1. COVER SHEET
2. EXISTING CONDITIONS PLAN
3. SITE LAYOUT PLAN
4. SITE GRADING AND UTILITY PLAN
5. SITE PLANTING PLAN
6. EROSION CONTROL PLAN
7. CONSTRUCTION DETAILS - 1
8. CONSTRUCTION DETAILS - 2
9. CONSTRUCTION DETAILS - 3
- SITE LIGHTING-LIGHTING PLAN, PHOTOMETRICS AND SCHEDULES BY SK & ASSOCIATES



Carlos A. Quintal
CARLOS A. QUINTAL P.E. #30812

REFERENCES:
ASSESSORS MAP 306 PARCEL 3
DEED BOOK 35681 PAGE 179
PLAN 348 OF 1987
PLAN 1364 OF 1987
PLAN 516 OF 1996
PLANS 620 - 622 OF 1940
SITE PLAN MODIFICATION AND CHANGE OF USE SITE PLAN BY GUERRIERE AND HALNOR, INC LAST REVISED OCTOBER 18, 2018



WAIVER REQUESTS:
1. TO ALLOW LESS THAN 42" OF COVER OVER THE RCP DRAIN PIPE. PROPOSED CLASS V RCP.
2. TO ALLOW THE USE OF HDPE PIPE FOR THE MANIFOLDS AND POND 10 AND POND 11. EXISTING ROOF PIPING IS 8" PVC.
3. TO ALLOW MINIMAL LIGHT SPILLAGE ONTO THE ABUTTING PROPERTIES.

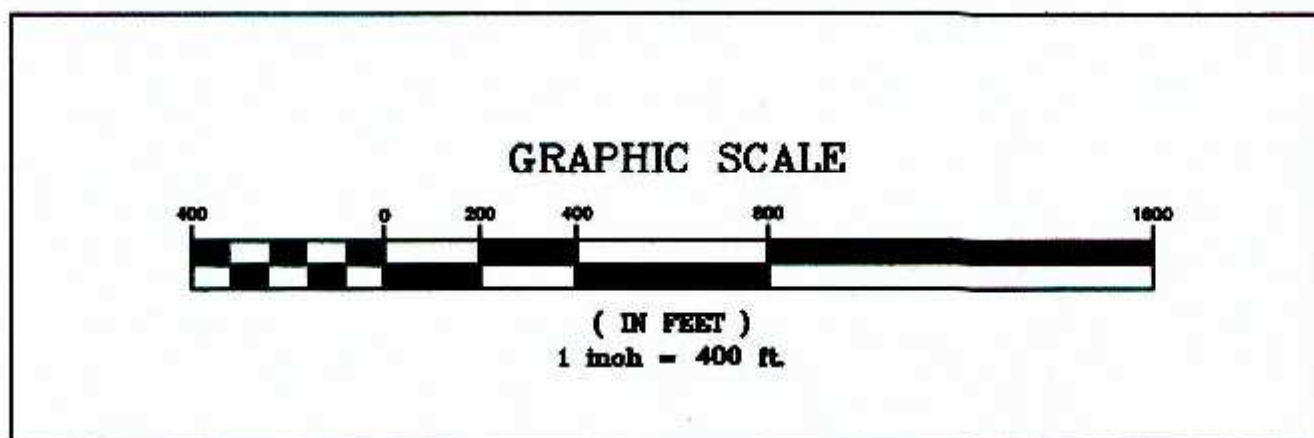
LOCUS MAP
SCALE: 1" = 400'
- ALL EROSION CONTROL MITIGATION MEASURES SHALL BE IN PLACE PRIOR TO MAJOR CONSTRUCTION OR SOIL DISTURBANCE COMMENCING ON THE SITE.

VICINITY MAP
SCALE: 1" = 100'

**SITE PLAN
COVER SHEET**
162 GROVE STREET
FRANKLIN, MASSACHUSETTS
PREPARED FOR
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MASSACHUSETTS
MAY 21, 2020
SCALE: 1" = 400'

**SITE PLAN APPROVAL
REQUIRED
FRANKLIN PLANNING BOARD**

DATE _____



NO.	DATE	DESCRIPTION	BY
1	7/8/20	REVIEW COMMENTS	RRG

DATE	FIELD BY:	INT.
4/20	FIELD BOOK	BL
5/20	CALCS BY:	RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

U
CONSULTANTS
INC.

850 FRANKLIN STREET SUITE 11D
WRENTHAM, MASSACHUSETTS 02093
508-384-8560 FAX 508-384-8568

DATE	MAY 21, 2020
SCALE	1" = 400'
PROJECT	UC1435
SHEET	1 of 9

NOTES:
 1. ELEVATIONS DATUM NAVD 1988.
 2. EXISTING CONDITIONS SURVEY WAS COMPLETED BETWEEN APRIL 6, 2020 AND APRIL 16, 2020.
 3. SOIL TYPES TAKEN FROM SOILS MAP OF NORFOLK COUNTY.

EXISTING DRAINAGE STRUCTURE SCHEDULE

XCB-1 RIM=265.1 INV=262.4	XDMH-1 RIM = 264.3 INV IN = 261.3 INV OUT = 260.9
XCB-2 RIM=265.1 INV=263.0	XDMH-2 RIM = 261.4 INV IN = 256.4 INV OUT = 255.9
XCB-3 RIM=261.7 INV=257.3	XDMH-3 RIM = 264.1 INV IN = 259.5 CB INV IN = 259.3 8" PVC INV OUT = 259.0
XCB-4 RIM=263.4 INV=259.9	XDMH-4 RIM = 259.8 INV IN = 253.8 INV OUT = 253.55
XCB-5 RIM=259.9 INV=254.2	

MAP 306 PARCEL 2
 160 GROVE STREET
 N/F HENNEP PROPERTIES, LLC
 BOOK 37525 PAGE 499
 ZONE - INDUSTRIAL
 USE - WAREHOUSE

REFERENCES:
 ASSESSORS MAP 306 PARCEL 3
 DEED BOOK 35681 PAGE 179
 PLAN 348 OF 1987
 PLAN 1364 OF 1987
 PLAN 516 OF 1996
 PLANS 620 - 622 OF 1940
 SITE PLAN MODIFICATION AND CHANGE OF USE SITE PLAN
 BY GUERRIERE AND HALNON, INC LAST REVISED OCTOBER 18, 2018



ANDREW C. MURPHY, P.L.S. #35042

LEGEND:

- DHSB DRILL HOLE STONE BOUND
- 300 --- EXISTING COUNTOUR
- 297 --- PROPOSED COUNTOUR
- x274.3 SPOT GRADE - PROPOSED
- x274.3EX. SPOT GRADE - EXISTING
- ⊙ 48M EXIST. TREE - DIAMETER - SPECIES
- ⊙ WB PROPOSED. TREE - SPECIES
- ⊙ UP4-1 UTILITY POLE
- OHV OVERHEAD WIRES
- ⊕ GAS GATE
- ⊕ WATER CURB STOP
- ⊕ WATER GATE
- ⊕ FIRE HYDRANT
- ⊕ DRAIN MANHOLE
- ⊕ CATCH BASIN
- ⊕ SEWER MANHOLE
- D DUMPSTER
- VCC VERTICAL CONCRETE CURBING
- QCB CAPE COD BERM
- HANDICAP PARKING SPACE
- BUILDING MOUNTED LIGHT
- POLE MOUNTED LIGHT
- ★ EXISTING POST LIGHT
- ★ EXISTING BUILDING MOUNTED LIGHT
- B BOLLARD
- CO CLEANOUT
- DS DOWNSPOUT
- PD PERSON DOOR
- OHD OVERHEAD DOOR

OWNER:
 CHARLEY2017, LCC
 7 MYRTLE STREET
 NORFOLK, MASSACHUSETTS

APPLICANT:
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS

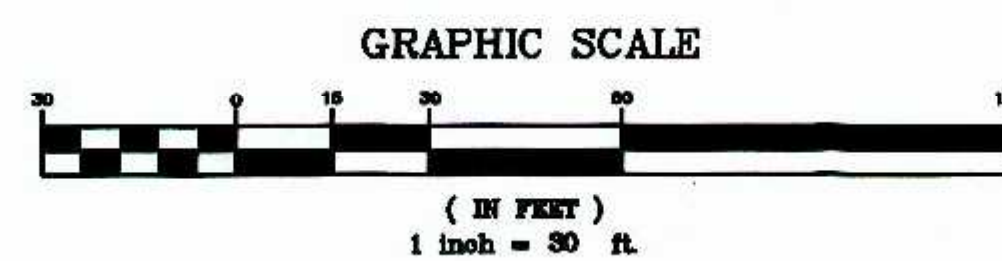
SITE PLAN
 EXISTING CONDITIONS PLAN
 162 GROVE STREET
 FRANKLIN, MASSACHUSETTS
 PREPARED FOR
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS
 MAY 21, 2020
 SCALE: 1" = 30'

PARCEL A
 174,351± SQ. FT.
 UPLAND AREA = 152,781± SQ. FT.

MAP 306 PARCEL 5
 166 GROVE STREET
 N/F CORE REAL ESTATE HOLDINGS, LLC
 BOOK 22762 PAGE 365
 ZONE - INDUSTRIAL
 USE - HEALTH CLUB

SITE PLAN APPROVAL REQUIRED
FRANKLIN PLANNING BOARD

DATE _____

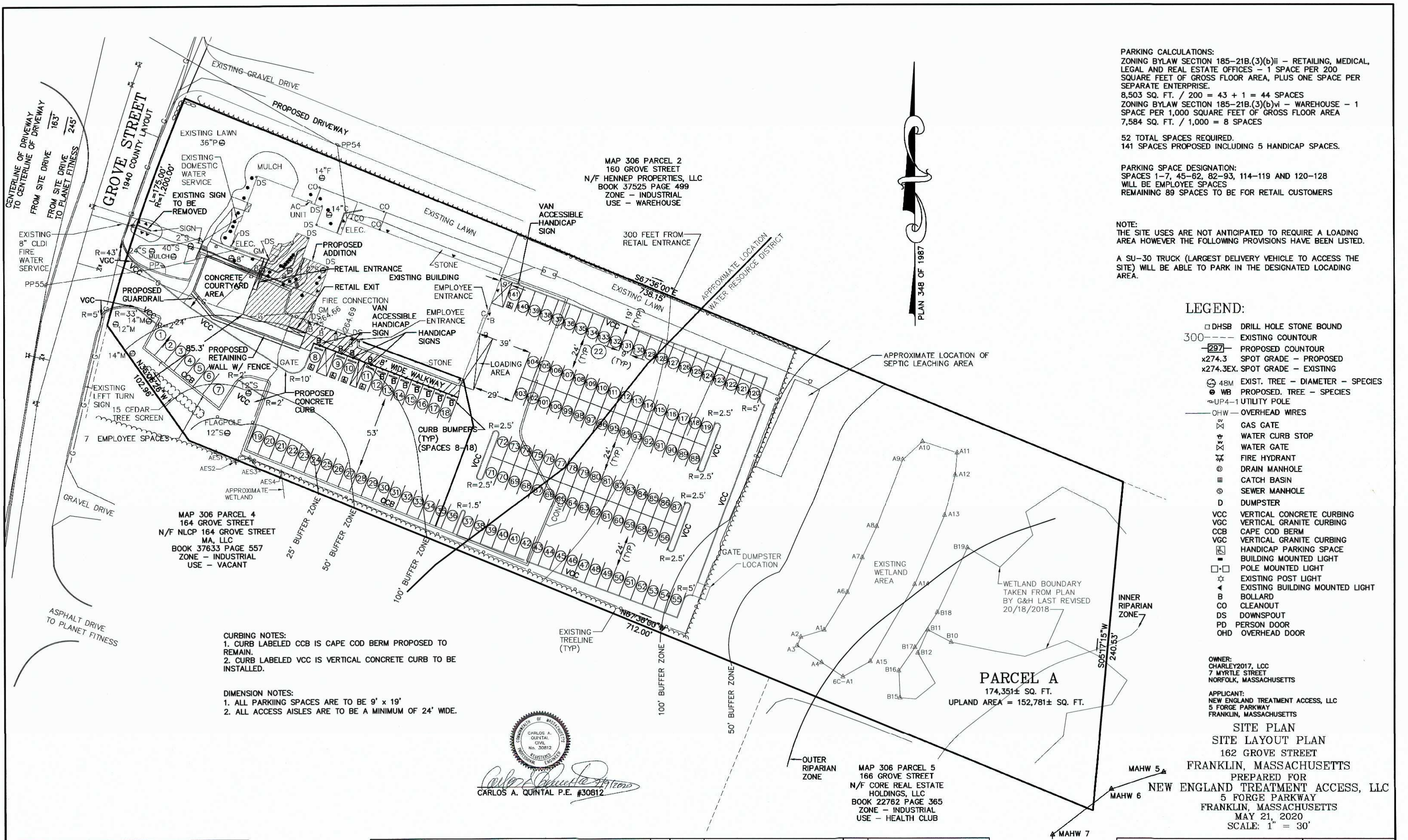


NO.	DATE	DESCRIPTION	BY

DATE	FIELD BY:	INT.
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5/20	CHECKED BY:	CAQ

UNITED CONSULTANTS INC.
 850 FRANKLIN STREET SUITE 11D
 WRENTHAM, MASSACHUSETTS 02093
 508-384-6560 FAX 508-384-6566

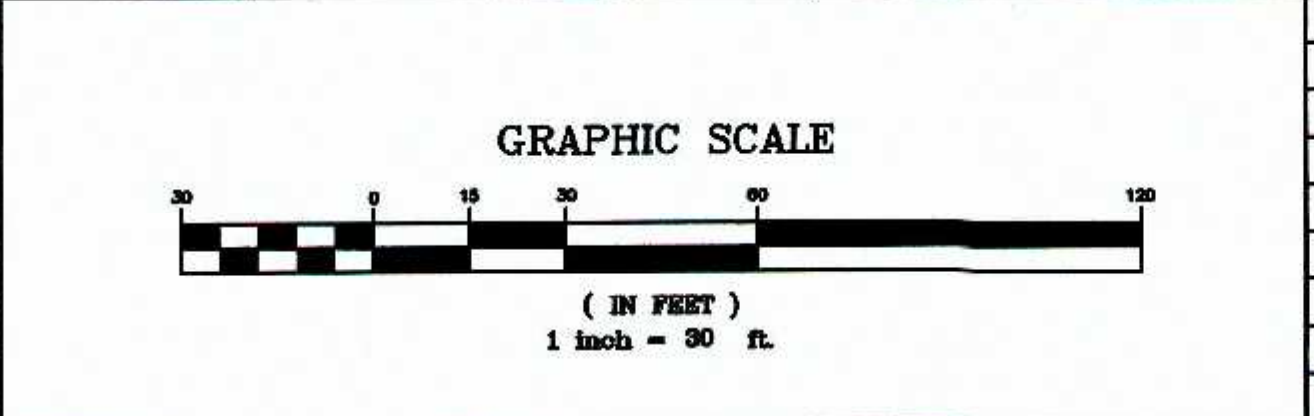
DATE	SCALE	PROJECT	SHEET
MAY 21, 2020	1" = 30'	UC1435	2 of 9



CARLOS A. QUINTAL
REGISTERED PROFESSIONAL ENGINEER
#30812

SITE PLAN APPROVAL
REQUIRED
FRANKLIN PLANNING BOARD

DATE _____



NO.	DATE	DESCRIPTION	BY
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508-384-8560 FAX 508-384-8566

DATE
MAY 21, 2020

SCALE
1" = 30'

PROJECT
UC1435

SHEET
3 of 9



MAP 306 PARCEL 2
160 GROVE STREET
N/F HENNEP PROPERTIES, LLC
BOOK 37525 PAGE 499
ZONE - INDUSTRIAL
USE - WAREHOUSE

MAP 306 PARCEL 4
164 GROVE STREET
N/F NLCP 164 GROVE STREET
MA, LLC
BOOK 37633 PAGE 557
ZONE - INDUSTRIAL
USE - VACANT

EXISTING DRAINAGE STRUCTURE SCHEDULE

XCB-1	XDMH-1
RIM=265.1	RIM = 264.3
INV=262.4	INV IN = 261.3
XCB-2	INV OUT = 260.9
RIM=265.1	XDMH-2
INV=263.0	RIM = 261.4
XCB-3	INV IN = 256.4
RIM=261.7	INV OUT = 255.9
INV=257.3	XDMH-3
XCB-4	RIM = 264.1
RIM=263.4	INV IN = 259.5 CB
INV=259.9	INV IN = 259.3 8" PVC
XCB-5	INV OUT = 259.0
RIM=259.9	XDMH-4
INV=254.2	RIM = 259.8
	INV IN = 253.8
	INV OUT = 253.55

FILL NOTE:
FILL PLACED IN QUANTITY GREATER THAN 15 CUBIC YARDS MUST BE CERTIFIED IN ACCORDANCE WITH BYLAW SECTION 185-40.E.(5)

PROPOSED DRAINAGE STRUCTURE SCHEDULE

CB-10	XDMH-1
RIM=264.0	RIM = 264.3
INV=261.24	INV IN = 261.3
CB-11	INV IN = 261.0 CB 10
STORMCEPTOR 450I	INV OUT = 260.9
RIM=259.3	XDMH-3
INV=256.3	RIM = 264.1
CB-12	INV IN = 259.5 CB
DOUBLE GRATE	INV OUT = 259.2 12" RCP
RIM=258.0	AT LOCATION OF EXISTING
INV=253.9	12" RCP IN FROM XCB-4
	DMH 10
	CONTECH
	CASCADE SEPARATOR CS-6
	RIM = 258.3
	12" IN = 252.68 PROP.
	12" IN = 251.68 EXIST.
	24" OUT = 251.58 EXIST.
	DMH 11
	RIM = 260.4
	12" IN = 255.44
	12" OUT = 255.34

- NOTES:**
- CONTRACTOR TO CONTACT DIGSAFE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 - CONTRACTOR TO VERIFY LOCATIONS OF EXISTING UTILITIES ANY REPORT ANY DISCREPANCIES TO UNITED CONSULTANTS, INC.
 - ALL WORK SHALL CONFORM TO THE TOWN OF FRANKLIN DPW STANDARDS.
 - MAINTAIN A MINIMUM OF 10' SEPARATION FROM THE WATER SERVICE TO THE SEWER SERVICE.

- UTILITY NOTES:**
- DOMESTIC WATER SUPPLY SHALL BE BASED ON PLUMBING ENGINEERS CALCULATIONS. USE EXISTING WATER SERVICE OR REPLACE AS MAY BE NECESSARY IN SAME LOCATION.
 - FIRE CONNECTION TO BE RELOCATED AS SHOWN. FINAL LOCATIONS TO BE DESIGNED BY PLUMBING ENGINEER AND APPROVED BY FIRE DEPARTMENT.
 - ELECTRIC, TELEPHONE AND CABLE TV LOCATIONS TO BE DETERMINED BY THE APPROPRIATE UTILITY COMPANIES.
 - GAS SERVICE TO BE RELOCATED AS SHOWN. FINAL LOCATION TO BE APPROVED BY THE GAS COMPANY.
 - THE DESIGN ENGINEER SHALL INSPECT THE EXCAVATION OF THE STORMWATER INFILTRATOR POND PRIOR TO ANY FILL OR STONE BEING PLACED.

SEPTIC SYSTEM NOTES:
REFERENCE A PLAN ENTITLED "DOERING EQUIPMENT COMPANY SEWERAGE DISPOSAL SYSTEM" DATED MAY 20, 1987.
PLAN INDICATES A DESIGN FLOW OF 750 GALLONS PER DAY.

PROPOSED USE OF 162 GROVE STREET BUILDING INCLUDING ADDITION
RETAIL - 3,856 SQ. FT. @ 50 GALLONS PER DAY (GPD) PER 1,000 SQ. FT.
OFFICE - 4,647 SQ. FT. @ 75 GALLONS PER DAY PER 1,000 SQ. FT.
WAREHOUSE - 7,584 SQ. FT. @ 15 GALLONS PER DAY PER EMPLOYEE

3,856 / 1,000 x 50 = 192.8 GPD
4,647 / 1,000 x 75 = 348.5 GPD
10 WAREHOUSE EMPLOYEES x 15 = 150 GPD

TOTAL PROPOSED FLOW IS 691.4 GPD
WATER RESOURCE DISTRICT: 185-40.D(1)(f) PROHIBITS FLOW FROM EXCEEDING 110 GALLONS PER 10,000 SQ. FT.
EXISTING DESIGN FLOW = 750 GALLONS
LAND AREA = 174,351 SQ. FT
750 / 110 = 6.818 x 10,000 = 68,181 SQ. FT OF LAND AREA REQUIRED

NOTE: RETAIL AREA INCLUDES ROOM 101 - 109 AND 115-116.

- STORMWATER SYSTEM CONSTRUCTION NOTES:**
- EXISTING CATCH BASIN 2 TO BE REMOVED AND THE 12" INLET OPENING INTO EXISTING DRAIN MANHOLE 1 SHALL BE BRICKED AND MORTARED.
 - EXISTING CATCH BASIN 4 TO BE REMOVED.
 - THE 15" DRAIN PIPE FROM X-DMH 3 TO X-DMH 2 SHALL BE ABANDONED AND BRICK AND MORTARED AT EACH END WITHIN THE DRAIN MANHOLES.
 - FOR CONNECTIONS OF 12" RCP PIPE TO 12" HDPE PIPE USE A MARMAC COUPLER.
 - ALL EXISTING CATCH BASINS TO BE CLEANED AND THE OIL SEPARATOR HOODS SHALL BE INSPECTED AND REPAIRED OR REPLACED AS NECESSARY.
 - ALL PROPOSED 12" RCP PIPE TO BE CLASS V.
 - INSTALL TWO ROOF LEADERS (SOUTH SIDE OF BUILDING) AND CONNECT TO THE EXISTING 8" PVC DRAIN PIPE.
 - CONTRACTOR TO EXCAVATE 3 TEST PITS IN THE EXISTING STONE TRENCH TO A DEPTH OF THE EXISTING PIPE AT LOCATIONS TO BE DETERMINED AND IN THE PRESENCE OF THE DESIGN ENGINEER. IF THE STONE IS DEEMED UNSUITABLE CONTRACTOR TO EXCAVATE A 3" WIDE TRENCH TO THE BOTTOM OF THE EXISTING PIPE FOR THE ENTIRE LENGTH OF THE NORTH SIDE OF THE BUILDING (120± FEET) AND INSTALL FILTER FABRIC AND DOUBLE WASHED STONE.

WETLAND BUFFER ZONE DISTURBANCES:
0 - 25' BUFFER ZONE = 0 SQ. FT.
25' - 50' BUFFER ZONE = 32 SQ. FT.
50' - 100' BUFFER ZONE = 6,662 SQ. FT.

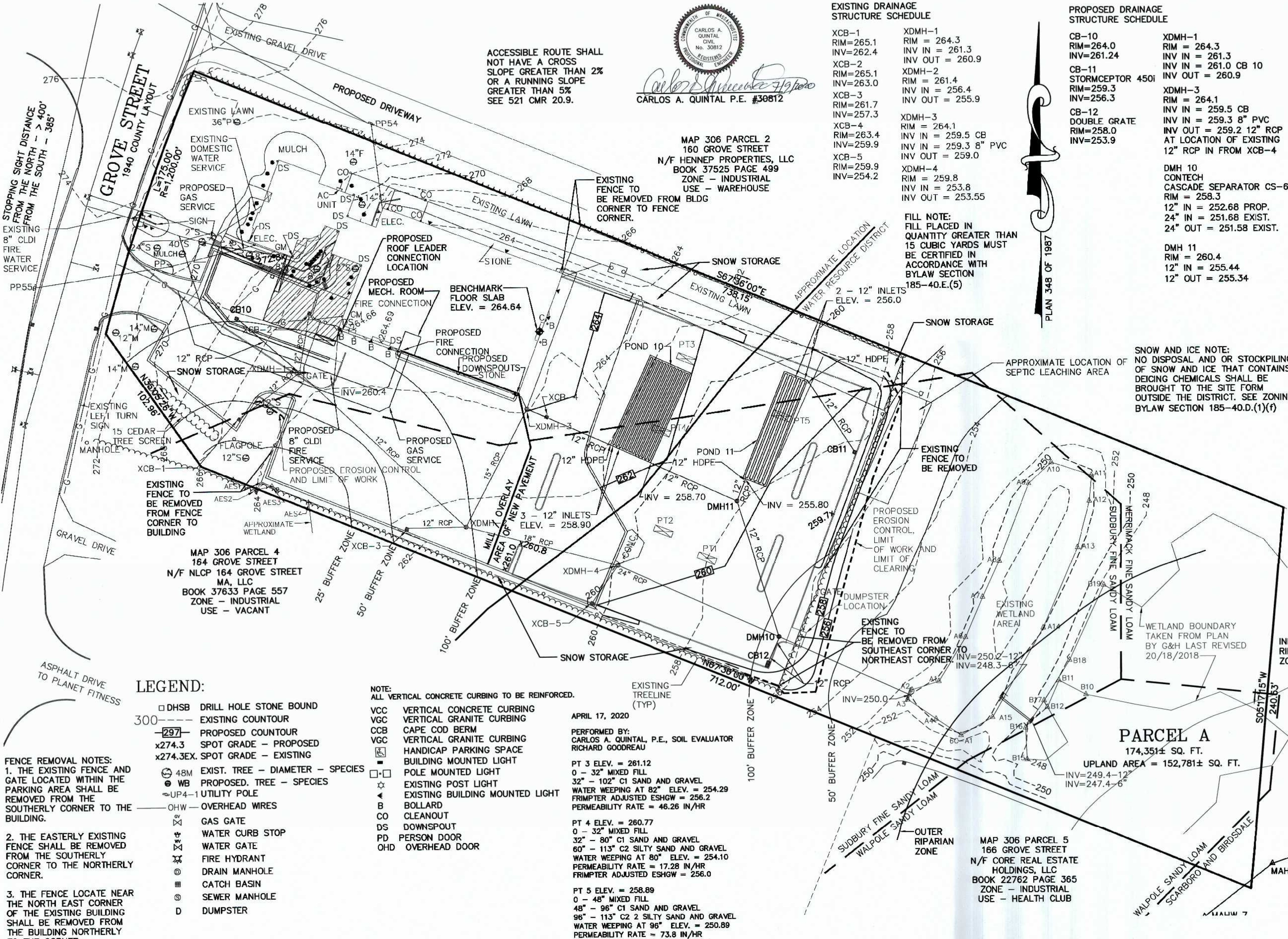
THERE ARE NOT ANY VERNAL POOLS WITHIN 100 FEET OF ANY PROPOSED WORK.

OWNER:
CHARLEY2017, LLC
7 MYRTLE STREET
NORFOLK, MASSACHUSETTS

APPLICANT:
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MASSACHUSETTS

SITE PLAN GRADING & UTILITY PLAN
162 GROVE STREET
FRANKLIN, MASSACHUSETTS
PREPARED FOR
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MASSACHUSETTS
MAY 21, 2020
SCALE: 1" = 30'

ACCESSIBLE ROUTE SHALL NOT HAVE A CROSS SLOPE GREATER THAN 2% OR A RUNNING SLOPE GREATER THAN 5% SEE 521 CMR 20.9.



LEGEND:

- DHSB DRILL HOLE STONE BOUND
- 300 --- EXISTING COUNTOUR
- 297- PROPOSED COUNTOUR
- x274.3 SPOT GRADE - PROPOSED
- x274.3EX SPOT GRADE - EXISTING
- 48M EXIST. TREE - DIAMETER - SPECIES
- WB PROPOSED. TREE - SPECIES
- UP4-1 UTILITY POLE
- OHW OVERHEAD WIRES
- GAS GATE
- WATER CURB STOP
- WATER GATE
- FIRE HYDRANT
- DRAIN MANHOLE
- CATCH BASIN
- SEWER MANHOLE
- D DUMPSTER

NOTE:
ALL VERTICAL CONCRETE CURBING TO BE REINFORCED.

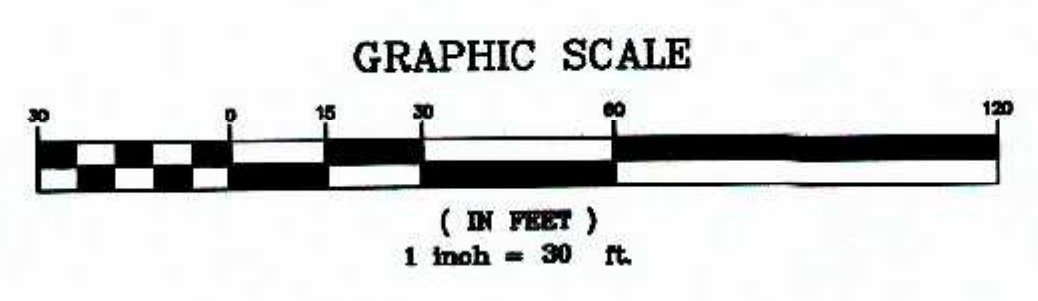
- VCC VERTICAL CONCRETE CURBING
- VGC VERTICAL GRANITE CURBING
- CCB CAPE COD BERM
- VGC VERTICAL GRANITE CURBING
- HANDICAP PARKING SPACE
- BUILDING MOUNTED LIGHT
- POLE MOUNTED LIGHT
- EXISTING POST LIGHT
- EXISTING BUILDING MOUNTED LIGHT
- B BOLLARD
- CO CLEANOUT
- DS DOWNSPOUT
- PD PERSON DOOR
- OHD OVERHEAD DOOR

APRIL 17, 2020
PERFORMED BY:
CARLOS A. QUINTAL, P.E., SOIL EVALUATOR
RICHARD GOODREAU

PT 3 ELEV. = 261.12
0 - 32" MIXED FILL
32" - 102" C1 SAND AND GRAVEL
WATER WEEPING AT 82" ELEV. = 254.29
FRIMPTER ADJUSTED ESHGW = 256.2
PERMEABILITY RATE = 46.26 IN/HR

PT 4 ELEV. = 260.77
0 - 32" MIXED FILL
32" - 80" C1 SAND AND GRAVEL
60" - 113" C2 SILTY SAND AND GRAVEL
WATER WEEPING AT 80" ELEV. = 254.10
PERMEABILITY RATE = 17.28 IN/HR
FRIMPTER ADJUSTED ESHGW = 256.0

PT 5 ELEV. = 258.89
0 - 48" MIXED FILL
48" - 96" C1 SAND AND GRAVEL
96" - 113" C2 2 SILTY SAND AND GRAVEL
WATER WEEPING AT 96" ELEV. = 250.89
PERMEABILITY RATE = 73.8 IN/HR
FRIMPTER ADJUSTED ESHGW = 252.8



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UNITED CONSULTANTS INC.
850 FRANKLIN STREET SUITE 11D
WRENTHAM, MASSACHUSETTS 02093
508-384-8580 FAX 508-384-8588

DATE: MAY 21, 2020
SCALE: 1" = 30'
PROJECT: UC1435
SHEET: 4 of 9

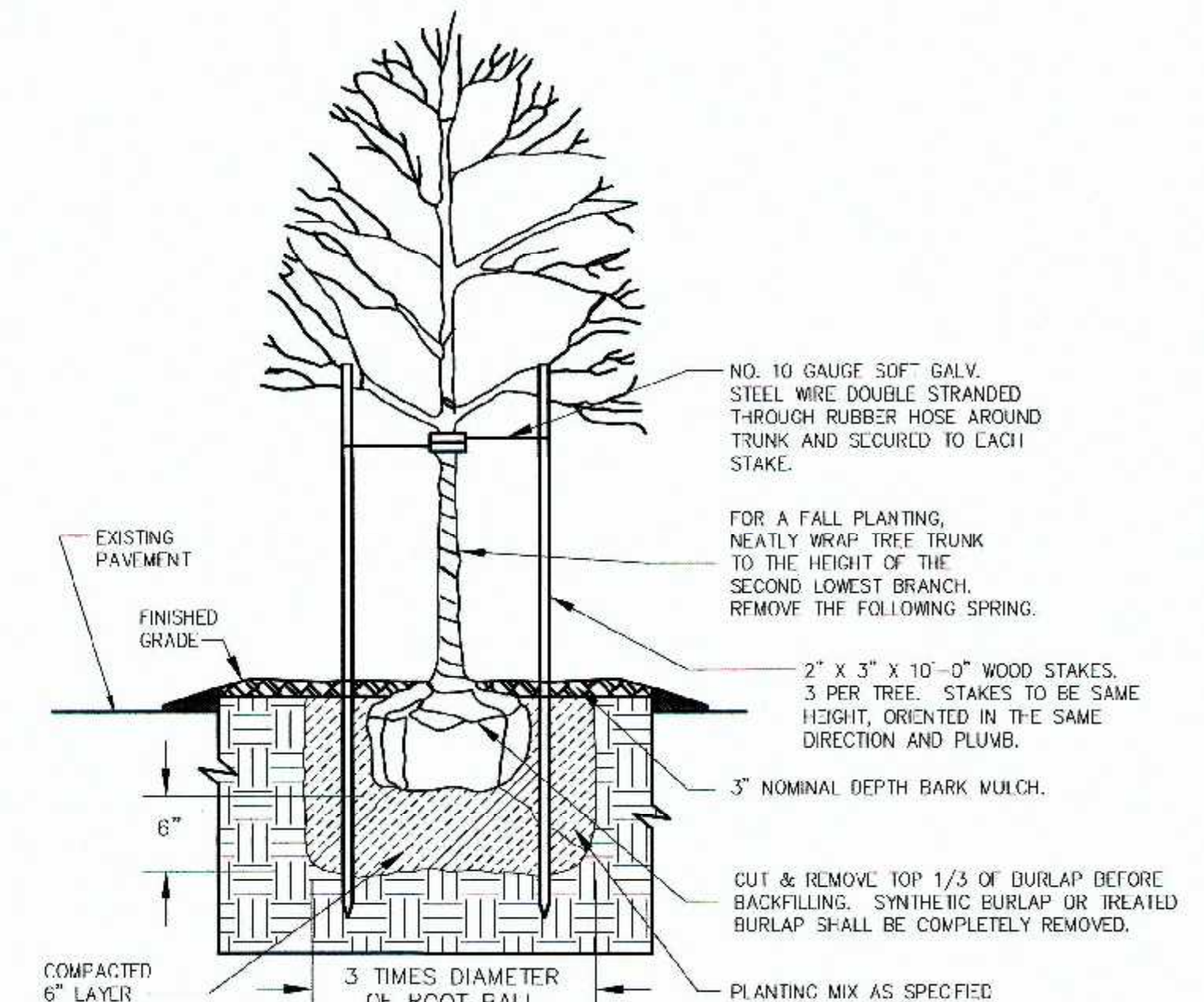
SITE PLAN APPROVAL REQUIRED
FRANKLIN PLANNING BOARD

DATE: _____

PLANTING SCHEDULE

NUMBER	COMMON NAME	SCIENTIFIC NAME	SIZE	CONDITION
5	AMERICAN ELM - AE	ULMUS AMERICANA	2 - 2 1/2"	B&B
5	RED MAPLE - RM	ACER RUBRUM	2 - 2 1/2"	B&B
5	WHITE BIRCH - WB	BETULA Papyrifera	4 - 6 FEET	B&B

- PER SECTION 185-21C(5) PROVIDE 1 TREE PER 10 PARKING SPACES.
 141 TOTAL PARKING SPACES / 10 = 15 TREES
 15 TREES PROVIDED.
 - ALL PLANTINGS ARE IN ACCORDANCE WITH THE TOWN OF FRANKLIN BEST DEVELOPMENT PRACTICES GUIDEBOOK.



DECIDUOUS TREE PLANTING

GENERAL NOTES

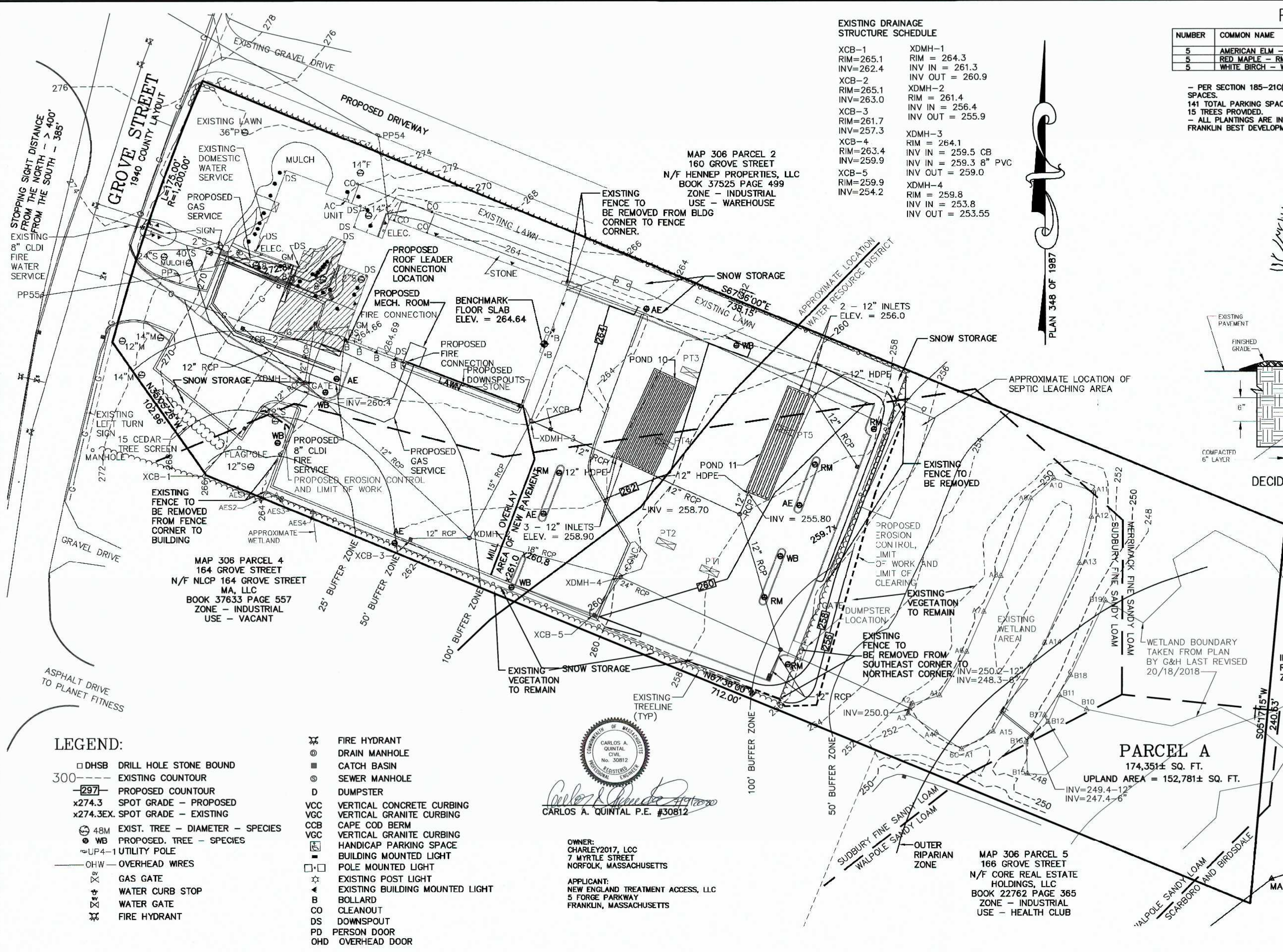
1. PLANTING HOLE SHALL BE THREE TIMES ROOT BALL DIAMETER.
2. ALL INSTALLED PLANT MATERIAL SHALL BEAR THE SAME RELATIONSHIP TO FINISH GRADE (TOP OF PLANTING SOIL MIX), AS IT BORE TO THE NURSERY OR FIELD GRADE.
3. THE PLANTING HOLE DEPTH SHALL PROVIDE FOR A SIX INCH DEPTH OF PLANTING SOIL MIX BELOW THE ANTICIPATED ROOT BALL BOTTOM.
4. NOTWITHSTANDING THE REQUIREMENTS OF NOTES 1 & 3 ABOVE, NO PLANTING HOLE FOR TREES SHALL HAVE LESS THAN ONE CUBIC YARD OF PLANTING SOIL MIX.
5. PLANTING SOIL MIX SHALL BE A LOAM OR SANDY LOAM, AS DEFINED BY THE U.S.D.A. THE FIRST (BOTTOM) SIX INCH LAYER IN THE PRE-EXCAVATED PLANTING HOLE SHALL BE FIRMLY TAMPED TO PREVENT SETTLEMENT OF THE ROOT BALL POSITIONED THEREON. SUBSEQUENT LIFTS TO FINISH GRADE SHALL BE IN SIX INCH LOOSE LIFTS, EACH SETTLED BY THOROUGH SOAKING.
6. UPON ATTAINMENT OF FINISH GRADE WITHIN EACH PLANTING BED, THE GROUND SURFACE SHALL RECEIVE AN EVEN APPLICATION OF ORGANIC NON-PHOSPHORUS FERTILIZER APPLIED PER THE MANUFACTURERS RECOMMENDATIONS.
7. COVERED WITH A THREE INCH NOMINAL DEPTH OF SHREDDED CEDAR BARK (OR APPROVED EQUIVALENT), MAINTAINING A ONE INCH MINIMUM DEPTH AT THE BERM EDGE, AND IMMEDIATELY RISING TO A THREE INCH DEPTH ACROSS THE PLANTING BED OR LANDSCAPE ISLAND. (SEE DETAIL)

SITE PLAN
 PLANTING PLAN
 162 GROVE STREET
 FRANKLIN, MASSACHUSETTS
 PREPARED FOR
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS
 MAY 21, 2020
 SCALE: 1" = 30'

EXISTING DRAINAGE STRUCTURE SCHEDULE

XCB-1	XDMH-1
RIM=265.1	RIM = 264.3
INV=262.4	INV IN = 261.3
XCB-2	INV OUT = 260.9
RIM=265.1	XDMH-2
INV=263.0	RIM = 261.4
XCB-3	INV IN = 256.4
RIM=261.7	INV OUT = 255.9
INV=257.3	XDMH-3
XCB-4	RIM = 264.1
RIM=263.4	INV IN = 259.5 CB
INV=259.9	INV IN = 259.3 8" PVC
XCB-5	INV OUT = 259.0
RIM=259.9	XDMH-4
INV=254.2	RIM = 259.8
	INV IN = 253.8
	INV OUT = 253.55

PLAN 348 OF 1987



LEGEND:

- DHSB DRILL HOLE STONE BOUND
- 300 --- EXISTING COUNTOUR
- 297- PROPOSED COUNTOUR
- x274.3 SPOT GRADE - PROPOSED
- x274.3EX SPOT GRADE - EXISTING
- 48M EXIST. TREE - DIAMETER - SPECIES
- WB PROPOSED. TREE - SPECIES
- UP4-1 UTILITY POLE
- OHW OVERHEAD WIRES
- ✕ GAS GATE
- ⊕ WATER CURB STOP
- ⊕ WATER GATE
- ✕ FIRE HYDRANT
- ⊕ FIRE HYDRANT
- ⊕ DRAIN MANHOLE
- ⊕ CATCH BASIN
- ⊕ SEWER MANHOLE
- D DUMPSTER
- VCC VERTICAL CONCRETE CURBING
- VGC VERTICAL GRANITE CURBING
- CCB CAPE COD BERM
- VGC VERTICAL GRANITE CURBING
- ⊕ HANDICAP PARKING SPACE
- ⊕ BUILDING MOUNTED LIGHT
- ⊕ POLE MOUNTED LIGHT
- ⊕ EXISTING POST LIGHT
- ⊕ EXISTING BUILDING MOUNTED LIGHT
- B BOLLARD
- CO CLEANOUT
- DS DOWNSPOUT
- PD PERSON DOOR
- OHD OVERHEAD DOOR



CARLOS A. QUINTAL P.E. #30812

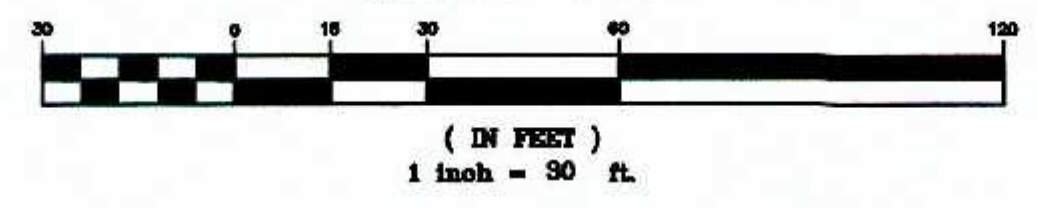
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 7 MYRTLE STREET
 NORFOLK, MASSACHUSETTS

APPLICANT:
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS

SITE PLAN APPROVAL
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 FRANKLIN PLANNING BOARD

DATE

GRAPHIC SCALE

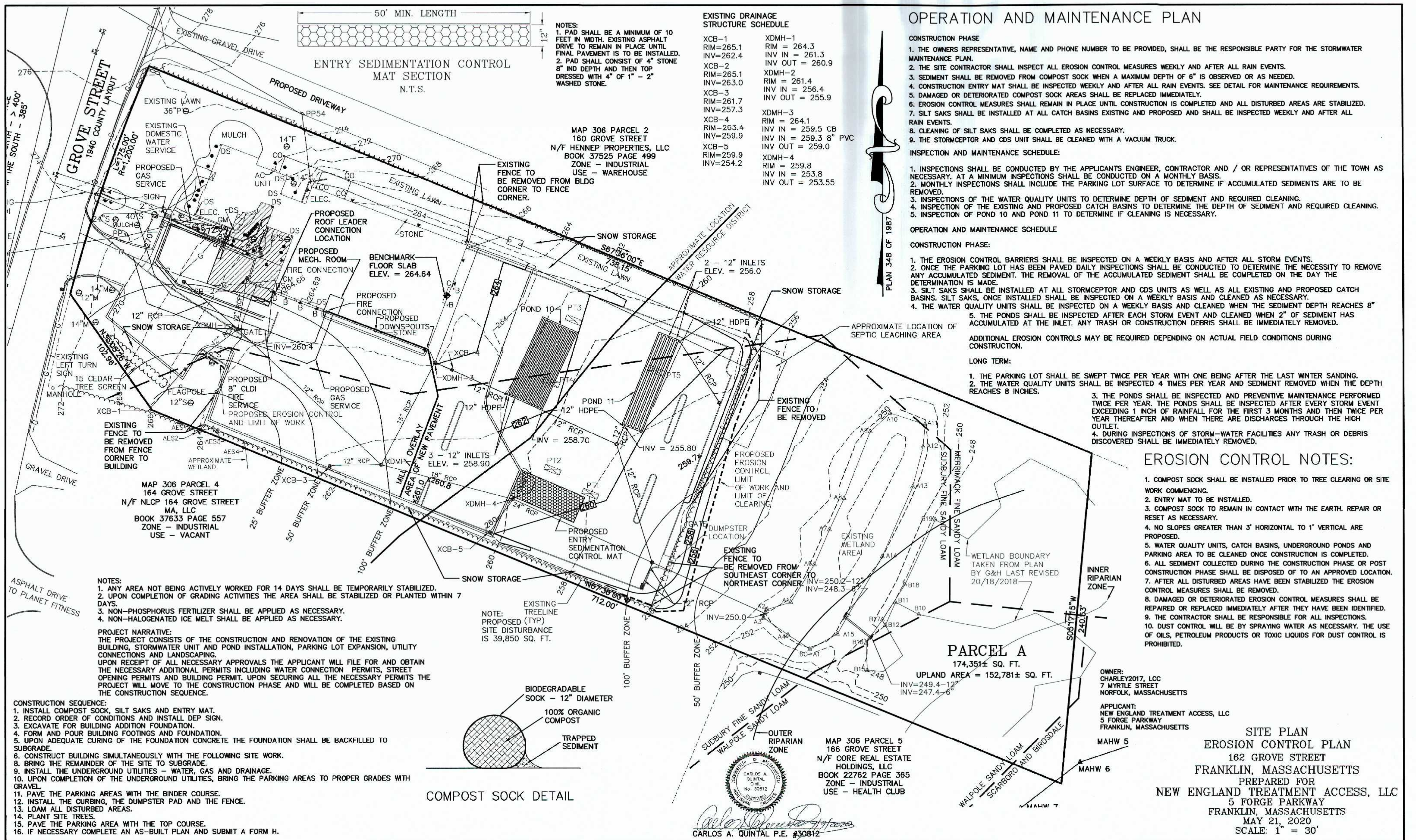


NO.	DATE	DESCRIPTION	BY
1	7/8/20	REVIEW COMMENTS	RRG

DATE	FIELD BY:	INT.
4/20		BL
5/20	CALCS BY:	RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

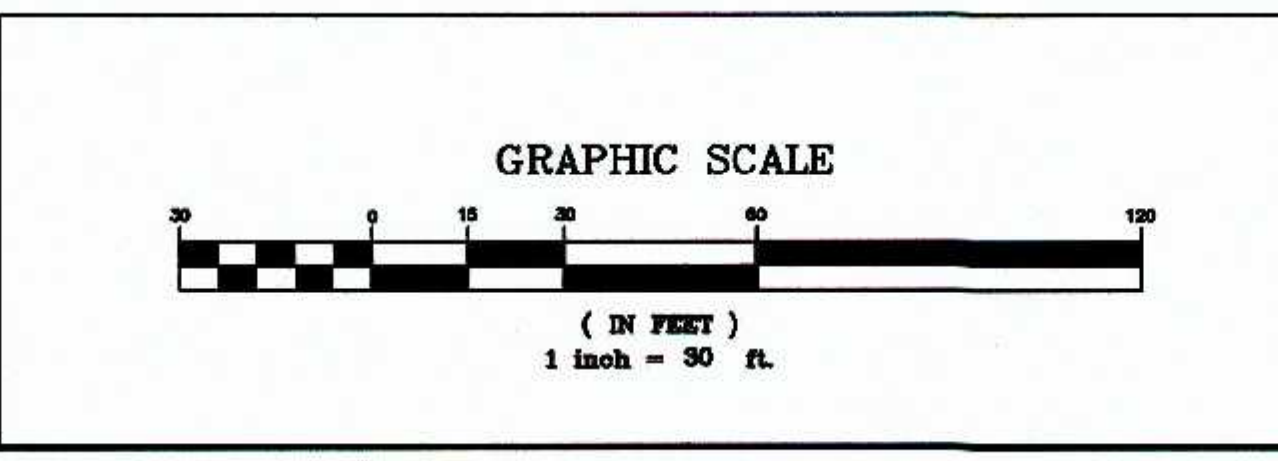
UNITED CONSULTANTS INC.
 850 FRANKLIN STREET SUITE 11D
 WRENTHAM, MASSACHUSETTS 02093
 508-384-8660 FAX 508-384-8666

DATE	SCALE	PROJECT	SHEET
MAY 21, 2020	1" = 30'	UC1435	5 of 9



SITE PLAN APPROVAL REQUIRED
FRANKLIN PLANNING BOARD

DATE	



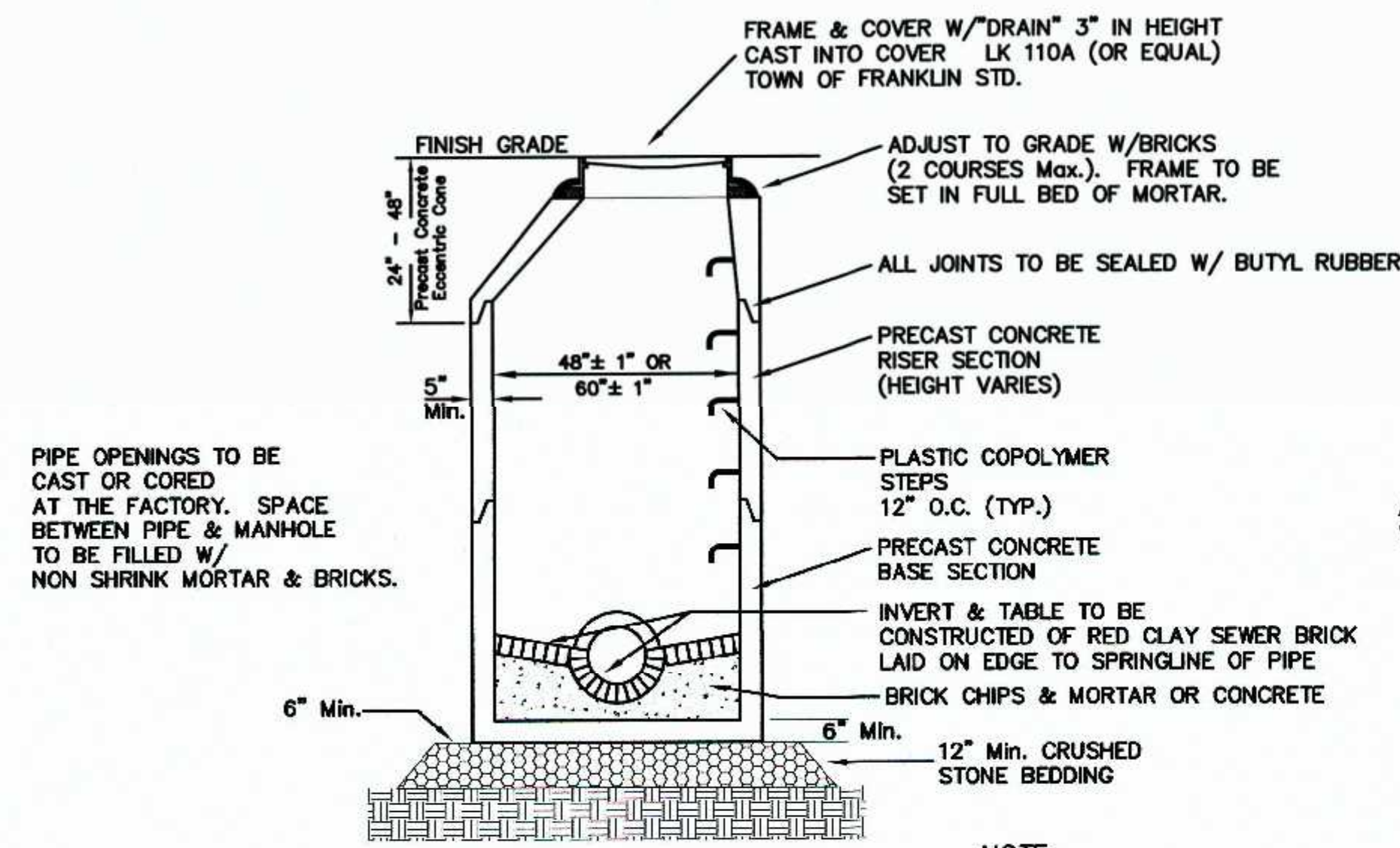
NO.	DATE	DESCRIPTION	BY
1	7/8/20	REVIEW COMMENTS	RRG

DATE	FIELD BY:	INT.
4/20	RRG	BL
BK#	FIELD BOOK	PG#
5/20	RRG	RRG
5/20	DESIGNED BY:	RRG
5/20	RRG	COMP
5/20	CHECKED BY:	CAQ
5/20	CAQ	

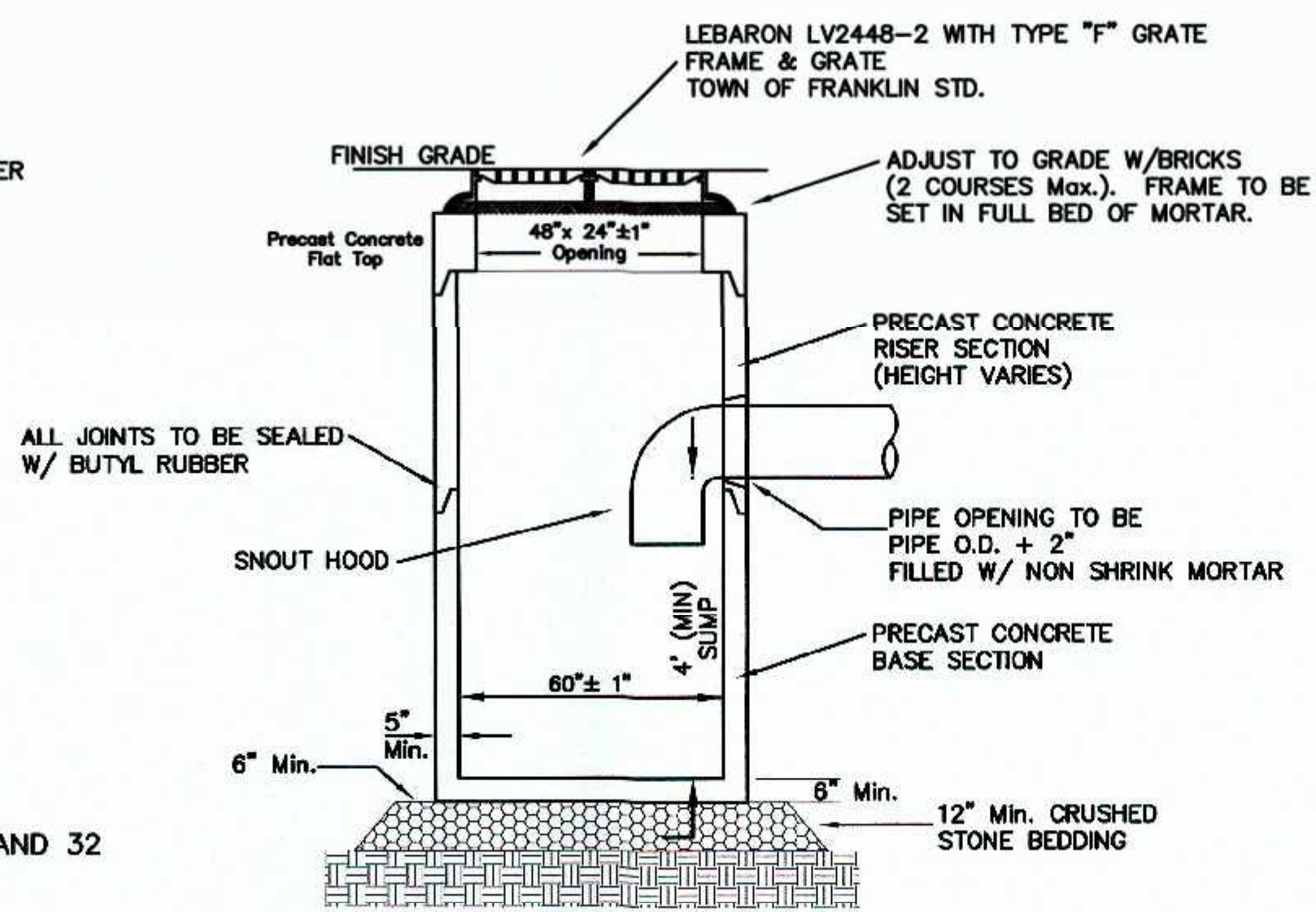
UNITED CONSULTANTS INC.

850 FRANKLIN STREET SUITE 11D
 WRENTHAM, MASSACHUSETTS 02093
 508-384-8660 FAX 508-384-8666

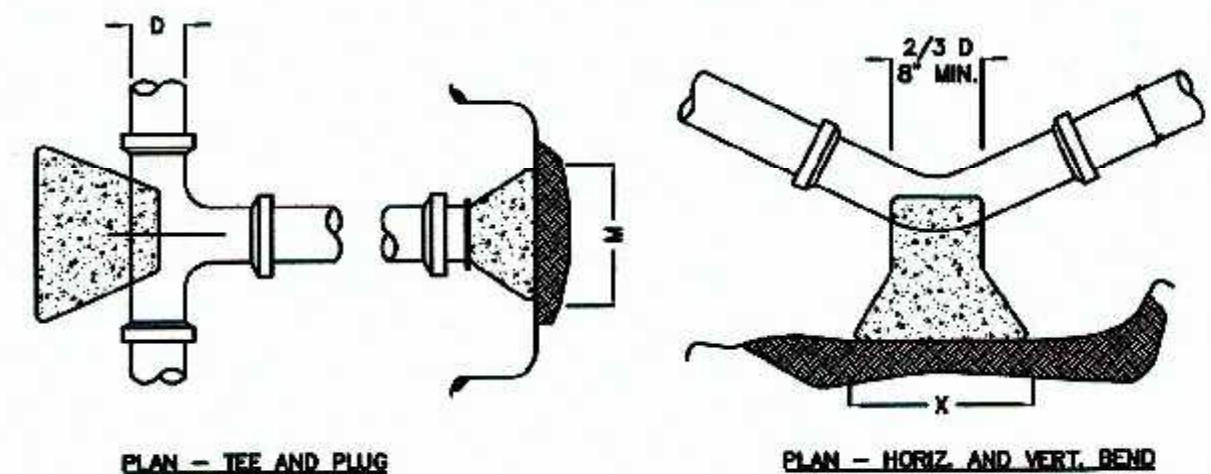
DATE	MAY 21, 2020
SCALE	1" = 30'
PROJECT	UC1435
SHEET	6 of 9



PRECAST DRAIN MANHOLE



DOUBLE GRATE PRECAST CATCH BASIN W/ DEEP SUMP

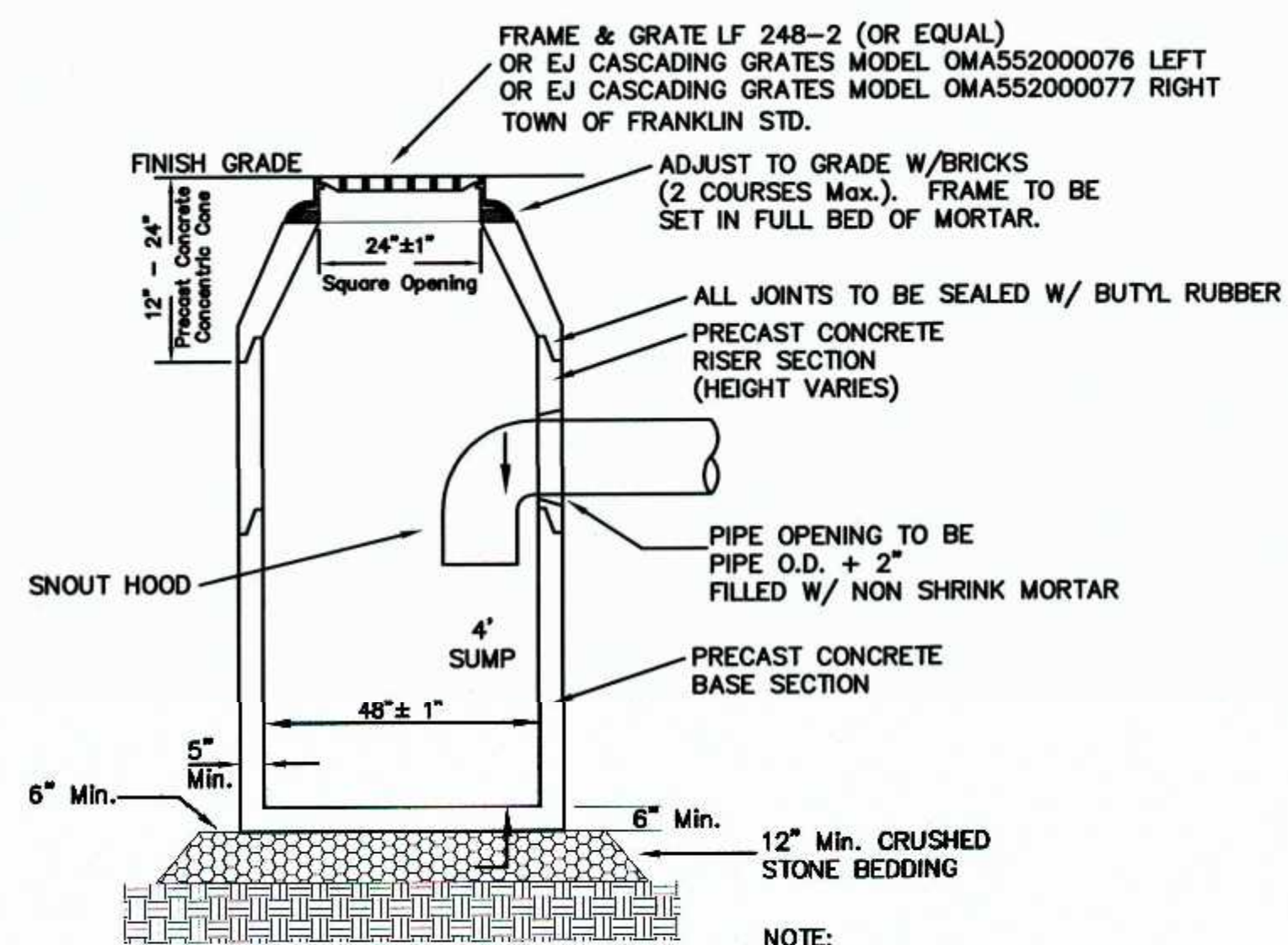


NOTES:
 1. CONTRACTOR TO CONTACT DIGSAFE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 2. CONTRACTOR TO VERIFY LOCATIONS OF EXISTING UTILITIES ANY REPORT ANY DISCREPANCIES TO UNITED CONSULTANTS, INC.
 3. ALL WORK SHALL CONFORM TO THE TOWN OF FRANKLIN DPW STANDARDS.
 4. MAINTAIN A MINIMUM OF 10' SEPARATION FROM THE WATER SERVICE TO THE SEWER SERVICE.

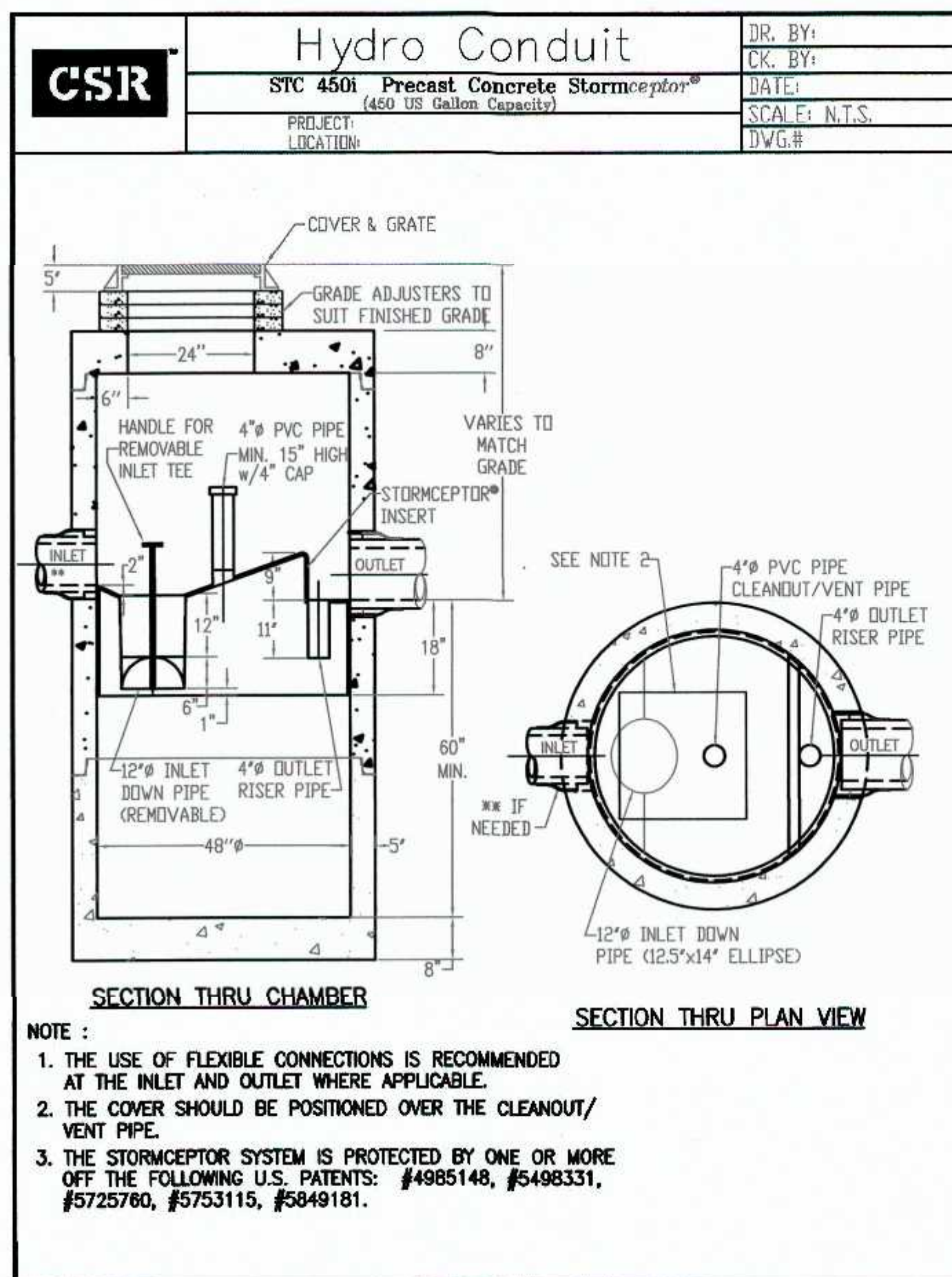
SIZE OF BRANCH	J	K	L	M	N	O
4" TO 6"	10"	10"	1'-0"	2'-0"	1'-6"	10"
10" TO 16"	1'-0"	1'-6"	1'-6"	3'-10"	2'-10"	1'-6"
24"	1'-4"	2'-0"	2'-6"	5'-0"	3'-6"	1'-8"

TEES AND PLUGS	
90 & 45 BENDS	22 1/2 & 11 1/4
D 4" TO 6"	10" TO 16"
X 1'-6"	3'-4"
Y 1'-2"	1'-8"

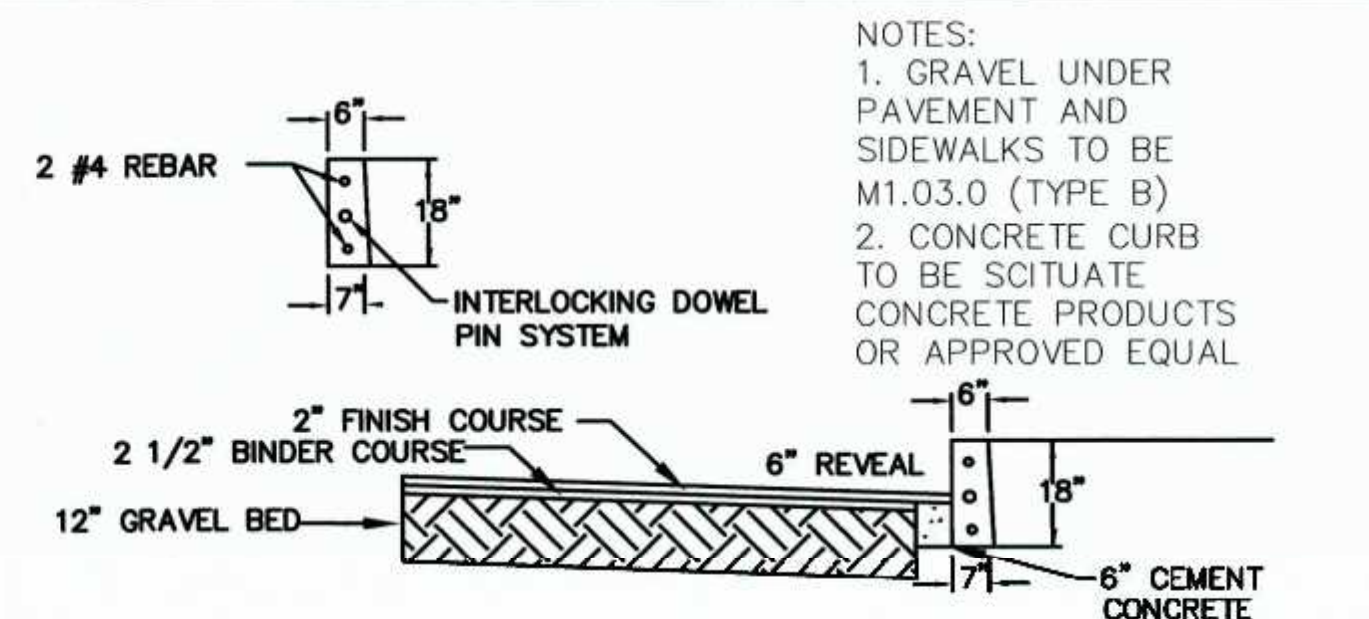
THRUST BLOCK DETAILS



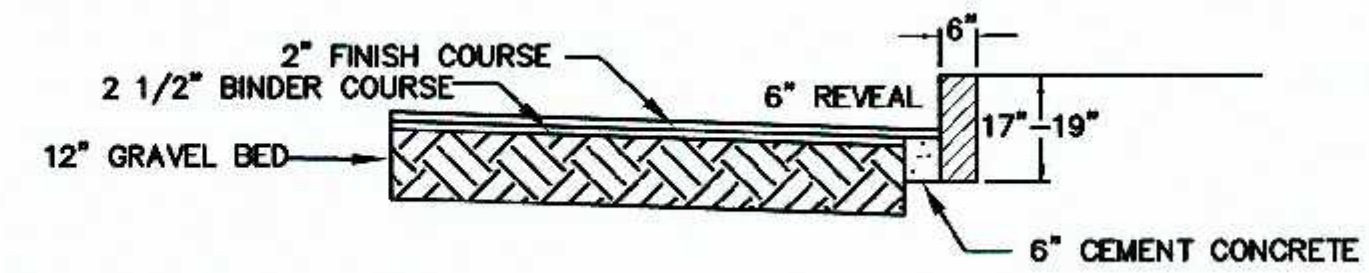
PRECAST CATCH BASIN



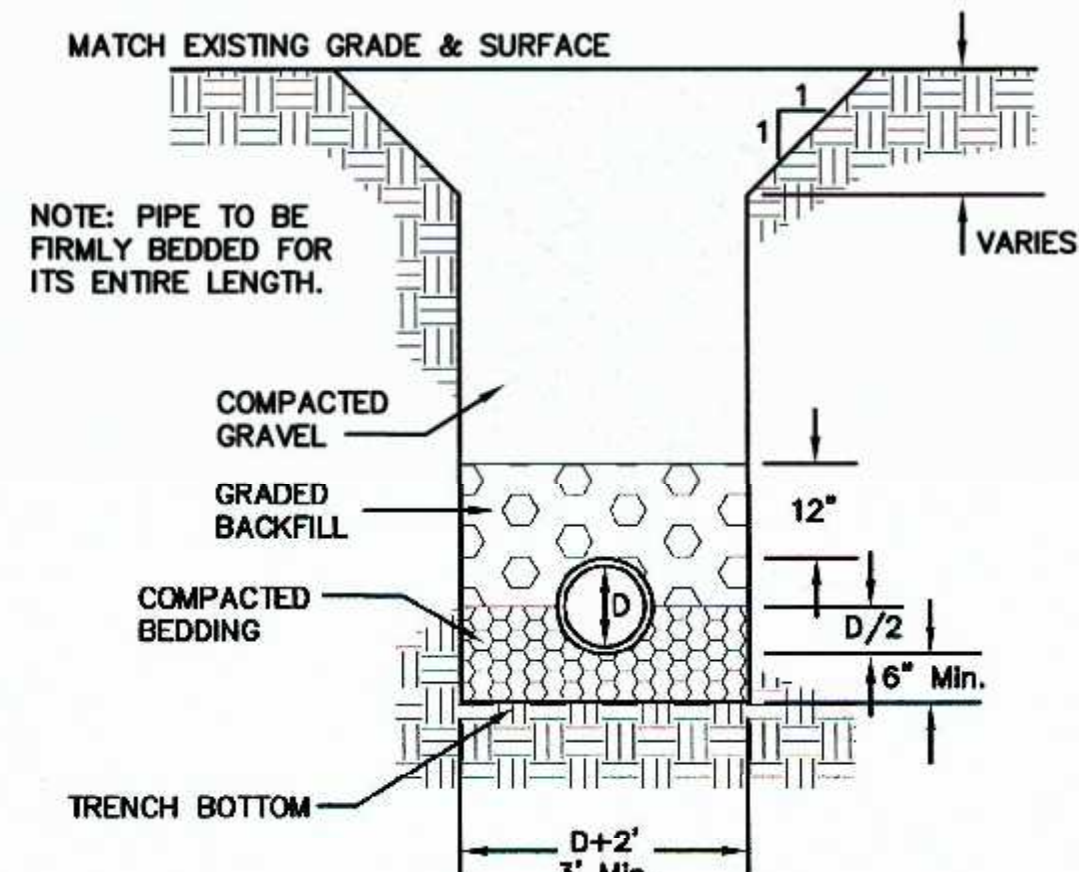
NOTE:
 1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
 2. THE COVER SHOULD BE POSITIONED OVER THE CLEANOUT/VENT PIPE.
 3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725780, #5753115, #5849181.



PAVEMENT AND VERTICAL CONCRETE CURBING

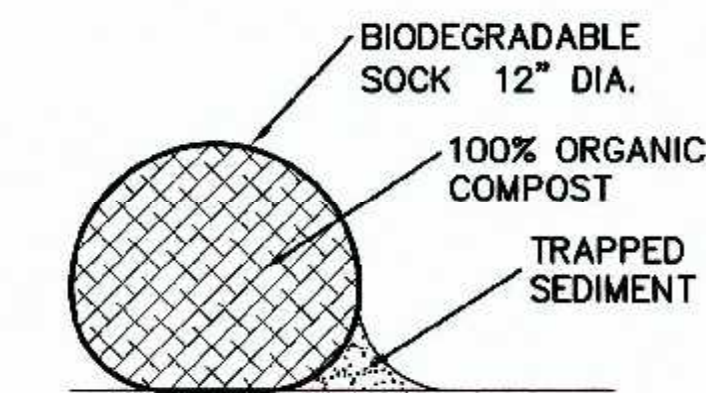


PAVEMENT AND VA-4 VERTICAL GRANITE CURBING

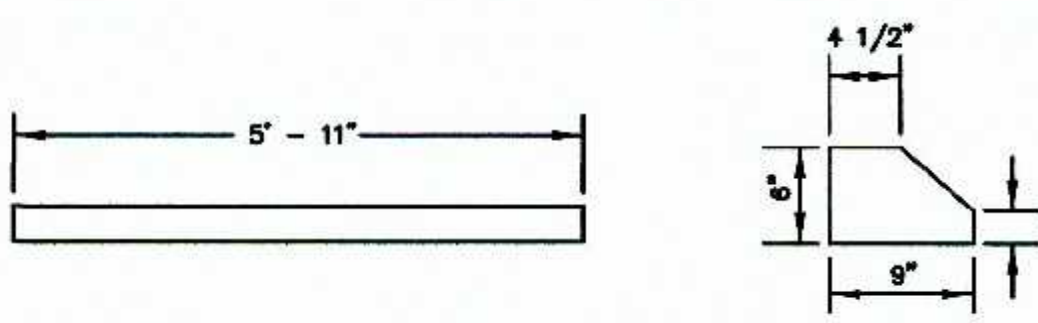
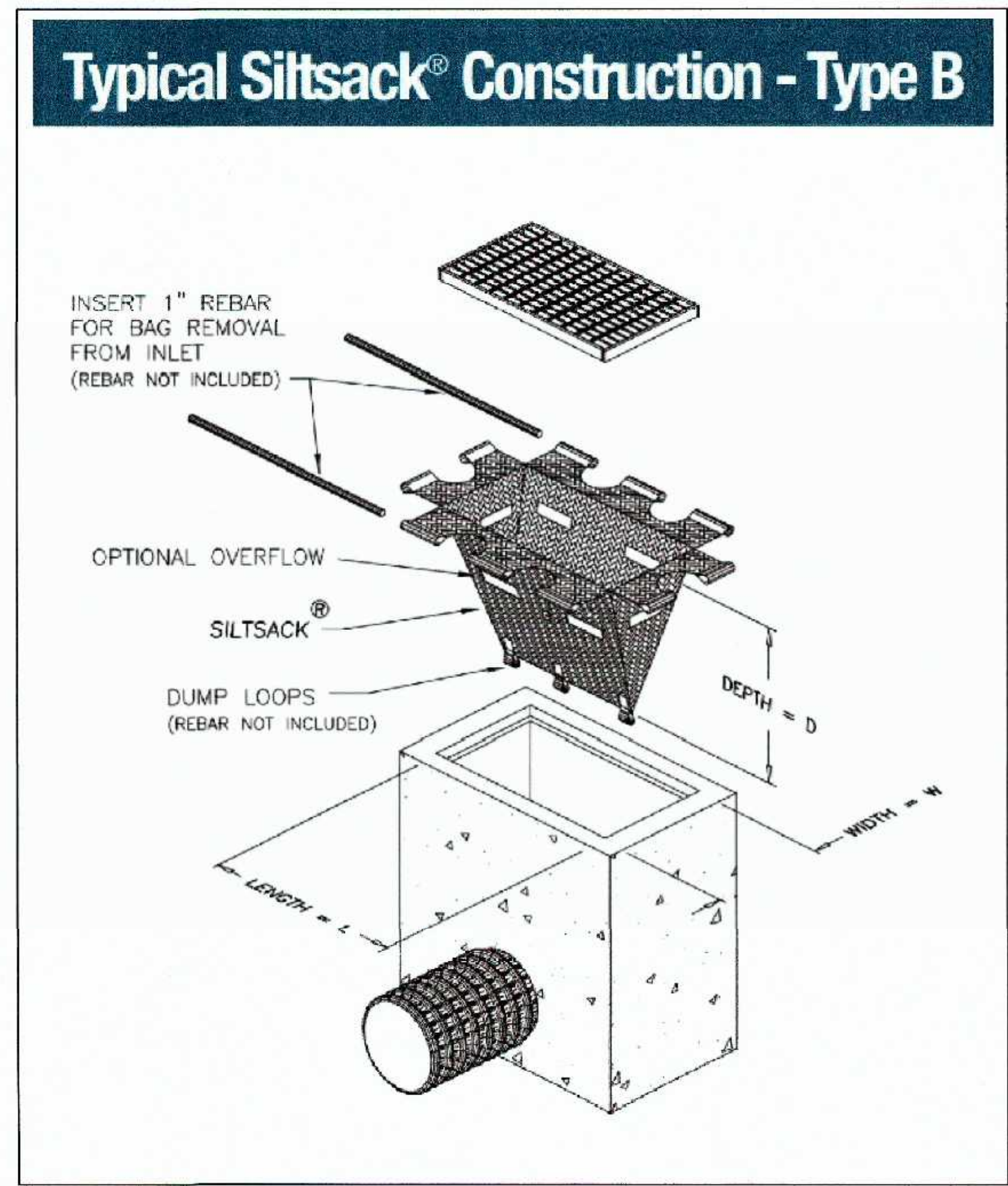


TYPE OF PIPE	RCP DRAIN	OLDI WATER	PVC SEWER	D.I. SEWER
BEDDING MATERIAL	PROC. GRAVEL	SAND	3/4" STONE	3/8" STONE
BACKFILL MATERIAL	ORD. FILL	SAND	3/4" STONE	3/8" STONE

UTILITY TRENCH DETAIL



COMPOST SOCK DETAIL



BUMPER CURB DETAIL

BUMPER CURB SHALL BE E.F. SHEA ITEM NO. B-BBSF OR APPROVED EQUAL.



OWNER:
 CHARLEY2017, LLC
 7 MYRTLE STREET
 NORFOLK, MASSACHUSETTS

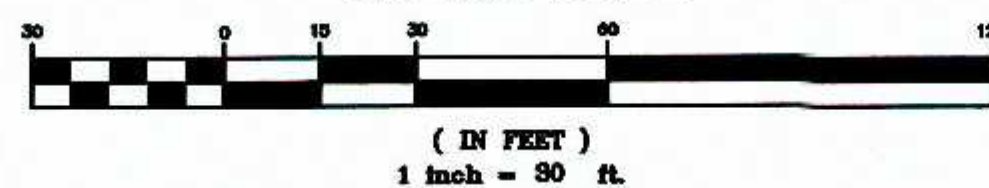
APPLICANT:
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS

SITE PLAN
 CONSTRUCTION DETAIL - 1
 162 GROVE STREET
 FRANKLIN, MASSACHUSETTS
 PREPARED FOR
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS
 MAY 21, 2020
 SCALE: 1" = 30'

SITE PLAN APPROVAL
 REQUIRED
 FRANKLIN PLANNING BOARD

DATE

GRAPHIC SCALE

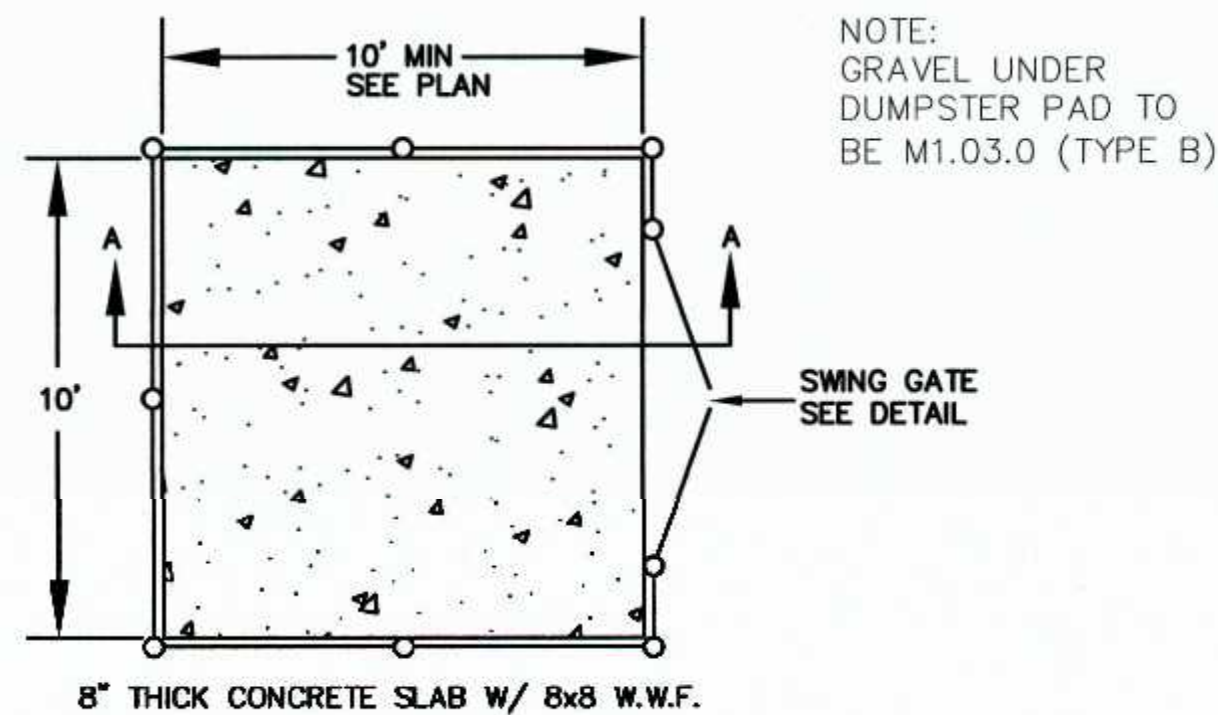


NO.	DATE	DESCRIPTION	BY
1	7/8/20	REVIEW COMMENTS	RRG

DATE	FIELD BY:	INT.
4/20	BL	
5/20	FIELD BOOK	PG#
5/20	CALCS BY:	RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

UNITED CONSULTANTS INC.
 850 FRANKLIN STREET SUITE 11D
 WRENTHAM, MASSACHUSETTS 02083
 508-384-6560 FAX 508-384-6566

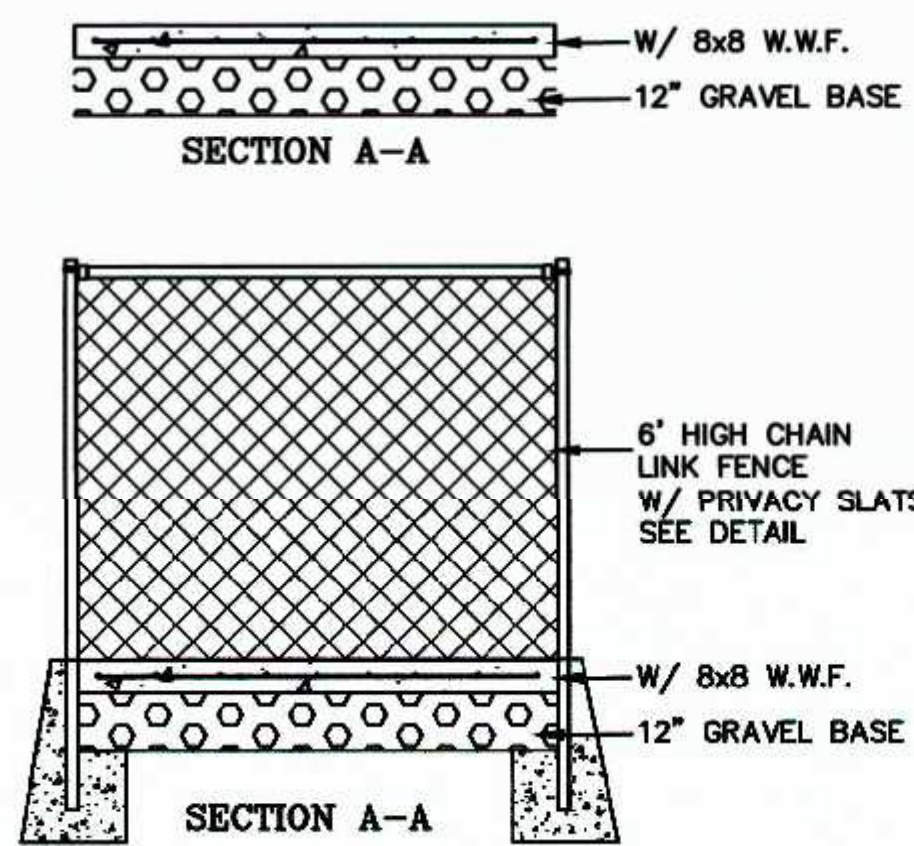
DATE
 MAY 21, 2020
 SCALE
 1" = 30'
 PROJECT
 UC1435
 SHEET
 7 of 9



CONCRETE DUMPSTER PAD

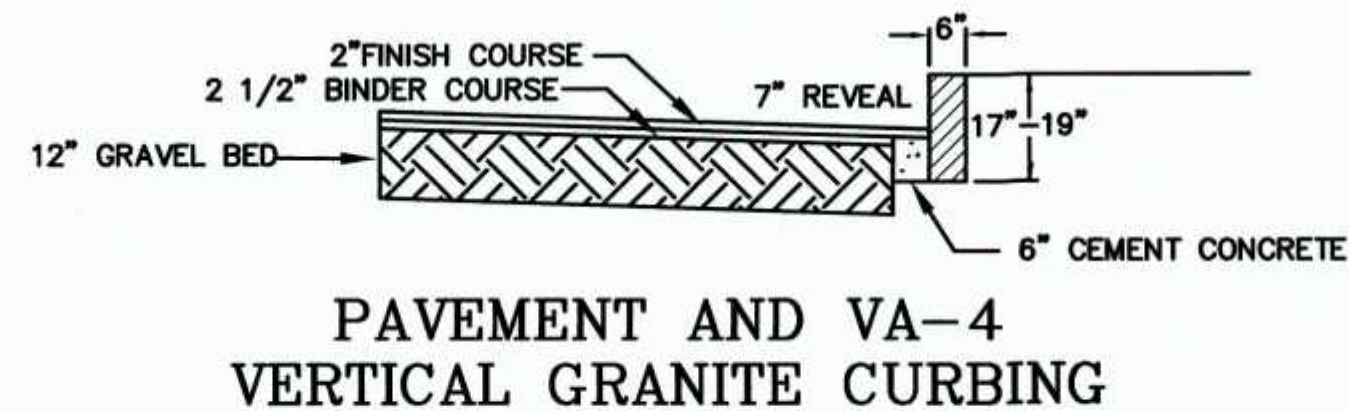
NOTE: DUMPSTER PAD AT BUILDING 1 WILL HAVE THE FENCE CONNECT TO THE RETAINING WALL. NO FENCE IS PROPOSED TO THE REAR OF THE DUMPSTER PAD.

NOTE: GRAVEL UNDER DUMPSTER PAD TO BE M1.03.0 (TYPE B)

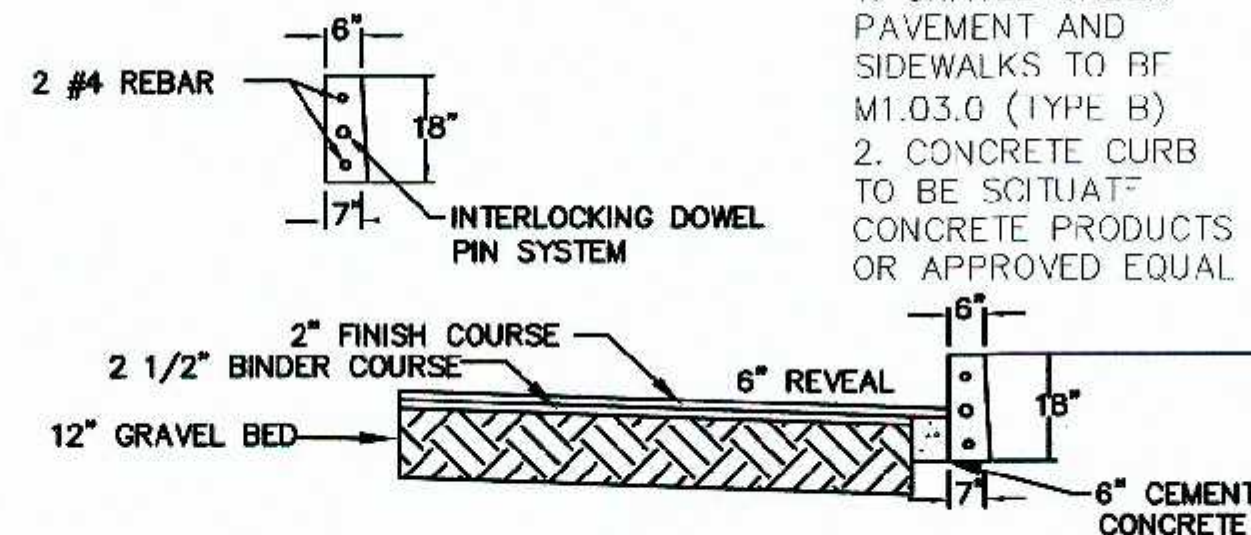


DUMPSTER AREA FENCE

NOTES:
 1. CONTRACTOR TO CONTACT DIGSAFE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
 2. CONTRACTOR TO VERIFY LOCATIONS OF EXISTING UTILITIES ANY REPORT ANY DISCREPANCIES TO UNITED CONSULTANTS, INC.
 3. ALL WORK SHALL CONFORM TO THE TOWN OF FRANKLIN DPW STANDARDS.
 4. MAINTAIN A MINIMUM OF 10' SEPARATION FROM THE WATER SERVICE TO THE SEWER SERVICE.

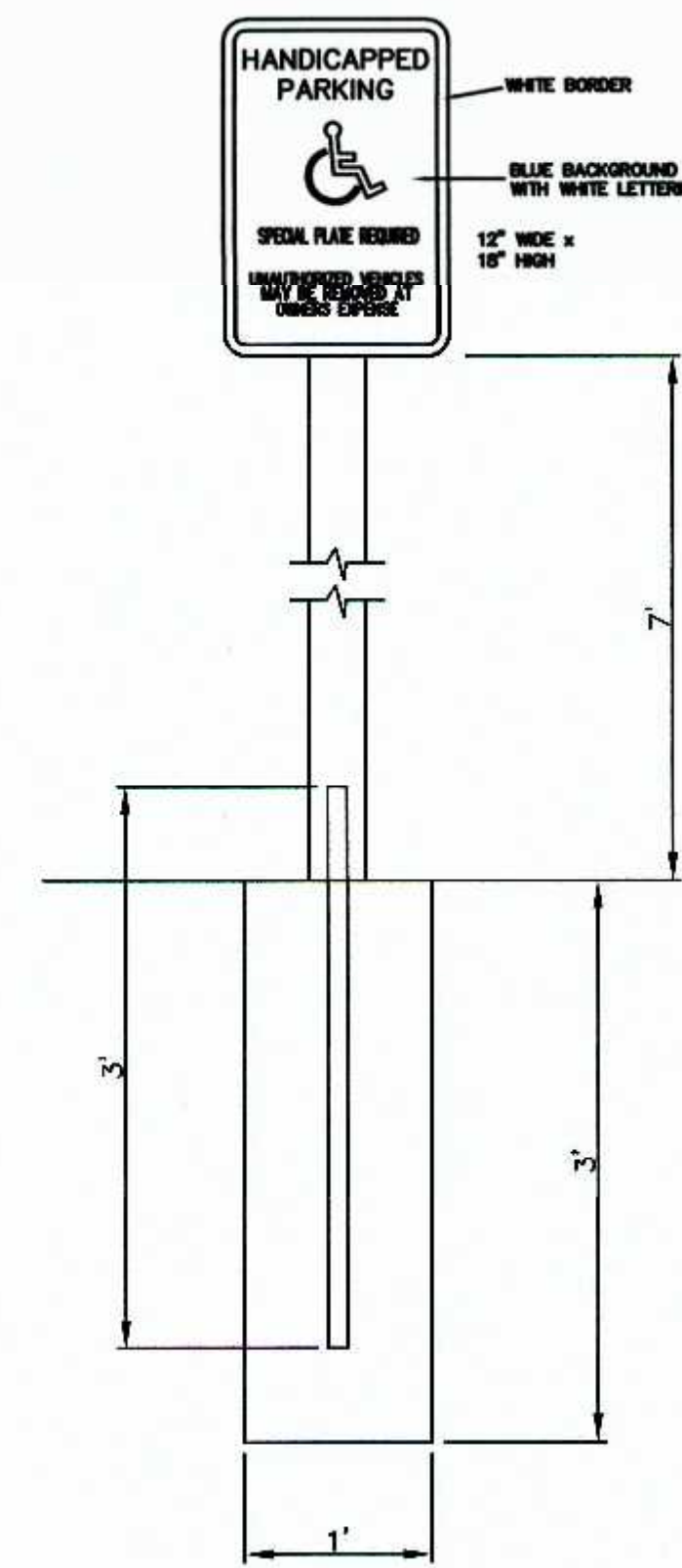


PAVEMENT AND VA-4 VERTICAL GRANITE CURBING

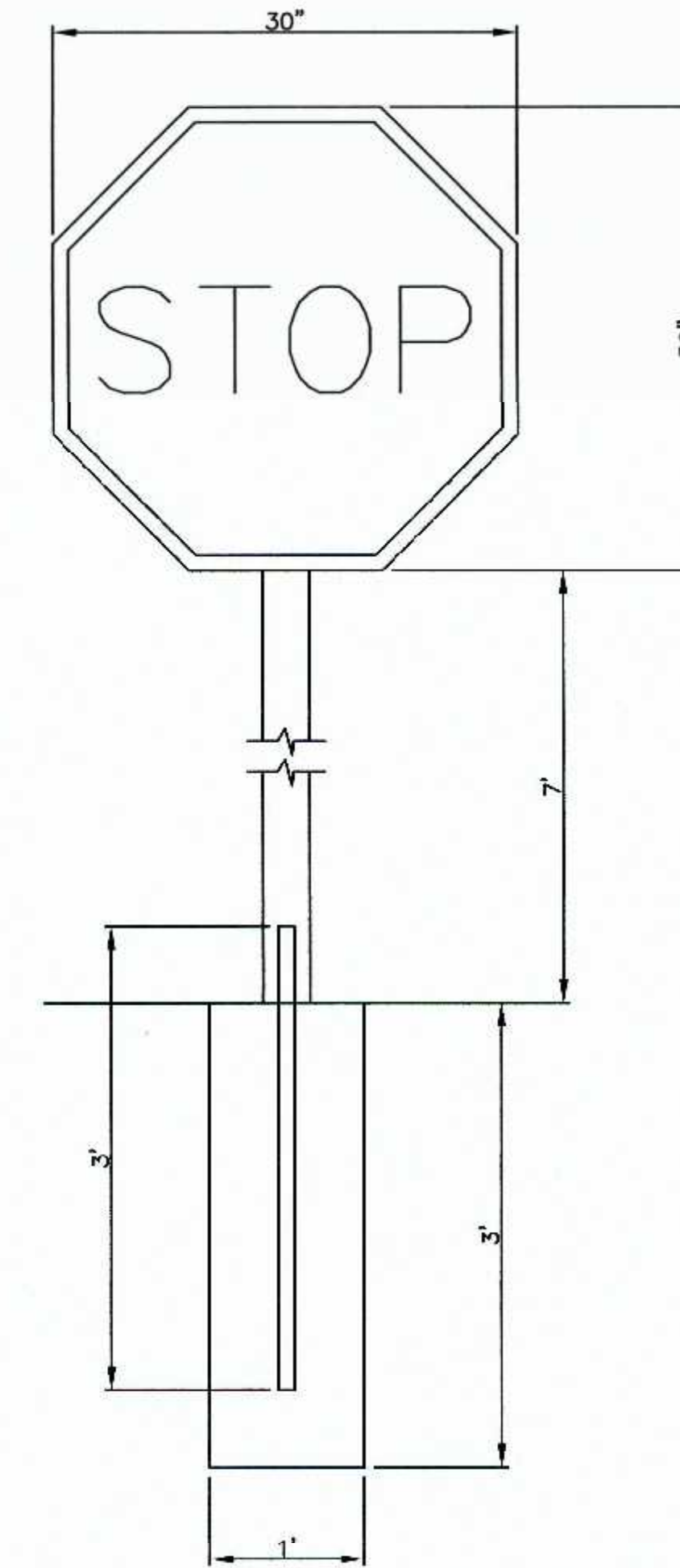


PAVEMENT AND VERTICAL CONCRETE CURBING

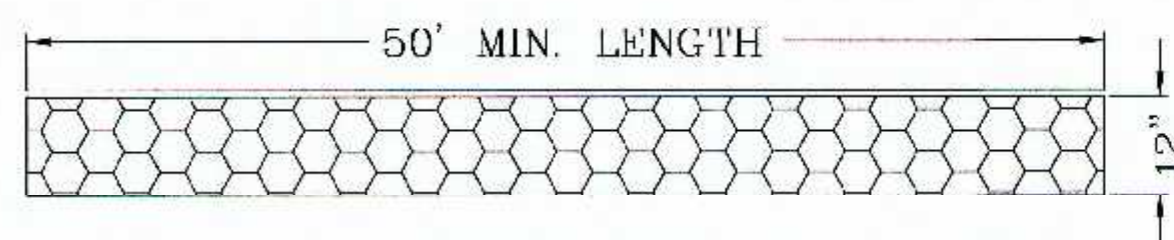
NOTES:
 1. GRAVEL UNDER PAVEMENT AND SIDEWALKS TO BE M1.03.0 (TYPE B)
 2. CONCRETE CURB TO BE SITUATED CONCRETE PRODUCTS OR APPROVED EQUAL



HANDICAP SIGN DETAIL
N.T.S.

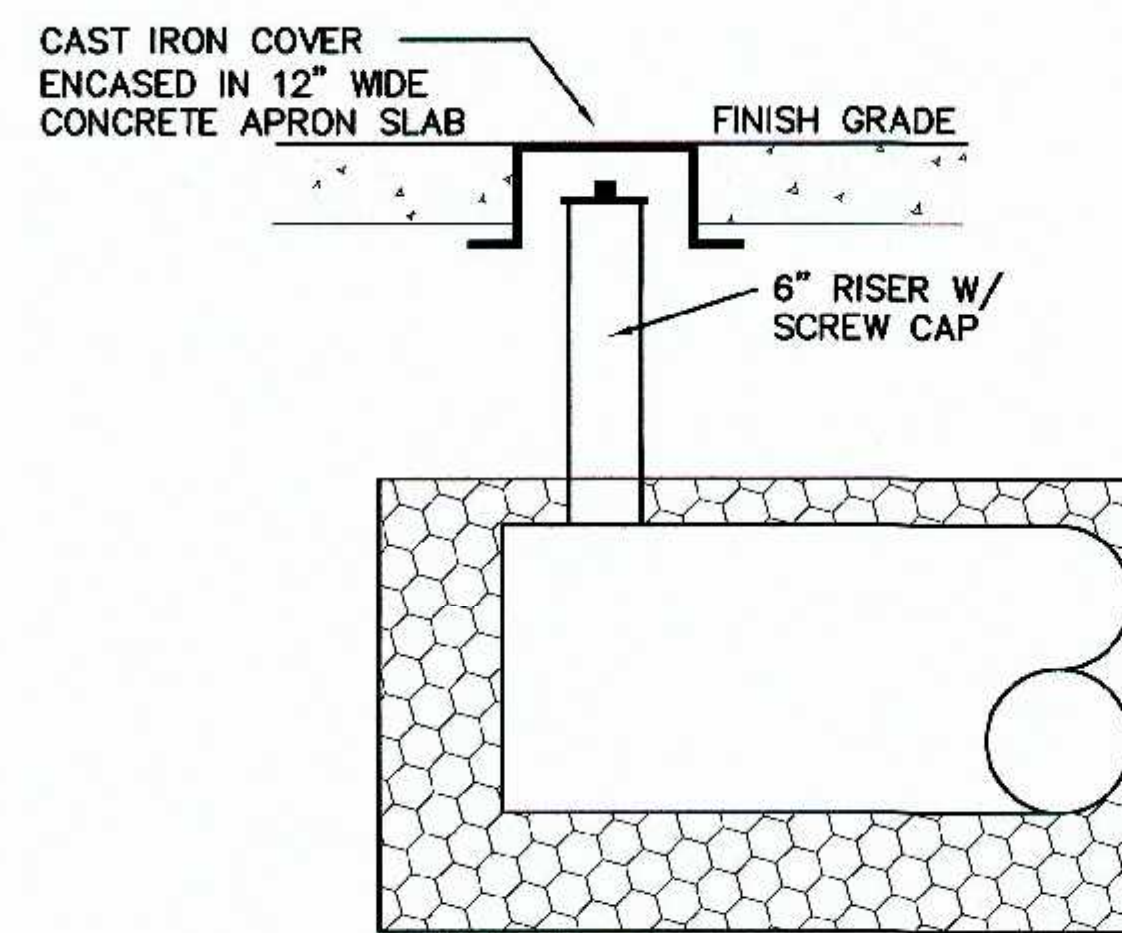


STOP SIGN DETAIL
N.T.S.

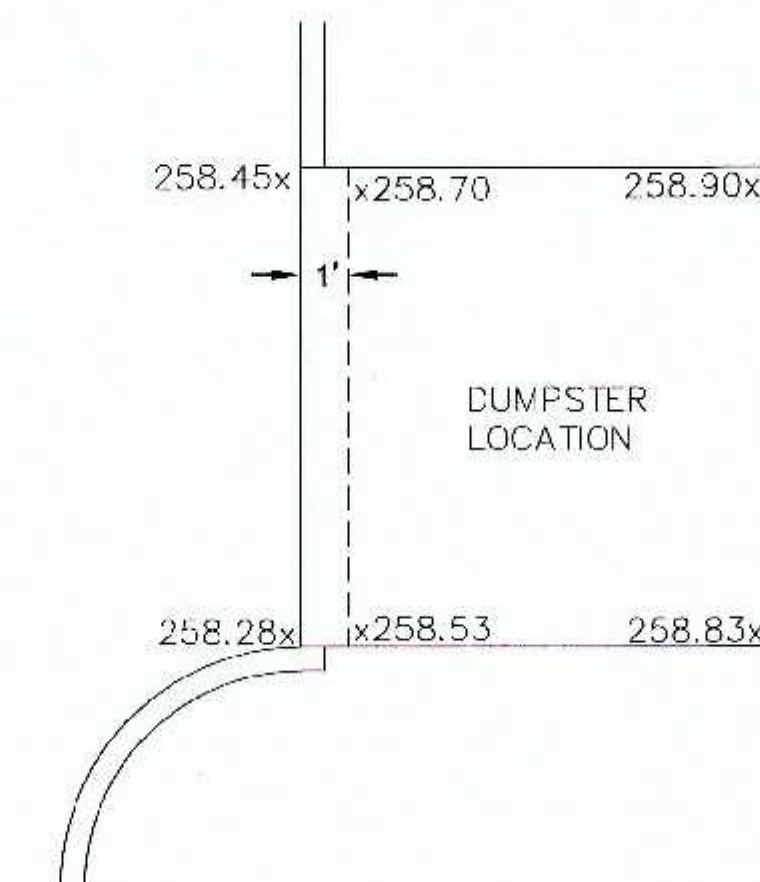


ENTRY SEDIMENTATION CONTROL MAT SECTION
N.T.S.

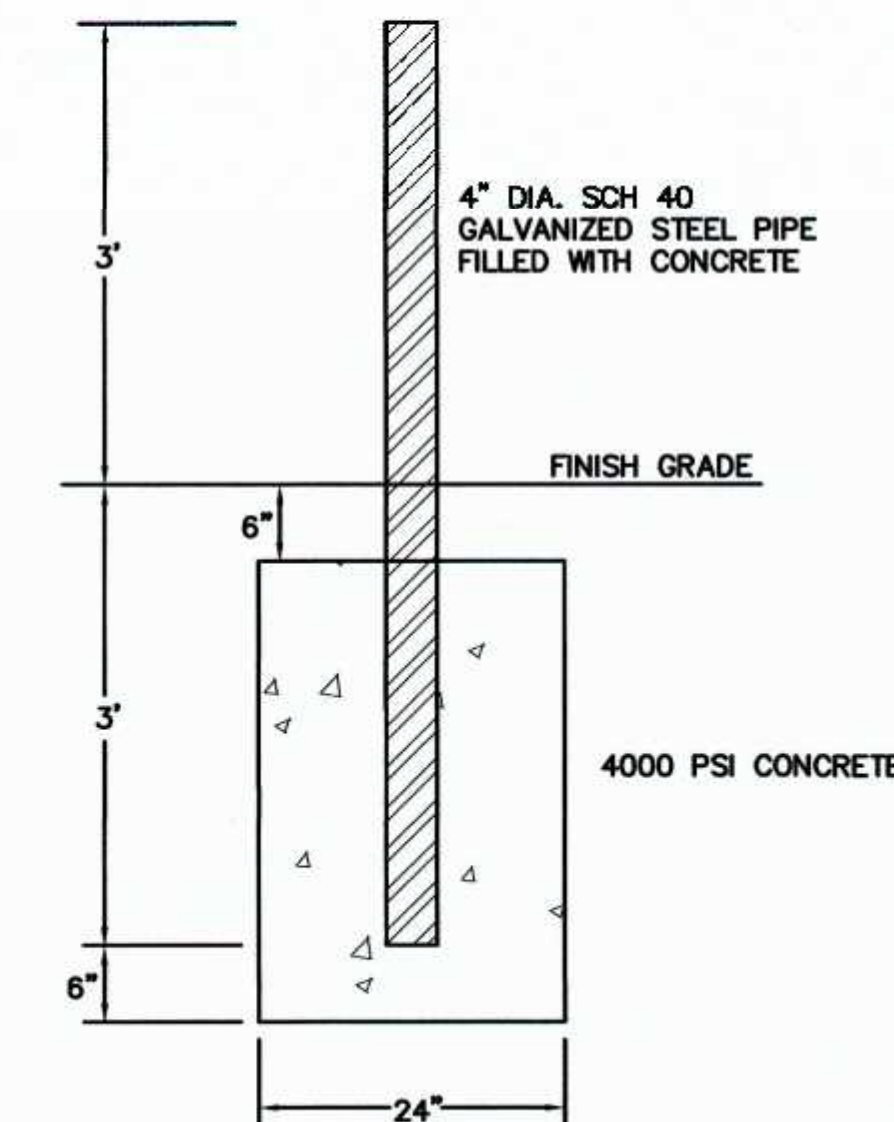
NOTES:
 1. PAD SHALL BE A MINIMUM OF 20 FEET IN WIDTH.
 2. PAD SHALL CONSIST OF 4\"/>



INSPECTION PORT DETAIL DRAINAGE INFILTRATION AREAS
N.T.S.



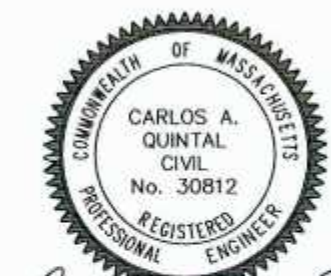
DUMPSTER AREA GRADING DETAIL
N.T.S.



BOLLARD DETAIL

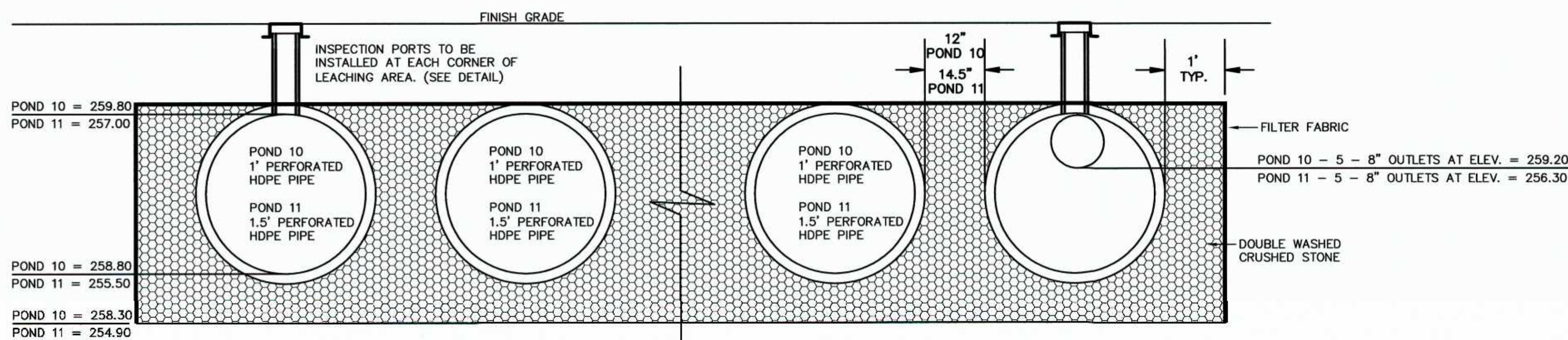
OWNER:
 CHARLEY2017, LCC
 7 MYRTLE STREET
 NORFOLK, MASSACHUSETTS

APPLICANT:
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS



Carlos A. Quintal
 CARLOS A. QUINTAL P.E. #30812

SITE PLAN
 CONSTRUCTION DETAIL - 2
 162 GROVE STREET
 FRANKLIN, MASSACHUSETTS
 PREPARED FOR
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS
 MAY 21, 2020
 SCALE: 1" = 30'



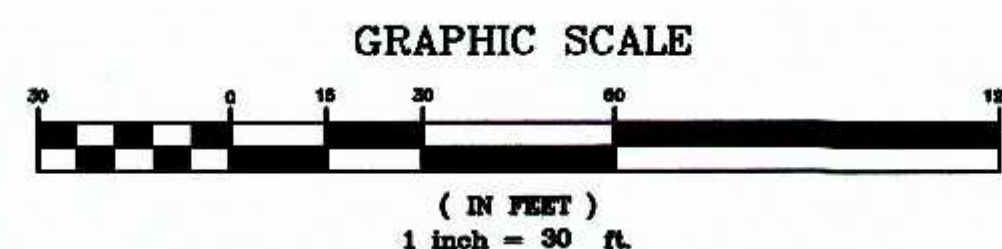
INFILTRATION PONDS 10 AND 11

NOTE:
 INFILTRATION POND 10 CONSISTS OF 12 ROWS OF 1\"/>

NOTE:
 INFILTRATION POND 11 CONSISTS OF 5 ROWS OF 1.5\"/>

SITE PLAN APPROVAL
 REQUIRED
 FRANKLIN PLANNING BOARD

DATE



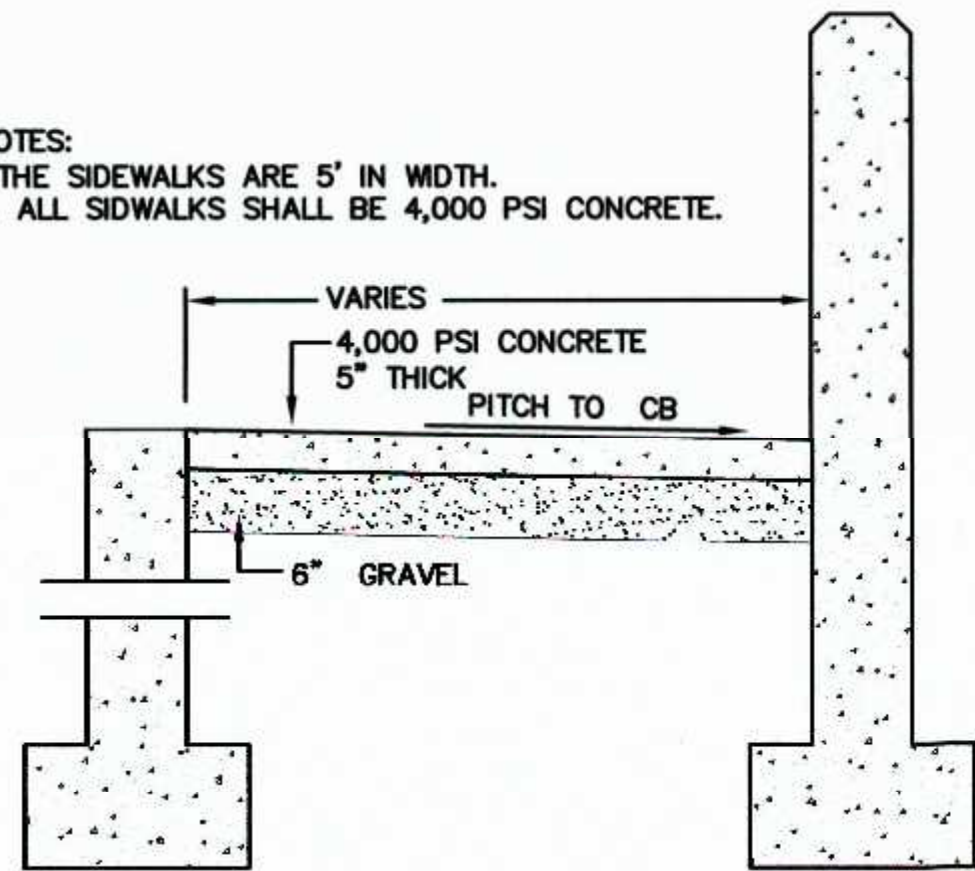
NO.	DATE	DESCRIPTION	BY
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4/20		BL
BK#	FIELD BOOK	PG#
5/20	CALCS BY:	RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

UNITED CONSULTANTS INC.
 850 FRANKLIN STREET SUITE 11D
 WRENTHAM, MASSACHUSETTS 02093
 508-384-8560 FAX 508-384-8568

DATE
 MAY 21, 2020
 SCALE
 1" = 30'
 PROJECT
 UC1435
 SHEET
 8 of 9

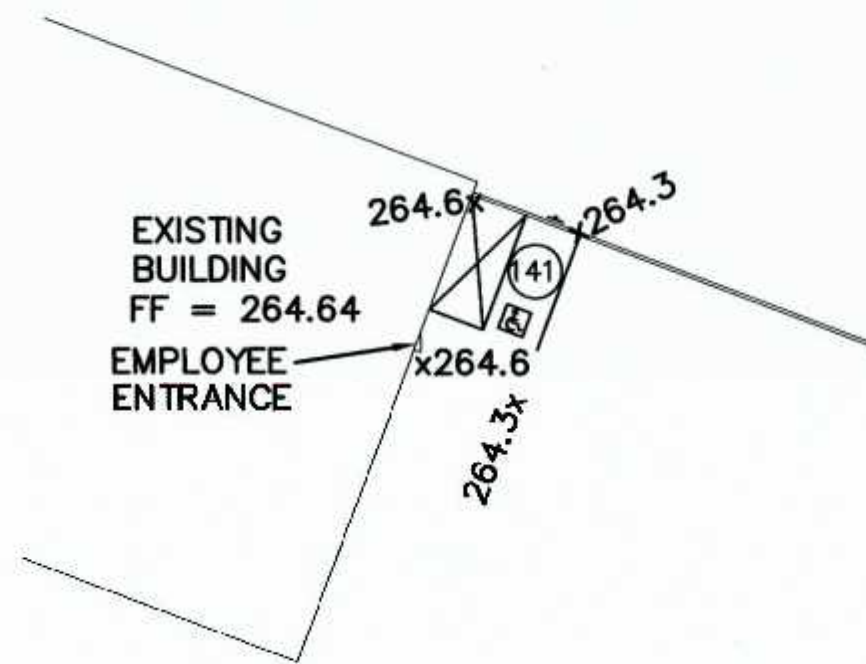
NOTES:
 1. THE SIDEWALKS ARE 5' IN WIDTH.
 2. ALL SIDEWALKS SHALL BE 4,000 PSI CONCRETE.



COURTYARD AREA DETAIL

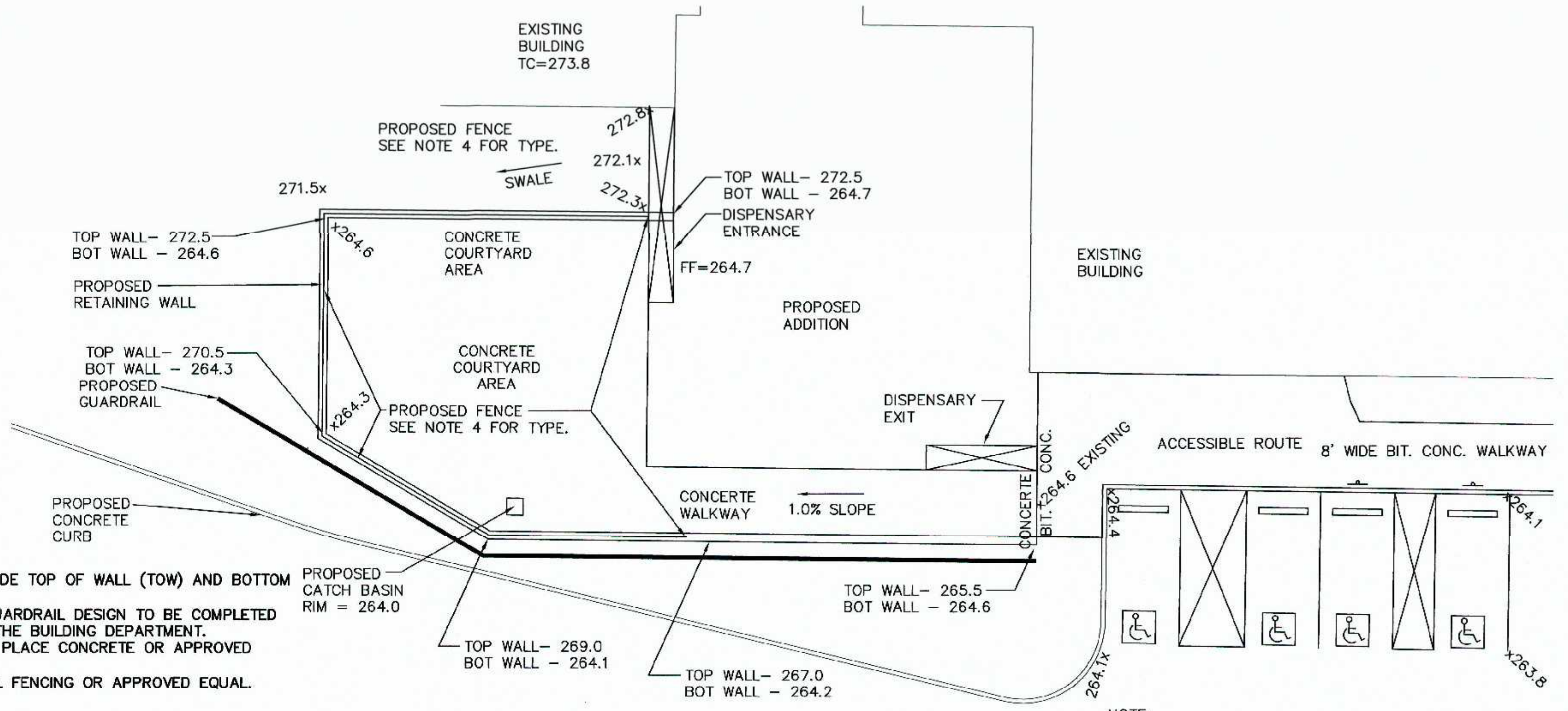
N.T.S.

NOTE:
 GRAVEL UNDER PAVEMENT AND SIDEWALKS TO BE M1.C3.0 (TYPE B)

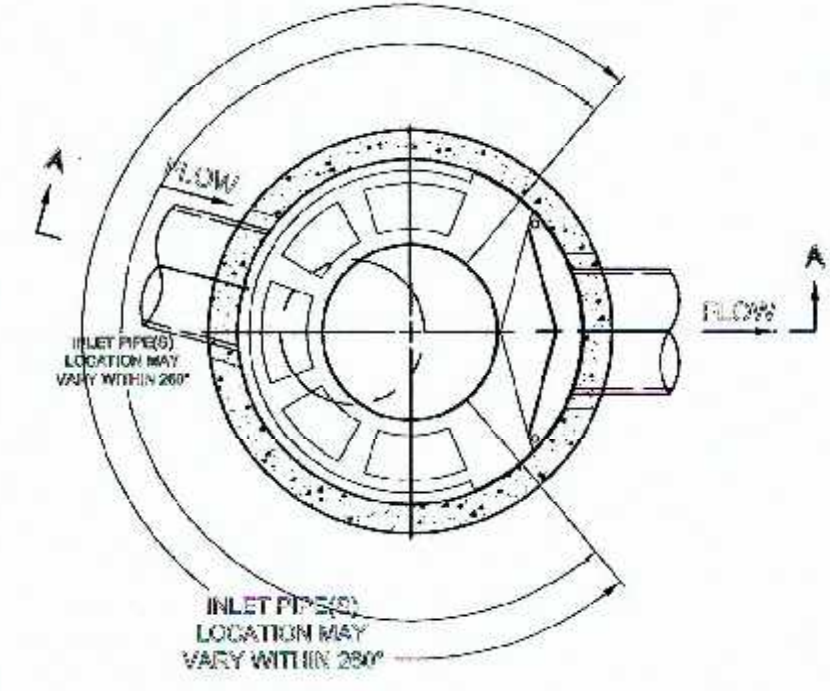


ACCESSIBLE ROUTE GRADING UPPER LEVEL
 SCALE: 1" = 40'

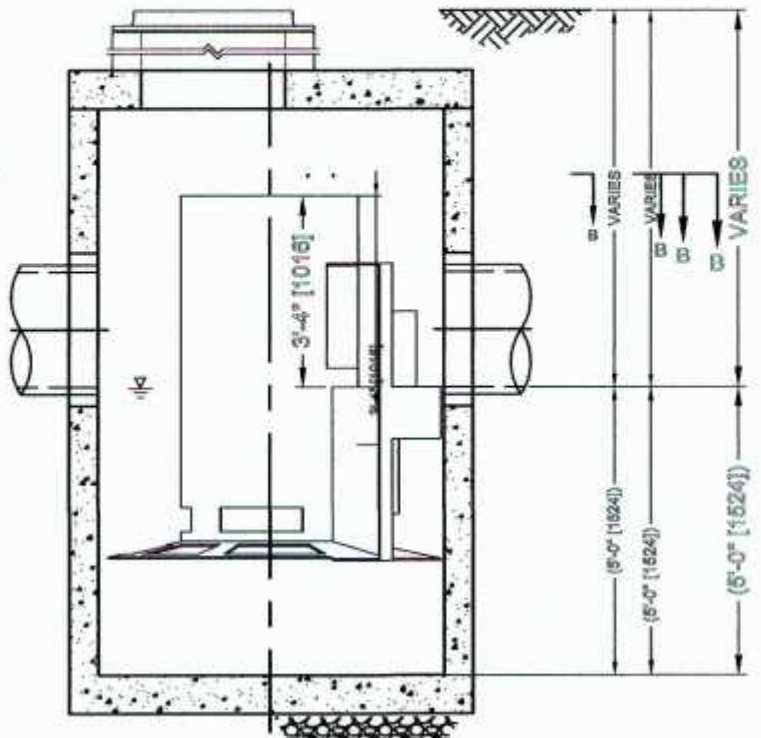
PROPOSED RETAINING WALL NOTES:
 1. PROPOSED RETAINING WALL SHOWN TO PROVIDE TOP OF WALL (TOW) AND BOTTOM OF WALL (BOW) ELEVATIONS.
 2. FINAL WALL DESIGNS, FENCE DESIGN AND GUARDRAIL DESIGN TO BE COMPLETED BY A STRUCTURAL ENGINEER AND FILED WITH THE BUILDING DEPARTMENT.
 3. PROPOSED RETAINING WALLS TO BE POURED IN PLACE CONCRETE OR APPROVED EQUAL.
 4. FENCE TO BE WAYFAIR 4' x 6' TEXAS METAL FENCING OR APPROVED EQUAL.



NOTE:
 GRIND AND SHIM EXISTING PAVEMENT AS NECESSARY TO PROVIDE A MAXIMUM SLOPE OF 2 PERCENT WITHIN THE HANDICAP PARKING SPACES AND ACCESS ISLES.



PLAN VIEW B-B
 NOT TO SCALE



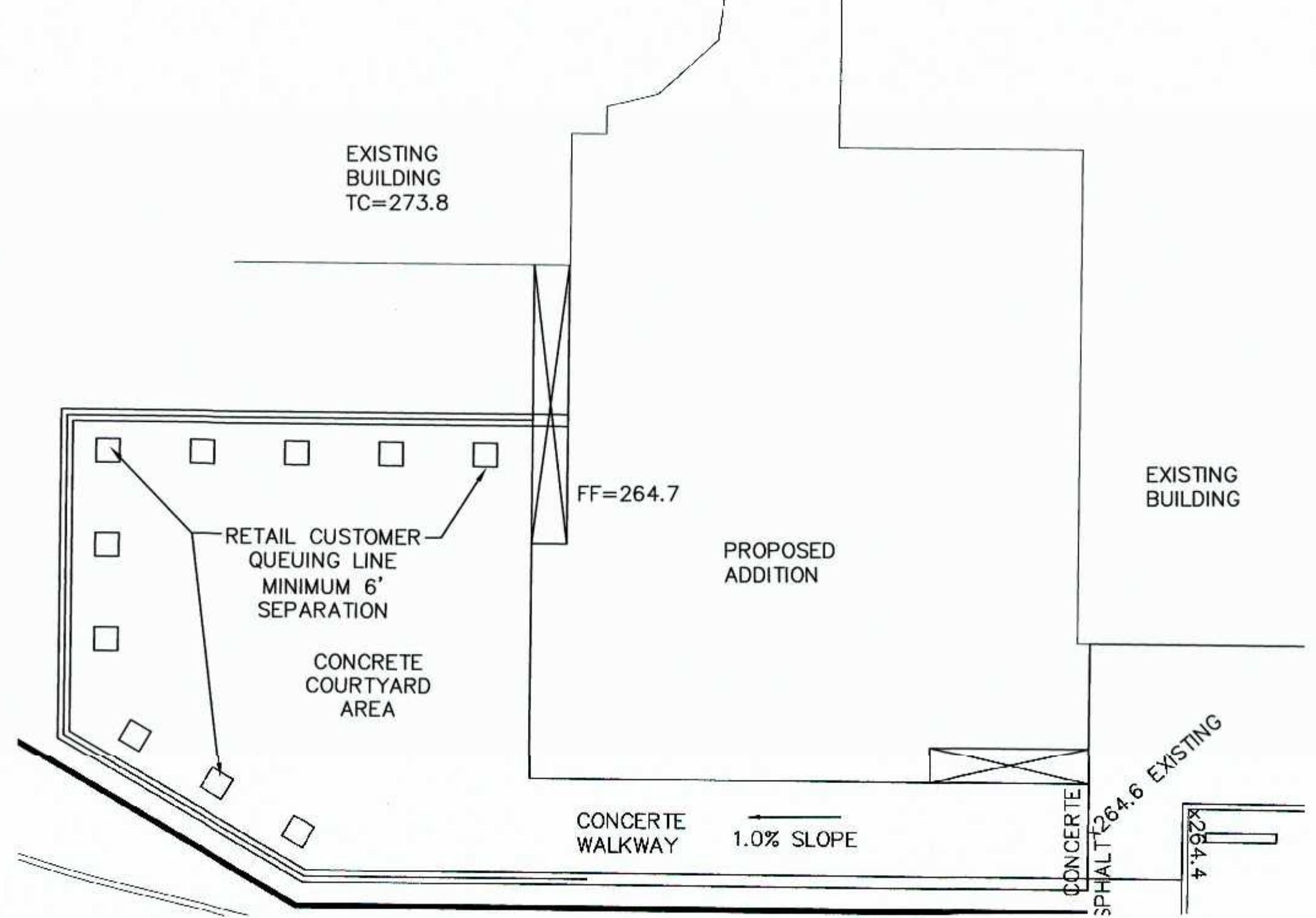
ELEVATION A-A
 NOT TO SCALE

CONTECH CASCADE SEPARATOR DETAIL

N.T.S.



FRAME AND COVER
 (DIAMETER VARIES)
 NOT TO SCALE

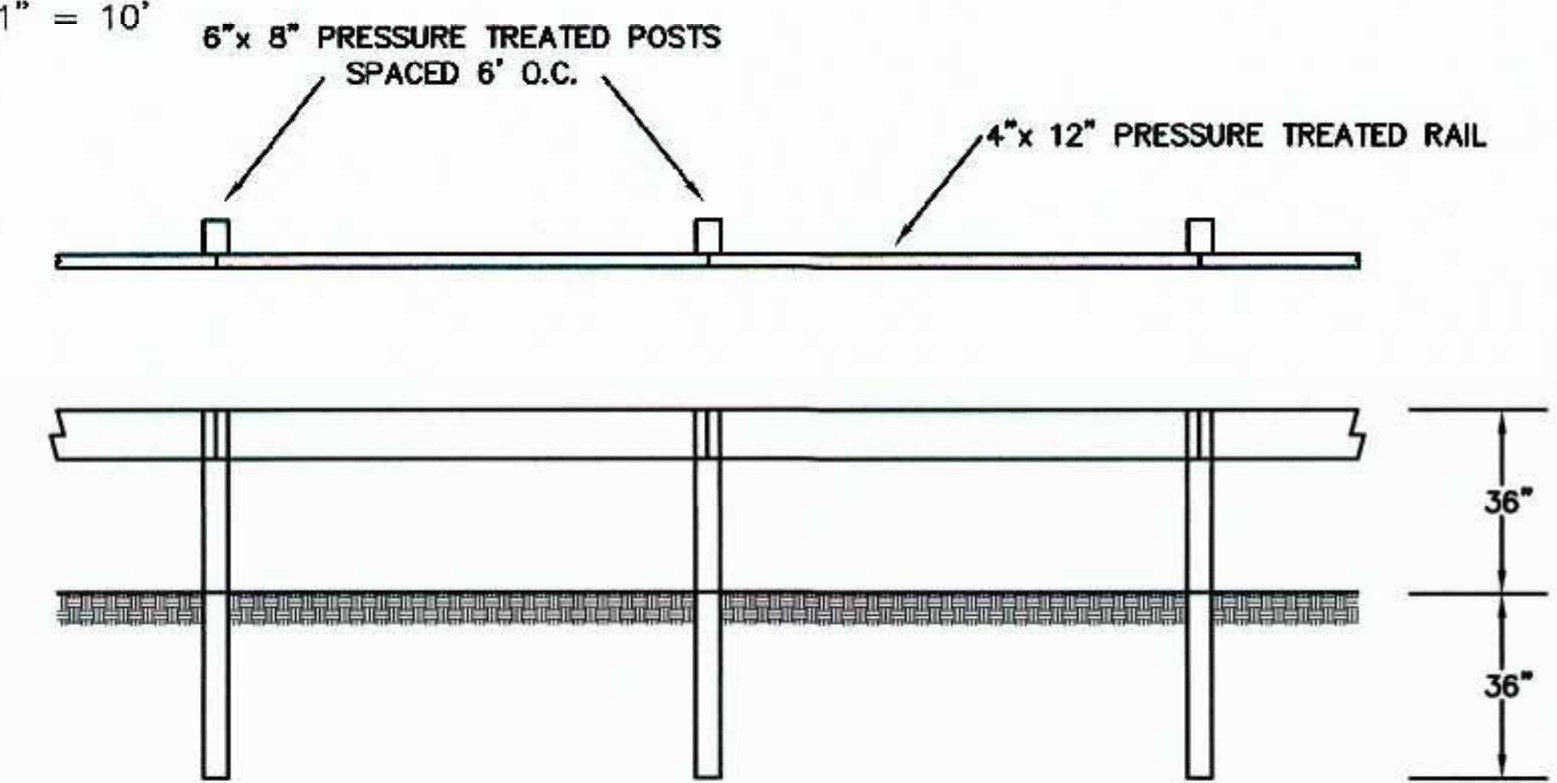


ENTRY QUEUING DETAIL

SCALE: 1" = 10'

ADDITION ENTRY AND ACCESSIBLE ROUTE DETAIL

SCALE: 1" = 10'



WOODEN GUARDRAIL DETAIL
 N.T.S.



CARLOS A. QUINTAL P.E. #30812

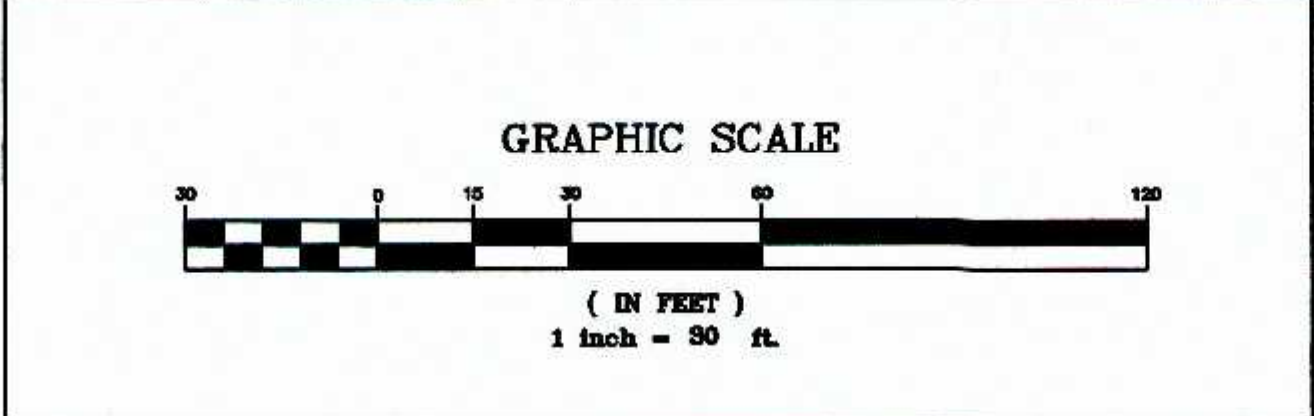
OWNER:
 CHARLEY2017, LLC
 7 MYRTLE STREET
 NORFOLK, MASSACHUSETTS

APPLICANT:
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS

SITE PLAN
CONSTRUCTION DETAIL - 3
 162 GROVE STREET
 FRANKLIN, MASSACHUSETTS
 PREPARED FOR
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS
 MAY 21, 2020
 SCALE: 1" = 30'

SITE PLAN APPROVAL REQUIRED
FRANKLIN PLANNING BOARD

DATE	

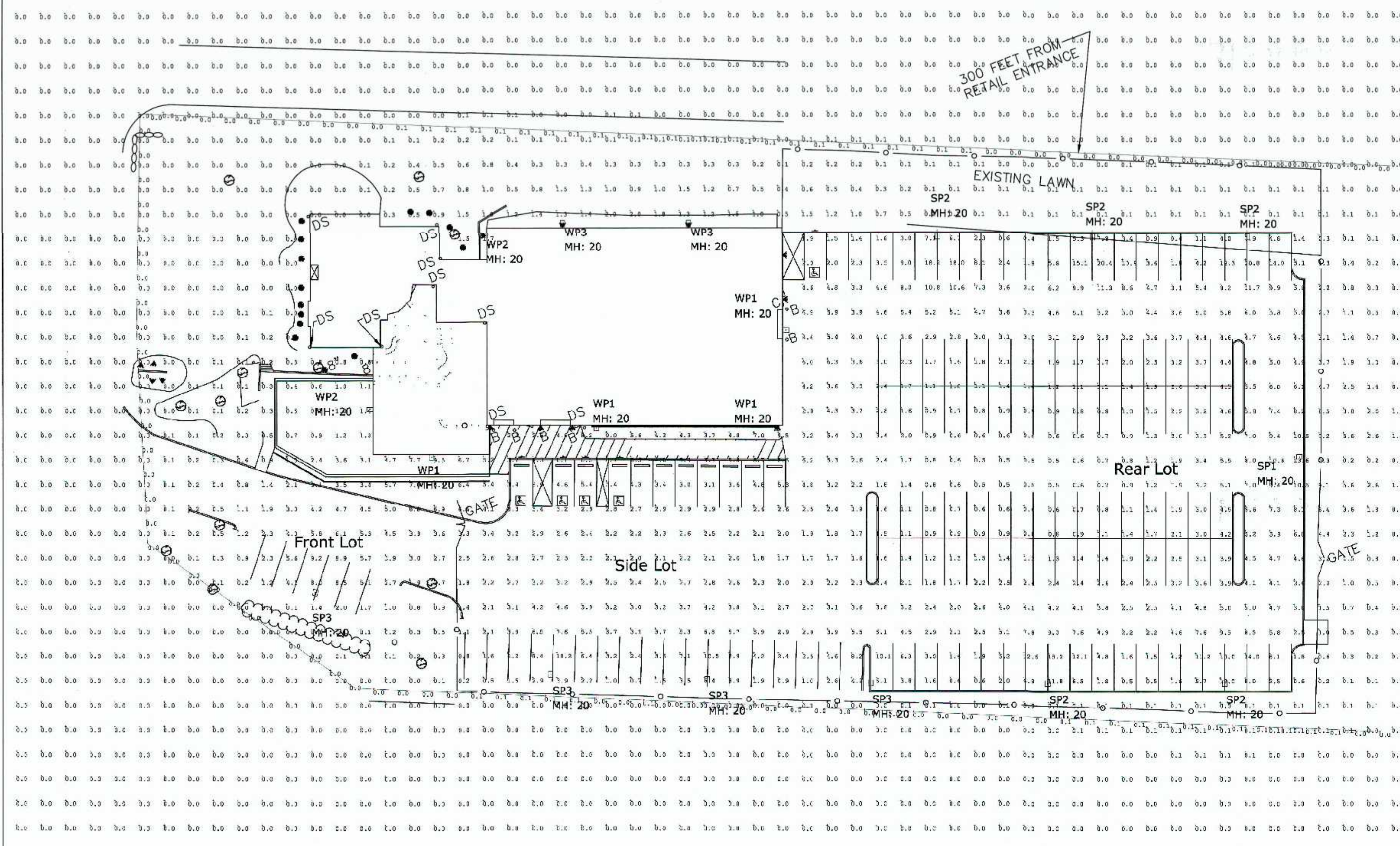


NO.	DATE	DESCRIPTION	BY
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5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

UNITED CONSULTANTS INC.
 850 FRANKLIN STREET SUITE 11D
 WRENTHAM, MASSACHUSETTS 02093
 508-384-6560 FAX 508-384-6566

DATE	MAY 21, 2020
SCALE	1" = 30'
PROJECT	UC1435
SHEET	9 of 9



1 Photometric Layout and Calculations

SCALE: 1:30

Luminaire Schedule						
Symbol	Qty	Label	Description	LLF	Lum. Lumens	Lum. Watts
	1	SP1	Visionaire - VMX-II-T4-55L-4K-UNV-AM-BZ-DIM ON -SNTS-4S-11-20-9BC-343-S1-BZ POLE	0.900	49881	400
	5	SP2	Visionaire - VMX-II-T4-55L-4K-UNV-AM-BZ-DIM-HS ON -SNTS-4S-11-20-9BC-343-S1-BZ POLE	0.900	21756	400
	4	SP3	Visionaire - VMX-II-T5LS-55L-4K-UNV-AM-BZ-DIM-HS ON -SNTS-4S-11-20-9BC-343-S1-BZ POLE	0.900	15400	400
	4	WP1	Visionaire - VMS-1-T4-96LC-5-4K-BZ-DIM-BP	0.900	19653	157
	2	WP2	Visionaire VSC-II-T4-16LC-5-4K-UNV-WM-BZ-DIM-BP	0.900	3093	26
	2	WP3	Visionaire VSC-II-T2-16LC-5-4K-UNV-WM-BZ-DIM-BP	0.900	3135	26

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Property Line	Iluminance	Fc	0.03	0.1	0.0	N.A.	N.A.
Site Calculations	Iluminance	Fc	0.96	20.8	0.0	N.A.	N.A.
Front Lot	Iluminance	Fc	4.02	9.2	0.9	4.47	10.22
Rear Lot	Iluminance	Fc	3.92	20.8	0.4	9.80	52.00
Side Lot	Iluminance	Fc	3.37	10.5	0.5	6.74	21.00

- NOTES:**
- A. A LIGHT LOSS FACTOR OF 0.900 HAS BEEN APPLIED TO FIXTURES UNLESS OTHERWISE NOTED. REFER TO LUMINAIRE SCHEDULE FOR LIGHT LOSS FACTOR AND LUMEN INFORMATION.
 - B. SEE "MH" ON LIGHTING FIXTURE TAG LOCATED ON PLAN FOR MOUNTING HEIGHT INFORMATION.
 - C. CALCULATION POINTS ARE TAKEN AT GRADE.
 - D. CALCULATION RESULTS ARE BASED ON IES STANDARDS UNLESS OTHERWISE REQUESTED.

VMS LED Specifications

Ordering Information

MODEL	OFFICE	SOURCE	CUMPLET	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS
VMS1	T1	ABLD	ON	5K	UNV	AM	BZ	DIM
	T2	ABLD	ON	5K	UNV	AM	BZ	DIM
	T3	ABLD	ON	5K	UNV	AM	BZ	DIM
	T4	ABLD	ON	5K	UNV	AM	BZ	DIM
	T5	ABLD	ON	5K	UNV	AM	BZ	DIM

2 Fixture Specification- Visionaire VMS

VSC LED Specifications

Ordering Information

MODEL	OFFICE	SOURCE	CUMPLET	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS
VSD-1	T1	ABLD	ON	5K	UNV	AM	BZ	DIM
	T2	ABLD	ON	5K	UNV	AM	BZ	DIM
	T3	ABLD	ON	5K	UNV	AM	BZ	DIM
	T4	ABLD	ON	5K	UNV	AM	BZ	DIM
	T5	ABLD	ON	5K	UNV	AM	BZ	DIM

3 Fixture Specification- Visionaire VSC

VMX ARRAY LED Specifications

Ordering Information

MODEL	OFFICE	SOURCE	CUMPLET	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS
VMX-1	T1	ABLD	ON	5K	UNV	AM	BZ	DIM
	T2	ABLD	ON	5K	UNV	AM	BZ	DIM
	T3	ABLD	ON	5K	UNV	AM	BZ	DIM
	T4	ABLD	ON	5K	UNV	AM	BZ	DIM
	T5	ABLD	ON	5K	UNV	AM	BZ	DIM

4 Fixture Specification- Visionaire VMX

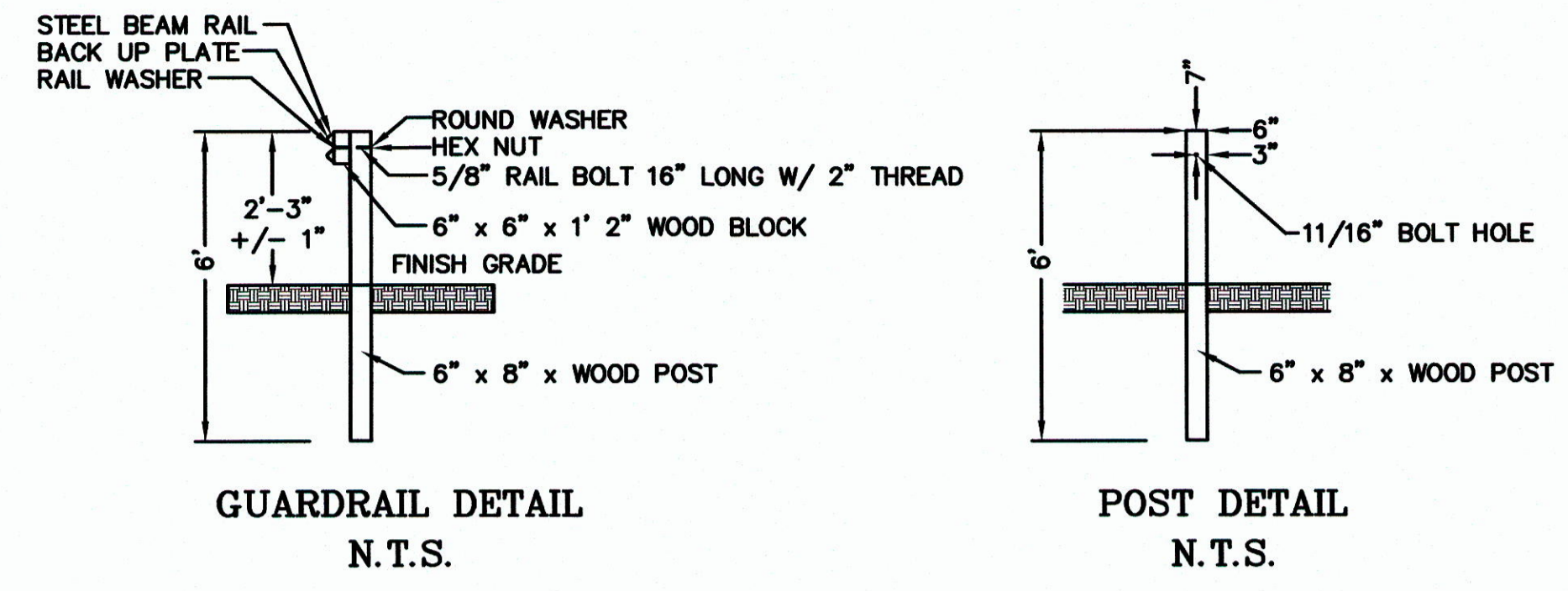
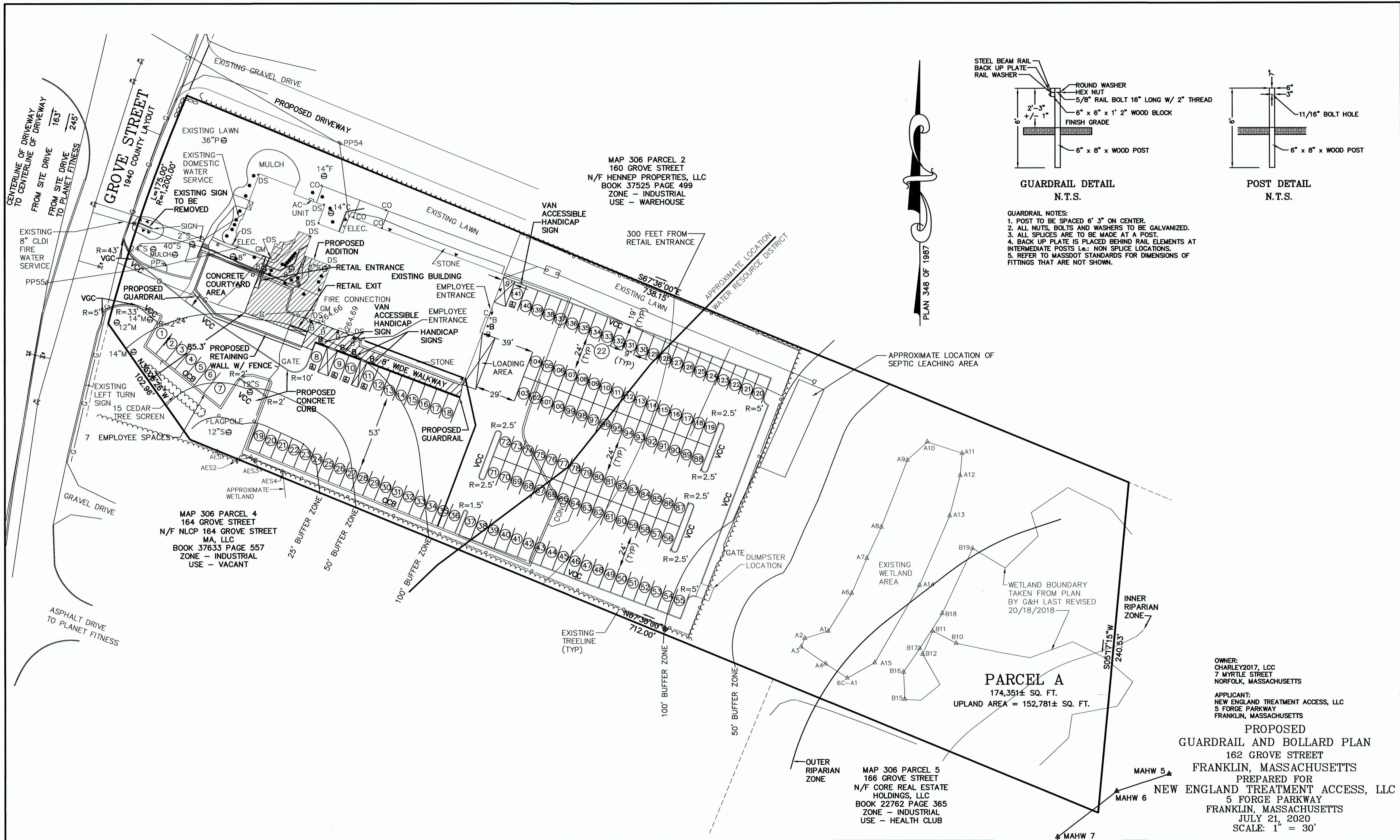
SNTS Specifications

Ordering Information

MODEL	SHAFT SIZE	GAUGE	HEIGHT	BASE	ANCHORAGE	MOUNTING	FINISH	OPTIONS
SNTS	45	11	10"	8BC	845	81	82	83
	45	11	20"	12BC	126	82	83	84
	45	11	30"	18BC	186	83	84	85
	45	11	40"	24BC	246	84	85	86
	45	11	50"	30BC	306	85	86	87

5 Fixture Specification- Visionaire SNTS

DATE:	REVISIONS:	DESCRIPTION:	DATE:
May 20, 2020	1		
PROJECT NUMBER: 20094	2		
DRAWN BY: AM	3		
CHECKED BY: TJ	4		
APPROVED BY: GD	5		
SCALE: AS NOTED	6		
	7		

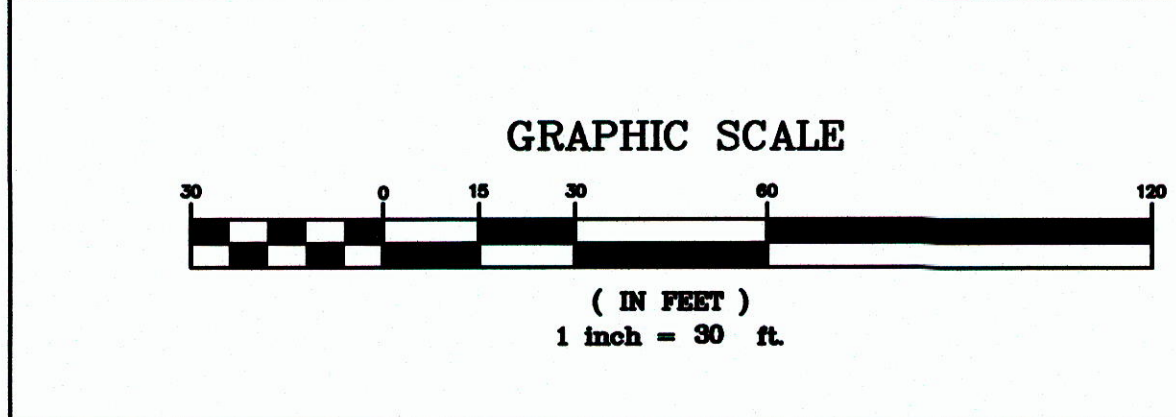


- GUARDRAIL NOTES:**
1. POST TO BE SPACED 6' 3" ON CENTER.
 2. ALL NUTS, BOLTS AND WASHERS TO BE GALVANIZED.
 3. ALL SPLICES ARE TO BE MADE AT A POST.
 4. BACK UP PLATE IS PLACED BEHIND RAIL ELEMENTS AT INTERMEDIATE POSTS I.E.: NON SPLICE LOCATIONS.
 5. REFER TO MASSDOT STANDARDS FOR DIMENSIONS OF FITTINGS THAT ARE NOT SHOWN.

PLAN 348 OF 1987

SITE PLAN APPROVAL REQUIRED
FRANKLIN PLANNING BOARD

DATE _____



NO.	DATE	DESCRIPTION	BY
1	7/8/20	REVIEW COMMENTS	RRG

DATE	FIELD BY:	INT.
4/20		BL
5/20	CALCS BY:	RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

UNITED CONSULTANTS INC.

850 FRANKLIN STREET SUITE 11D
WRENTHAM, MASSACHUSETTS 02093
508-384-6560 FAX 508-384-6566

DATE
JULY 21, 2020

SCALE
1" = 30'

PROJECT
UC1435

SHEET
1 of 1

OWNER:
CHARLEY2017, LCC
7 MYRTLE STREET
NORFOLK, MASSACHUSETTS

APPLICANT:
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MASSACHUSETTS

PROPOSED GUARDRAIL AND BOLLARD PLAN
162 GROVE STREET
FRANKLIN, MASSACHUSETTS
PREPARED FOR
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MASSACHUSETTS
JULY 21, 2020
SCALE: 1" = 30'

United Consultants, Inc.

850 Franklin Street Suite 11D
Wrentham, MA 02093
508-384-6560 FAX 508-384-6566

July 8, 2020

Mr. Anthony Padula, Chairman
Franklin Planning Board
355 East Central Street
Franklin, MA 02038

**Re: 162 Grove Street
Site Plan and Special Permit Application Peer Review**

Mr. Chairman and Board Members,

On behalf of the applicant New England Treatment Access, LLC. we have provided responses to the following comments from the Franklin Town Engineer, Franklin Town Planner, Franklin Fire Department, BETA Group, Inc. and Wetland Strategies, Inc. The review comments are listed below and our response are immediately following each comment and have been italicized. Responses to the BETA Group, Inc. Traffic Peer Review will be provided by Tetra Tech separately.

Town Engineer

1. Applications that will need to be filed with the Franklin Department of Public Works may include, but are not necessarily limited to Water Renewal Permits and a Soil Erosion and Sediment Control Permit.
Upon obtaining necessary Town Board approvals the applicant will file for the necessary permits with the DPW.
2. We recommend installing vertical granite curb at the driveway radius within the town right-of-way.
Vertical Granite curbing has been added to the driveway radii at the driveway entrance at Grove Street and the labels were added. See sheet 3. A granite curbing detail has been added to sheet 7.
3. It appears that a portion of the proposed parking lot is being extended and some other areas are being reconstructed. Please identify the limits of paving on the plans and if some areas are to remain in their existing condition.
The limits of new paving and mill / overlay have been labeled on sheet 4.
4. It is unclear what is being proposed for the 15" RCP between existing DMH#2 and 3.
Storm water system construction note #3 has been added to sheet 4 to address the 15" pipe abandonment.

Town Planner

1. The Applicant is in the process of submitting a revised Special Permit application to reference the correct section of the Zoning By-Law.

A revised application has been filed with the Planning Department.

2. The applicant has submitted and received a recommendation for a sign, however the sign location is not shown on the plans.

The sign was part of a previous development plan by the applicant. Upon completion of revised sign design the applicant will apply for the necessary permits.

3. The Applicant is providing 141 parking spaces for site to include employee and customer parking, where 52 spaces are required.

Agreed. No additional comment.

4. Due to COVID-19 regulations, the applicant may want to consider adding a queuing line outside the building. The plans show for a patio and sidewalk along the building. How many people can wait outside standing 6 feet apart?

An entry queuing detail has been added to sheet 9.

5. Due to COVID-19 regulations, is there an entrance only and exit only doors provided? Show on the plans how the customers will enter and exit the building.

The retail entrance and retail exit have been added to sheet 3 and sheet 9.

6. A traffic study has been submitted. BETA is in the process of reviewing the traffic study.

BETA's traffic study review comments have been received by Tetra Tech and responses will be provided separately.

BETA Group, Inc. – Site Plan Peer Review

General Comments

- G1. Provide safety fencing along the top of wall on the western end of the courtyard area that abuts the exiting walkway.

The proposed fence location has been added too the detail on sheet 9.

- G2. Provide typical details for proposed light poles and luminaires.

SK and Associates has added the requested information to sheet SL1.

- G3. Confirm the limits of existing fence to be removed, particularly in the area of the site entrance.

Three fence removal notes have been added and the existing notes have been clarified on sheet 4.

- G4. Indicate where bollards are proposed.

Proposed bollards have been added at the head in end of parking spaces 8 through 18 on sheet 3.

- G5. Indicate the limits of new pavement, pavement reconstruction, or any mill/overlay.

The limits of new paving / mill and overlay have been labeled on sheet 4.

Zoning

The Site is located within the Industrial (I) Zoning District and the Marijuana Use Overlay District. The proposed use of the Site is identified as both Medical Marijuana Treatment Center and Non-Medical Marijuana Retail Establishment. The proposed uses are allowed in the District via a Special Permit from the Planning Board.

Schedule of Lot, Area, Frontage, Yard and Height Requirements (§185 Attachment 9)

The project site will meet the requirements for lot area, frontage, lot depth, lot width, yards, height, and impervious coverage.

Parking, Loading and Driveway Requirements (§185-21)

The existing Site includes one paved access driveway from Grove Street to the west and a small parking area on the southern side of the building. The project proposes to generally retain this access route and expand the parking lot into the central portion of the lot.

Section §185-21.B.(3) describes the number of parking spaces required for residential and nonresidential buildings in the Industrial Zoning District. The parking schedule provided in the submission indicates a floor area of 8,503 sq. ft. for retailing and medical uses and 7,584 sq. ft. for warehouses. The required parking is calculated as one space per 200 sq. ft. of retail/medical uses (43 spaces) and one space per 1,000 sq. ft. for warehouse uses (6 spaces). A total of 49 spaces are required per the Bylaw and 141 spaces are proposed. With the understanding that retail marijuana uses have specific parking demands, additional commentary will be provided as part of the Traffic Review, to be provided under separate cover.

Proposed parking spaces are depicted as 19' long and 9' wide. In accordance with Massachusetts Architectural Access Board (MAAB) requirements, five parking spaces have been designed to be handicap accessible, three of which are also van accessible.

It is anticipated that the Fire Chief will review turning movements for fire equipment throughout the site.

In compliance with §185-21.C.(5), one tree must border the parking lot per every 10 parking spaces. A total of five American Elms, five Red Maples, and five White Birch trees are proposed to meet this requirement. Existing trees will also be retained near the site entrance.

P1. Clarify the limits of proposed curb adjacent to the 8' wide walkway and if curb breaks/ramps are required. It is unclear if the walkway is intended to be raised or flush with the surrounding pavement.

The walkway is proposed to be flush with the parking area and curbing is not proposed.

P2. Clarify if the proposed walkway will be reconstructed with concrete as shown on the Courtyard Area Detail or will remain bituminous concrete.

The proposed 8 foot wide walkway located southerly of the existing building will remain bituminous concrete. The limits of concrete and bituminous concrete have been labeled on the addition entry and accessible route detail on sheet 9.

P3. Indicate if an accessible route is provided internally for the northwesterly portion of the existing building. The walkway connecting to the front of this building includes a set of stairs.

The existing walkway and stairs are proposed to remain. The building will be handicap accessible .

Sidewalks (§185-28)

The project is located within the Industrial Zoning District and is not required to provide sidewalks along the street frontage. There are no existing sidewalks on Grove Street in proximity to the project.

Curbing (§185-29)

The project proposes the use of concrete curbing within the Grove Street right-of-way and along the majority of parking areas. Cape cod berm is proposed to remain along the southern side of existing parking areas.

- C1. Revise the radius curb within the Grove Street right-of-way to be granite.

Vertical Granite curbing has been added to the driveway radii at the driveway entrance at Grove Street and the labels were added. See sheet 3. A granite curbing detail has been added to sheet 7.

- C2. Recommend for the Board to discuss their preference for the use of vertical curb that is proposed to replace two short segments of existing Cape Cod berm along the south side of the site entrance.

The southerly entrance will now have vertical granite curb within Grove Street and vertical concrete curb to the terminus of the 2 foot radius.

Site Plan Review (§185-31)

The proposed development is subject to Site Plan Review and must comply with the requirements of this section.

- S1. Include abutting land uses and zoning information on the Locus Map (§185-31.C.(3)(d)).

Abutting land uses and zoning information can be found on sheets 2 – 6.

- S2. Indicate proposed snow storage locations on the plans (§185-31.C.(3)(i)).

Snow storage areas have been added to sheet 4. A note referencing zoning bylaw section 185-40D.(1))f) has been added to sheet 4.

- S3. Provide sight line information, including intersection sight distance, at the proposed driveway egress (§185-31.C.(3)(t)).

Sight distances have been provided by the applicants traffic consultant Tetra Tech. Stopping sight distances are located on the west side of Grove Street on Sheet 4.

- S4. Depict existing tree line and limits of clearing on the plans, as applicable (§185-31.C.(3)(u)).

The existing tree line and the limit of work label has been revised to include limit of clearing on sheet 4.

Screening (§185-35)

The project proposes outdoor parking for 10 or more cars, which must be screened from adjacent residential districts or uses from which they would otherwise be visible. The Site is surrounded by lots zoned as Industrial, and it does not appear that the project will be visible from any residential use; therefore, screening is unnecessary.

Water Resources District (§185-40)

The Site is partially located within the Water Resources District due to the presence of a Zone II Wellhead Protection Area. This portion of the Site includes the eastern end of the proposed parking lot.

WR1. Confirm the estimated sewage flow for the on-site disposal system does not exceed 110 gallons per 10,000 sq. ft. of lot area (§185-40.D.(1)(i)).

The requested confirmation and supporting calculations have been added to sheet 4.

WR2. Section §185-40.D.(1)(i)(ii) requires that the proposed groundwater recharge efforts must be approved by a hydrogeologist; however, provided that the stormwater management system is revised to fully comply with the Massachusetts Stormwater Management Standards no adverse impacts to groundwater are anticipated as a result of the project. BETA defers to the preference of the Board to require approval by a hydrogeologist.

The storm water system complies with Massachusetts Stormwater Management Standards. We defer to the Board on the review.

WR3. Revise design to direct all new impervious areas to on-site recharge systems (§185-40.E.(4)). BETA notes that this requirement can be waived following consultation with, and approval from the Conservation Commission and the Building Inspector if recharge is determined to be infeasible.

The project proposal consists of 20,259 sq. ft. of new impervious surfaces within the water resource district (WRD) area. The stormwater system will provide for on-site recharge of the building roof and storm water directed to CB11 which has an area of 26,416 sq. ft.

WR4. Note that any fill placed in quantity greater than 15 yards must be certified in accordance with §185-40.E.(5).

The requested note has been added to sheet 4.

Utilities

Proposed utilities include drainage, gas, and fire water services. Existing domestic water service, overhead electric, and on-site septic system will be retained. Detailed review of water and sewer utilities is anticipated to be provided by the DPW and Fire Chief (e.g. for fire hydrants), as applicable.

U1. Indicate size/material of existing water services, if available.

The fire line label has been revised to include the size and type of material.

U2. Clarify if vehicles will be able to access the warehouse internally. If so, floor drains and gas traps may be required.

Vehicles will not be able to access the building.

Stormwater Management

The project proposes to direct runoff from impervious areas into existing and new closed drainage systems comprised of roof leaders, deep sump catch basins with hoods, manholes, two water quality units, and two subsurface infiltration systems. Overflows from the proposed systems will be directed into an existing wetland system on the eastern portion of the site through an existing outfall.

General

SW1. As part of the MS4 regulations, the Town is proposing revisions to Chapter 153, Stormwater Management. Once the revisions are approved (date not yet determined) they will be applicable to any project that is subject to the Bylaw and has not yet been approved. BETA recommends the designer review the proposed Bylaw revisions to evaluate if additional stormwater provisions or treatment may be required.

We have reviewed the proposed bylaw regulations. We have revised DMH 10 which is now a Contech Cascade Separator Model CS-6. This will provide downstream treatment for the stormwater exiting the two infiltration ponds which occurs in the 10 and 100 year storm events (pond 11) and 100 year storm event (pond 10). Additional treatment will be provided for the stormwater from the existing impervious areas prior to discharging into the existing detention basin. WQU manhole # 12 has been eliminated.

SW2. Recommend labeling which drainage structures and pipes are to be removed/abandoned.

The removal protocol for the existing 15" RCP pipe connecting X-DMH3 to X-DMH2 has been added to the stormwater system construction note 3 on sheet 4.

SW3. Provide detail for CDS unit.

A detail of the proposed Contech Cascade Separator Model CS-6 has been added to sheet 9.

SW4. Provide detailed grading in the area of the dumpster pad to ensure stormwater flow is not directed through the enclosure, bypassing the stormwater management system.

A dumpster area grading detail was added to sheet 8.

Massachusetts Stormwater Management Standards:

The proposed development will disturb greater than one acre and is subject to Chapter 153: Stormwater Management of the Town of Franklin Bylaws and MassDEP Stormwater Management Standards.

No untreated stormwater (Standard Number 1): *No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

The project does not propose any new untreated stormwater discharges to wetlands. One existing outfall will be retained which discharges into the wetland areas to the east.

SW5. Indicate if there are any existing erosion control issues at the existing outfall.

A field inspection of the outfall into the existing detention pond was conducted. Erosion was not present.

Post-development peak discharge rates (Standard Number 2): *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

The project proposes an increase in impervious area and will use subsurface infiltration systems to mitigate increases in post-development peak discharge rates and total runoff volumes.

SW6. Clarify how Watershed XR-7 and R15 are being conveyed into the drainage systems.

Roof area 15 will be captured in an existing pipe within the stone trench adjacent to the building. Refer to storm water system construction notes for inspection and if necessary, construction protocol.

- SW7. Revise watershed R15 to include any upgradient areas that will drain into the drainage system and proposed infiltration systems.

The sub-catchment area on the post development watershed map was revised.

- SW8. Review grading as it relates to the contributing areas for CB11 and CB12. BETA estimates that less area is directed to CB11 (and therefore the infiltration system) than indicated in the HydroCAD model.

Refer to the 259.7 spot grade along the easterly gutter which has been included to create a high point.

Recharge to groundwater (Standard Number 3): *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to maximum extent practicable.* NRCS maps indicate the presence of Merrimac fine sandy loam, rated in hydrologic soil group (HSG) A, Sudbury fine sandy loam (HSG B), and Walpole fine sandy loam (HSG B/D). The infiltration systems have been designed to provide a recharge volume in excess of that required for the net new impervious area. Test pit logs indicate the presence of sand, silty sand, and gravel throughout the Site.

- SW9. As no mottling was observed in the test pits, a Frimpter Analysis should be conducted to adjust observed weeping to an estimated seasonal high groundwater elevation. BETA estimates the separation to ESHGW from the bottom of the proposed infiltration structures is approximately 2+ feet.

The Frimpter adjusted ESHGW elevations were added to the soil logs on sheet 4.

- SW10. Provide mounding analysis for proposed infiltration systems as separation to groundwater is less than 4 feet.

A mounding analysis has been included in the revised drainage analysis.

- SW11. Revise exfiltration elevation of subsurface infiltration systems within HydroCAD models to be the bottom of each basin.

The exfiltration elevation was revised and set at 0.01 feet below the pond bottom design elevation. This was done because of an issue with the HydroCad program not allowing exfiltration when the pond bottom elevation matches the pond storage elevation.

80% TSS Removal (Standard Number 4): *For new development, stormwater management systems must be designed to remove 80% of the annual load of Total Suspended Solids.*

The project proposes to direct runoff from new impervious areas to proposed treatment trains that include a combination of deep sump catch basins, water quality units, and subsurface infiltration systems. As the Site is partially within a Zone II Wellhead Protection Area, 44% pretreatment has been provided prior to infiltration.

- SW12. Review grading as it relates to the contributing impervious areas for the CDS and Stormceptor calculations.

Refer to the 259.7 spot grade along the easterly gutter which has been included to create a high point.

SW13. Provide documentation of third-party testing that demonstrates the 75% TSS removal rate for the CDS unit can be achieved.

The CDS unit has been revised. A detail of the proposed Contech Cascade Separator Model CS-6 has been added to sheet 9. Refer to the revised stormwater report for revised TSS Removal Rates.

Higher Potential Pollutant Loads (Standard Number 5): *Stormwater discharges from Land Uses with Higher Potential Pollutant Loads require the use of specific stormwater management BMPs.*

The project does not qualify as a Land Use with Higher Potential Pollutant Load (LUHPPL).

Critical Areas (Standard Number 6): *Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas.*

The project includes discharges to a Zone II Wellhead Protection Area, a critical area. The proposed treatment trains are consistent with the recommendations of MassDEP for discharges to Zone II wellhead protection areas. The required 44% pretreatment prior to discharge to infiltration structures is also provided.

SW14. Revise narrative to indicate the presence of a critical area.

The narrative has been revised.

Redevelopment (Standard Number 7): *Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable.*

The project qualifies as a mix of new and redevelopment. New impervious areas will comply fully with the Stormwater Management Standards, while existing areas to be retained will primarily rely on existing stormwater management systems.

SW15. Provide a brief narrative or documentation on how the project will improve the existing conditions for redevelopment areas.

A narrative has been added to the drainage analysis.

SW16. Consider relocating the proposed CDS water quality unit to the location of proposed DMH10, if practicable.

We have revised DMH 10 which is now a Contech Cascade Separator Model CS-6. This will provide downstream treatment for the stormwater existing the two infiltration ponds which occurs in the 10 and 100 year storm events (pond 11) and 100 year storm event (pond 10). Additional treatment will be provided for the stormwater from the existing impervious areas prior to discharging into the existing detention basin. WQU manhole # 12 has been eliminated.

Construction Period Erosion and Sediment Controls (Standard Number 8): *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

The project as currently depicted will disturb greater than one acre of land; therefore, a Notice of Intent with EPA and a Stormwater Pollution Prevention Plan (SWPPP) is required. The project plans indicate the use of perimeter compost sock, entry sedimentation control mat, and catch basin inlet protection. The proposed erosion and sedimentation controls are anticipated to be adequate for the site.

Operations/maintenance plan (Standard Number 9): *A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

A Long-Term Operation and Maintenance (O&M) Plan has been provided.

Illicit Discharges (Standard Number 10): *All illicit discharges to the stormwater management systems are prohibited.*

The Stormwater Management Report indicates that no illicit discharges are proposed, and a signed Illicit Discharge Compliance Statement will be provided prior to construction.

SW17. Resolve discrepancy between stormwater narrative and stormwater checklist regarding inclusion of the Illicit Discharge Compliance Statement.

The stormwater checklist has been revised. A draft of the Illicit Discharge Statement has been included.

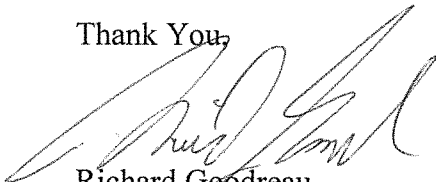
Wetland Strategies, Inc.

At the Commission's request, the riverfront area may be shown on revised plans to confirm that no proposed activity falls within the riverfront area.

The Mean Annual High Water line, depicted on the plans of record, and the inner and outer riparian zones have been added to sheet 4.

We look forward to meeting with the Planning Board to discuss this project further.

Thank You,



Richard Goodreau
Project Manager

July 16, 2020

Mr. Anthony Padula, Chairman
355 East Central Street
Franklin, MA 02038

**Re: 162 Grove Street
Site Plan Peer Review Update**

Dear Mr. Padula:

BETA Group, Inc. has reviewed revised documents for the proposed Site Plan Approval application, "**Site Layout Plan – 162 Grove Street, Franklin, Massachusetts.**" This letter is provided to update findings, comments, and recommendations.

BASIS OF REVIEW

BETA received the following items:

- **Site Plan & Special Permit Application**, including the following:
 - *Cover Letter*
 - *Application for Approval of a Site Plan and Special Permits*
 - *Exhibit 5: Special Permit Findings*
 - *Form P*
 - *Certificate of Ownership*
- Plans (10 Sheets) entitled **Site Plan 162 Grove Street** revised July 8, 2020 and prepared by United Consultants, Inc. of Wrentham, MA.
- **Drainage Analysis**, revised July 8, 2020 and prepared by United Consultants, Inc. of Wrentham, MA.
- **Traffic Summary**, dated May 22, 2020 and prepared by Tetra Tech of Marlborough, MA.

Review by BETA included the above items along with the following, as applicable:

- Site Visit
- **Zoning Chapter 185 From the Code of the Town of Franklin**, current through October 2019
- **Zoning Map of the Town of Franklin, Massachusetts**, attested to April 30, 2019
- **Stormwater Management Chapter 153 From the Code of the Town of Franklin**, Adopted May 2, 2007
- **Subdivision Regulations Chapter 300 From the Code of the Town of Franklin**, current through January 1, 2016
- **Wetlands Protection Chapter 181 From the Code of the Town of Franklin**, dated August 20, 1997
- **Town of Franklin Best Development Practices Guidebook**, dated September 2016

INTRODUCTION

The project site consists of 162 Grove Street, a vacant, developed parcel formerly used as a truck terminal (the "Site"). The parcel contains an area of 4.003 Acres and is located along the eastern side of Grove Street. The Town of Franklin Assessor's Office identifies the parcel as Map 306 Lot 3. The Site and all surrounding properties are located within the Industrial Zoning District. The parcel is also within the Marijuana Use Overlay District.

The existing Site includes a 12,800± sq. ft., one-story building. Associated site features include paved and gravel parking areas, utilities, (drainage, water, sewer, gas, and electric) fencing, and landscaping. Topography at the Site is generally sloped towards the east, and grades are typically 3% - 5%.

The applicant proposes to retain the existing building for conversion into a Medical Marijuana Treatment Center and Non-Medical Marijuana Retail Establishment. Associated site developments will include expansion of the existing parking area, a new addition to the existing building, concrete curb, utilities, lighting, and landscaping. Stormwater management is proposed through catch basins, proprietary treatment units, and two subsurface infiltration systems.

A portion of the project is located within an approved wellhead protection area (Zone II) and the Water Resource District. Wetland resource areas are located within the project limits and work is proposed within the buffer zone which will require obtaining an Order of Conditions from the Franklin Conservation Commission. The project is not located within a FEMA mapped 100-year flood zone or a NHESP mapped estimated habitat area of rare or endangered species. NRCS maps indicate the presence of Merrimac fine sandy loam, rated in hydrologic soil group (HSG) A, Sudbury fine sandy loam (HSG B), and Walpole fine sandy loam (HSG B/D).

FINDINGS, COMMENTS AND RECOMMENDATIONS

GENERAL COMMENTS

- G1. Provide safety fencing along the top of wall on the western end of the courtyard area that abuts the exiting walkway. *UCI: The proposed fence location has been added to the detail on sheet 9.* **BETA2: Fencing provided – issue resolved.**
- G2. Provide typical details for proposed light poles and luminaires. *UCI: SK and Associates has added the requested information to sheet SL1.* **BETA2: Information provided – issue resolved.**
- G3. Confirm the limits of existing fence to be removed, particularly in the area of the site entrance. *UCI: Three fence removal notes have been added and the existing notes have been clarified on sheet 4.* **BETA2: Clarification provided – issue resolved.**
- G4. Indicate where bollards are proposed. *UCI: Proposed bollards have been added to the head in end of parking spaces 8 through 18 on sheet 3.* **BETA2: Locations provided. Recommend reducing the gap between bollards/cars stops at the van accessible parking spaces to less than the width of a vehicle for pedestrian safety and security.**
- G5. Indicate the limits of new pavement, pavement reconstruction, or any mill/overlay. *UCI: The limits of new paving/mill have been labeled on sheet 4.* **BETA2: Information provided – issue resolved.**

ZONING

The Site is located within the Industrial (I) Zoning District and the Marijuana Use Overlay District. The proposed use of the Site is identified as both Medical Marijuana Treatment Center and Non-Medical Marijuana Retail Establishment. The proposed uses are allowed in the District via a Special Permit from the Planning Board.

SCHEDULE OF LOT, AREA, FRONTAGE, YARD AND HEIGHT REQUIREMENTS (§185 ATTACHMENT 9)

The project site will meet the requirements for lot area, frontage, lot depth, lot width, yards, height, and impervious coverage.

PARKING, LOADING AND DRIVEWAY REQUIREMENTS (§185-21)

The existing Site includes one paved access driveway from Grove Street to the west and a small parking area on the southern side of the building. The project proposes to generally retain this access route and expand the parking lot into the central portion of the lot.

Section §185-21.B.(3) describes the number of parking spaces required for residential and nonresidential buildings in the Industrial Zoning District. The parking schedule provided in the submission indicates a floor area of 8,503 sq. ft. for retailing and medical uses and 7,584 sq. ft. for warehouses. The required parking is calculated as one space per 200 sq. ft. of retail/medical uses (43 spaces) and one space per 1,000 sq. ft. for warehouse uses (6 spaces). A total of 49 spaces are required per the Bylaw and 141 spaces are proposed. With the understanding that retail marijuana uses have specific parking demands, additional commentary will be provided as part of the Traffic Review, to be provided under separate cover.

Proposed parking spaces are depicted as 19' long and 9' wide. In accordance with Massachusetts Architectural Access Board (MAAB) requirements, five parking spaces have been designed to be handicap accessible, three of which are also van accessible.

It is anticipated that the Fire Chief will review turning movements for fire equipment throughout the site.

In compliance with §185-21.C.(5), one tree must border the parking lot per every 10 parking spaces. A total of five American Elms, five Red Maples, and five White Birch trees are proposed to meet this requirement. Existing trees will also be retained near the site entrance.

- P1. Clarify the limits of proposed curb adjacent to the 8' wide walkway and if curb breaks/ramps are required. It is unclear if the walkway is intended to be raised or flush with the surrounding pavement. *UCI: The walkway is proposed to be flush with the parking area and curbing is not proposed. BETA2: Information provided – issue resolved.*
- P2. Clarify if the proposed walkway will be reconstructed with concrete as shown on the Courtyard Area Detail or will remain bituminous concrete. *UCI: The proposed 8 foot wide walkway located southerly of the existing building will remain bituminous concrete. The limits of concrete and bituminous concrete have been labeled on the additional entry and accessible route detail on sheet 9. BETA2: Clarification provided – issue resolved.*
- P3. Indicate if an accessible route is provided internally for the northwesterly portion of the existing building. The walkway connecting to the front of this building includes a set of stairs. *UCI: The existing walkway and stairs are proposed to remain. The building will be handicap accessible.*

BETA2: Information provided. BETA defers to the Building Commissioner to evaluate internal access when a building permit is filed.

SIDEWALKS (§185-28)

The project is located within the Industrial Zoning District and is not required to provide sidewalks along the street frontage. There are no existing sidewalks on Grove Street in proximity to the project.

CURBING (§185-29)

The project proposes the use of concrete curbing within the Grove Street right-of-way and along the majority of parking areas. Cape cod berm is proposed to remain along the southern side of existing parking areas.

- C1. Revise the radius curb within the Grove Street right-of-way to be granite. *UCI: Vertical granite curbing has been added to the driveway radii at the driveway entrance at Grove Street and the labels were added see sheet 3. A granite curbing detail has been added to sheet 7.* **BETA2: Curb material revised – issue resolved.**
- C2. Recommend for the Board to discuss their preference for the use of vertical curb that is proposed to replace two short segments of existing Cape Cod berm along the south side of the site entrance. *UCI: The southerly entrance will now have vertical granite curb within Grove Street and vertical concrete curb to the terminus of the 2 foot radius.* **BETA2: No further comment.**

SITE PLAN REVIEW (§185-31)

The proposed development is subject to Site Plan Review and must comply with the requirements of this section.

- S1. Include abutting land uses and zoning information on the Locus Map (§185-31.C.(3)(d)). *UCI: Abutting land uses and zoning information can be found on sheets 2-6.* **BETA2: Information provided – issue resolved.**
- S2. Indicate proposed snow storage locations on the plans (§185-31.C.(3)(i)). *UCI: Snow storage areas have been added to sheet 4. A note referencing zoning bylaw section §185-40D(1)(j) has been added to sheet 4.* **BETA2: Snow storage areas provided – issue resolved.**
- S3. Provide sight line information, including intersection sight distance, at the proposed driveway egress (§185-31.C.(3)(t)). *UCI: Sight distances have been provided by the applicants traffic consultant Tetra Tech. Stopping sight distances are located on the west side of Grove Street on Sheet 4.* **BETA2: Refer to traffic analysis provided under separate cover.**
- S4. Depict existing tree line and limits of clearing on the plans, as applicable (§185-31.C.(3)(u)). *UCI: The existing tree line and the limit of work label has been revised to include limit of clearing on sheet 4.* **BETA2: Information provided – issue resolved.**

SCREENING (§185-35)

The project proposes outdoor parking for 10 or more cars, which must be screened from adjacent residential districts or uses from which they would otherwise be visible. The Site is surrounded by lots

zoned as Industrial, and it does not appear that the project will be visible from any residential use; therefore, screening is unnecessary.

WATER RESOURCES DISTRICT (§185-40)

The Site is partially located within the Water Resources District due to the presence of a Zone II Wellhead Protection Area. This portion of the Site includes the eastern end of the proposed parking lot.

- WR1. Confirm the estimated sewage flow for the on-site disposal system does not exceed 110 gallons per 10,000 sq. ft. of lot area (§185-40.D.(1)(i)). *UCI: The requested confirmation and supporting calculations have been added to sheet 4.* **BETA2: Information provided – issue resolved.**
- WR2. Section §185-40.D.(1)(l)(ii) requires that the proposed groundwater recharge efforts must be approved by a hydrogeologist; however, provided that the stormwater management system is revised to fully comply with the Massachusetts Stormwater Management Standards no adverse impacts to groundwater are anticipated as a result of the project. BETA defers to the preference of the Board to require approval by a hydrogeologist. *UCI: The stormwater system complies with Massachusetts Stormwater Management Standards. We defer to the Board on the review.* **BETA2: BETA defers to the preference of the Board on this issue.**
- WR3. Revise design to direct all new impervious areas to on-site recharge systems (§185-40.E.(4)). BETA notes that this requirement can be waived following consultation with, and approval from the Conservation Commission and the Building Inspector if recharge is determined to be infeasible. *UCI: The project proposal consists of 20,259 sq. ft. of new impervious surfaces within the water resource district (WRD) area. The stormwater system will provide for on-site recharge of the building roof and stormwater directed to CB1 which has an area of 26,416 sq. ft.* **BETA2: Information provided – issue resolved.**
- WR4. Note that any fill placed in quantity greater than 15 yards must be certified in accordance with §185-40.E.(5). *UCI: The requested note has been added to sheet 4.* **BETA2: Note provided – issue resolved.**

UTILITIES

Proposed utilities include drainage, gas, and fire water services. Existing domestic water service, overhead electric, and on-site septic system will be retained. Detailed review of water and sewer utilities is anticipated to be provided by the DPW and Fire Chief (e.g. for fire hydrants), as applicable.

- U1. Indicate size/material of existing water services, if available. *UCI: The fire line label has been revised to include the size and type of material.* **BETA2: Information provided – issue resolved.**
- U2. Clarify if vehicles will be able to access the warehouse internally. If so, floor drains and gas traps may be required. *UCI: Vehicles will not be able to access the building.* **BETA2: BETA notes the existing entrance on the east side of the building may provide access for vehicles. BETA defers to the plumbing inspector to determine if bollards are required if no floor drains and gas traps are installed.**

STORMWATER MANAGEMENT

The project proposes to direct runoff from impervious areas into existing and new closed drainage systems comprised of roof leaders, deep sump catch basins with hoods, manholes, two water quality units, and two subsurface infiltration systems. Overflows from the proposed systems will be directed into an existing wetland system on the eastern portion of the site through an existing outfall.

GENERAL

- SW1. As part of the MS4 regulations, the Town is proposing revisions to Chapter 153, Stormwater Management. Once the revisions are approved (date not yet determined) they will be applicable to any project that is subject to the Bylaw and has not yet been approved. BETA recommends the designer review the proposed Bylaw revisions to evaluate if additional stormwater provisions or treatment may be required. *UCI: We have reviewed the proposed bylaw regulations. We have revised DMH 10 which is now a Contech Cascade Separator Model CS-6. This will provide downstream treatment for the stormwater existing the two infiltration ponds which occurs in the 10 and 100 year storm events (pond 11) and 100 year storm event (pond 10). Additional treatment will be provided for the stormwater from the existing impervious areas prior to discharging into the existing detention basin. WQU manhole #12 has been eliminated.* **BETA2: The designer has revised the stormwater management system to provide additional treatment, which is anticipated to comply with the forthcoming regulations – issue resolved.**
- SW2. Recommend labeling which drainage structures and pipes are to be removed/abandoned. *UCI: The removal protocol for the existing 15" RCP pipe connecting X-DMH3 to X-DMH2 has been added to the stormwater system construction note 3 on sheet 4.* **BETA2: Information provided – issue resolved.**
- SW3. Provide detail for CDS unit. *UCI: A detail of the proposed Contech Cascade Separator Model CS-6 has been added to sheet 9.* **BETA2: Detail provided – issue resolved.**
- SW4. Provide detailed grading in the area of the dumpster pad to ensure stormwater flow is not directed through the enclosure, bypassing the stormwater management system. *UCI: A dumpster grading detail was added to sheet 8.* **BETA2: Grading detail provided – issue resolved.**

MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS:

The proposed development will disturb greater than one acre and is subject to Chapter 153: Stormwater Management of the Town of Franklin Bylaws and MassDEP Stormwater Management Standards.

No untreated stormwater (Standard Number 1): *No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

The project does not propose any new untreated stormwater discharges to wetlands. One existing outfall will be retained which discharges into the wetland areas to the east.

- SW5. Indicate if there are any existing erosion control issues at the existing outfall. *UCI: A field investigation of the outfall into the existing detention basin was conducted. Erosion was not present.* **BETA2: Information provided – issue resolved.**

Post-development peak discharge rates (Standard Number 2): *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

The project proposes an increase in impervious area and will use subsurface infiltration systems to mitigate increases in post-development peak discharge rates and total runoff volumes.

SW6. Clarify how Watershed XR-7 and R15 are being conveyed into the drainage systems. *UCI: Roof area 15 will be captured in an existing pipe within the stone trench adjacent to the building. Refer to stormwater system construction notes for inspection and necessary construction protocol.* **BETA2: Information provided – issue resolved.**

SW7. Revise watershed R15 to include any upgradient areas that will drain into the drainage system and proposed infiltration systems. *UCI: The sub-catchment area on the post development watershed map was revised.* **BETA2: Information provided – issue resolved.**

SW8. Review grading as it relates to the contributing areas for CB11 and CB12. BETA estimates that less area is directed to CB11 (and therefore the infiltration system) than indicated in the HydroCAD model. *UCI: Refer to the 259.7 spot grade along the easterly gutter which has been included to create a high point.* **BETA2: Information provided – issue resolved.**

Recharge to groundwater (Standard Number 3): *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to maximum extent practicable.*

NRCS maps indicate the presence of Merrimac fine sandy loam, rated in hydrologic soil group (HSG) A, Sudbury fine sandy loam (HSG B), and Walpole fine sandy loam (HSG B/D). The infiltration systems have been designed to provide a recharge volume in excess of that required for the net new impervious area. Test pit logs indicate the presence of sand, silty sand, and gravel throughout the Site.

SW9. As no mottling was observed in the test pits, a Frimpter Analysis should be conducted to adjust observed weeping to an estimated seasonal high groundwater elevation. BETA estimates the separation to ESHGW from the bottom of the proposed infiltration structures is approximately 2+ feet. *UCI: The Frimpter adjusted ESHGW elevations were added to the soil logs on sheet 4.* **BETA2: Information provided – issue resolved.**

SW10. Provide mounding analysis for proposed infiltration systems as separation to groundwater is less than 4 feet. *UCI: A mounding analysis has been included in the revised drainage analysis.* **BETA2: Mounding analysis provided – issue resolved.**

SW11. Revise exfiltration elevation of subsurface infiltration systems within HydroCAD models to be the bottom of each basin. *UCI: The exfiltration elevation was revised and set 0.01 feet below the pond bottom design elevation. This was done because of an issue with the HydroCAD program not allowing exfiltration when the pond bottom elevation matches the pond storage elevation.* **BETA2: Elevation revised – issue resolved.**

80% TSS Removal (Standard Number 4): *For new development, stormwater management systems must be designed to remove 80% of the annual load of Total Suspended Solids.*

The project proposes to direct runoff from new impervious areas to proposed treatment trains that include a combination of deep sump catch basins, water quality units, and subsurface infiltration systems. As the Site is partially within a Zone II Wellhead Protection Area, 44% pretreatment has been provided prior to infiltration.

SW12. Review grading as it relates to the contributing impervious areas for the CDS and Stormceptor calculations. *UCI: Refer to the 259.7 spot grade along the easterly gutter which has been included to create a high point. BETA2: Information provided – issue resolved.*

SW13. Provide documentation of third-party testing that demonstrates the 75% TSS removal rate for the CDS unit can be achieved. *UCI: The CDS unit has been revised. A detail of the proposed Contech Cascade Separator Model CS-6 has been added to sheet 9. Refer to the revised stormwater report for revised TSS removal rates. BETA2: TSS rate revised – issue resolved.*

Higher Potential Pollutant Loads (Standard Number 5): *Stormwater discharges from Land Uses with Higher Potential Pollutant Loads require the use of specific stormwater management BMPs.*

The project does not qualify as a Land Use with Higher Potential Pollutant Load (LUHPPL).

Critical Areas (Standard Number 6): *Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas.*

The project includes discharges to a Zone II Wellhead Protection Area, a critical area. The proposed treatment trains are consistent with the recommendations of MassDEP for discharges to Zone II wellhead protection areas. The required 44% pretreatment prior to discharge to infiltration structures is also provided.

SW14. Revise narrative to indicate the presence of a critical area. *UCI: The narrative has been revised. BETA2: Narrative revised – issue resolved.*

Redevelopment (Standard Number 7): *Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable.*

The project qualifies as a mix of new and redevelopment. New impervious areas will comply fully with the Stormwater Management Standards, while existing areas to be retained will primarily rely on existing stormwater management systems.

SW15. Provide a brief narrative or documentation on how the project will improve the existing conditions for redevelopment areas. *UCI: A narrative has been added to the drainage analysis. BETA2: Narrative provided – issue resolved.*

SW16. Consider relocating the proposed CDS water quality unit to the location of proposed DMH10, if practicable. *UCI: We have revised DMH 10 which is now a Contech Cascade Separator Model CS-6. This will provide downstream treatment for the stormwater existing the two infiltration ponds which occurs in the 10 and 100 year storm events (pond 11) and 100 year storm event (pond 10). Additional treatment will be provided for the stormwater from the existing impervious areas prior to discharging into the existing detention basin. WQU manhole #12 has been eliminated. BETA2: Water quality unit location revised to provide additional treatment – issue resolved.*

Construction Period Erosion and Sediment Controls (Standard Number 8): *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

The project as currently depicted will disturb greater than one acre of land; therefore, a Notice of Intent with EPA and a Stormwater Pollution Prevention Plan (SWPPP) is required. The project plans indicate the use of perimeter compost sock, entry sedimentation control mat, and catch basin inlet protection. The proposed erosion and sedimentation controls are anticipated to be adequate for the site.

Operations/maintenance plan (Standard Number 9): *A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

Mr. Anthony Padula, Chairman

July 16, 2020

Page 9 of 9

A Long-Term Operation and Maintenance (O&M) Plan has been provided.

Illicit Discharges (Standard Number 10): *All illicit discharges to the stormwater management systems are prohibited.*

The Stormwater Management Report indicates that no illicit discharges are proposed, and a signed Illicit Discharge Compliance Statement will be provided prior to construction.

SW17. Resolve discrepancy between stormwater narrative and stormwater checklist regarding inclusion of the Illicit Discharge Compliance Statement. *UCI: The stormwater checklist has been revised. A draft of the illicit discharge statement has been included.* **BETA2: The signed statement should be provided to DEP and the Conservation Commission prior to construction.**

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.



Matthew J. Crowley, PE
Project Manager



Stephen Borgatti
Staff Engineer

cc: Amy Love, Planner
Jen Delmore, Conservation Agent



TOWN OF FRANKLIN

DEPARTMENT OF PUBLIC WORKS

Franklin Municipal Building

257 Fisher Street

Franklin, MA 02038-3026

July 22, 2020

Mr. Anthony Padula, Chairman
Members of the Franklin Planning Board
355 East Central Street
Franklin, MA 02038

RE: Site Plan and Special Permit – #162 Grove St

Dear Mr. Chairman and Members:

We have reviewed the revised materials for the subject project and our previous comments have been addressed.

Should you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Michael Maglio, P.E.
Town Engineer



**FRANKLIN PLANNING & COMMUNITY
DEVELOPMENT**

355 EAST CENTRAL STREET, ROOM 120
FRANKLIN, MA 02038-1352
TELEPHONE: 508-520-4907

MEMORANDUM

DATE: July 23, 2020
TO: Franklin Planning Board
FROM: Department of Planning and Community Development
RE: 162 Grove Street – NETA
Special Permit & Site Plan Modification

The DPCD has reviewed the above referenced Special Permit & Site Plan Modification application for the Monday, July 27, 2020 Planning Board meeting and offers the following commentary:

General:

1. The site is approximately 4 acres and is located at 162 Grove Street in the Industrial Zoning and Marijuana Overlay District; Assessor's Map 306 Lot 003.
2. Applicant has filed for a Special Permit: To allow Non-medical marijuana facility under 185 Attachment 3, Part II Section 2.23
3. The footprint of the existing buildings is approximately 12,421 square feet. NETA proposes to expand the existing buildings, as shown on the proposed Site Plans and to convert the existing buildings into approximately 3,856 square feet of retail space, approximately 4,647 square feet of office space, and approximately 7,584 square feet of warehouse space. There will be no product manufacturing, testing or research operations at the Facility.
4. Letters were received from the Fire Department, Town Engineer and BETA.
5. Applicant has filed with the Conservation Commission.
6. Applicant has received recommendation from Design Review.

Records on File:

1. Application for Site Plan and Special Permit
2. Certificate of Ownership
3. Special Permit Criteria
4. Abutters certified mailing
5. Overview of Proposed project and Special Permit Findings
6. Site Plans
7. Traffic Study
8. Stormwater Management Plans

Comments from the June 29 Meeting:

1. Add bollards from parking spaces 8-18. *Applicants has provided bollards.*
2. Show the snow storage areas. *Applicant has provided snow storage on site.*
3. Show the location of the plantings. *Applicant has not provided a revised landscape plan.*
4. Traffic – the following concerns were raised:
 - a. The traffic counts were used from the Northampton location, may be inadequate for this location.
 - b. Chair Padula stated concern about the traffic on Grove Street and stated that a signal at the intersection of Washington Street and Grove Street should be looked into.
 - c. Mr. Roundeau requested a letter from the Police Department.
 - d. The Planning Board may want to consider Traffic Mitigation measures.
5. The applicant has submitted and received a recommendation for a sign, however the sign location is not shown on the plans. *Applicant says they will apply when the design is completed.*
6. Due to COVID-19 regulations, is there an entrance only and exit only doors provided? Show on the plans how the customers will enter and exit the building. *Applicant has provided details on the plan.*

DPCD has no further comments.

ROLE CALL VOTE:

This determination shall be in addition to the following specific findings:

Special Permit VOTE for USE: §185 Attachment 3 Section 2.23 – Non-Medical Marijuana facility

If you vote NO on any of the following, please state reason why you are voting NO:

(1) Special Permit: To allow retail marijuana in the Marijuana use overlay district.

(a) Proposed project addresses or is consistent with neighborhood or Town need.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO
William David	YES	NO			

(b) Vehicular traffic flow, access and parking and pedestrian safety are properly addressed.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO
William David	YES	NO			

(c) Public roadways, drainage, utilities and other infrastructure are adequate or will be upgraded to accommodate development.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO
William David	YES	NO			

(d) Neighborhood character and social structure will not be negatively impacted.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO
William David	YES	NO			

(e) Project will not destroy or cause substantial damage to any environmentally-significant natural resource, habitat, or feature or, if it will, proposed mitigation, remediation, replication or compensatory measures are adequate.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO
William David	YES	NO			

(f) Number, height, bulk, location and siting of building(s) and structure(s) will not result in abutting properties being deprived of light or fresh air circulation or being exposed to flooding or subjected to excessive noise, odor, light, vibrations, or airborne particulates.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO
William David	YES	NO			

(g) Water consumption and sewer use, taking into consideration current and projected future local water supply and demand and wastewater treatment capacity, will not be excessive.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO

William David YES NO

The proposed use will not have adverse effects which overbalance its beneficial effects on either the neighborhood or the Town, in view of the particular characteristics of the site and of the proposal in relation to that site.

Anthony Padula	YES	NO	Joseph Halligan	YES	NO
Rick Power	YES	NO	Gregory Rondeau	YES	NO
William David	YES	NO			

STANDARD CONDITIONS OF APPROVAL

1. This Special Permit shall not be construed to run with the land and shall run with the Site Plan as endorsed by the Planning Board. A new Special Permit shall be required from the Planning Board if any major change of use or major change to the site plan is proposed.
2. This Special Permit shall lapse if a substantial use or construction has not begun, except for good cause, within twenty four (24) months of approval, unless the Board grants an extension. No final Certificate of Occupancy shall be issued until all requirements of the Special Permit have been completed to the satisfaction of the Board unless the applicant has submitted a Partial Certificate of Completion for the remainder of the required improvements and received approval by the Planning Board. The applicant's engineer or surveyor, upon completion of all required improvements, shall submit a Certificate of Completion. The Board or its agent(s) shall complete a final inspection of the site upon filing of the Certificate of Completion by the applicant. Said inspection is further outlined in condition #4.
3. Construction or operations under this Special Permit shall conform to any subsequent amendment of the Town of Franklin Zoning Bylaw (§185) unless the use or construction is commenced within a period of six (6) months after the issuance of this Special Permit and, in cases involving construction, unless such construction is continued through to completion as continuously and expeditiously as is reasonable.
4. **The Planning Board will use outside consultant services to complete construction inspections upon the commencement of construction.** The Franklin Department of Public Works Director, directly and through employees of the Department of Public Works and outside consultant services shall act as the Planning Board's inspector to assist the Board with inspections necessary to ensure compliance with all relevant laws, regulations and Planning Board approved plan specifications. Such consultants shall be selected and retained upon a majority vote of the Board.
5. Actual and reasonable costs of inspection consulting services shall be paid by the owner/applicant before or at the time of the pre-construction meeting. Should additional inspections be required beyond the original scope of work, the owner/applicant shall be required to submit fees prior to the issuance of a Final Certificate of Completion by the Planning Board (Form H). Said inspection is further outlined in condition #4.
6. No alteration of the Special Permit and the plans associated with it shall be made or affected other than by an affirmative vote of the members of the Board at a duly posted meeting and upon the issuance of a written amended decision.
7. All applicable laws, by-laws, rules, regulations, and codes shall be complied with, and all necessary licenses, permits and approvals shall be obtained by the owner/applicant.

8. Prior to the endorsement of the site plan, the following shall be done:
 - The owner/applicant shall make a notation on the site plan that references the Special Permit and the conditions and dates of this Certificate of Vote.
 - A notation shall be made on the plans that all erosion mitigation measures shall be in place prior to major construction or soil disturbance commencing on the site.
 - All outstanding invoices for services rendered by the Town's Engineers and other reviewing Departments of the Town relative to their review of the owner/applicant's application and plans shall have been paid in full.
 - The owner/applicant shall submit a minimum of six copies of the approved version of the plan.
9. Prior to any work commencing on the subject property, the owner/applicant shall provide plans to limit construction debris and materials on the site. In the event that debris is carried onto any public way, the owner/applicant and his assigns shall be responsible for all cleanup of the roadway. All cleanups shall occur within twenty-four (24) hours after first written notification to the owner/applicant by the Board or its designee. Failure to complete such cleanup may result in suspension of construction of the site until such public way is clear of debris.
10. The owner/applicant shall install erosion control devices as necessary and as directed by the Town's Construction Inspector.
11. **Prior to construction activities, there shall be a pre-construction meeting with the owner/applicant, and his contractor(s), the Department of Public Works and the Planning Board's Inspector.**
12. Any signage requires the Applicant to file with the Design Review Commission.
13. Prior to the endorsement, the Certificate of Vote and Order of Conditions shall be added to the Site Plans.

OPERATION AND MAINTENANCE PLAN

CONSTRUCTION PHASE

1. THE OWNERS REPRESENTATIVE, NAME AND PHONE NUMBER TO BE PROVIDED, SHALL BE THE RESPONSIBLE PARTY FOR THE STORMWATER MAINTENANCE PLAN.
2. THE SITE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES WEEKLY AND AFTER ALL RAIN EVENTS.
3. SEDIMENT SHALL BE REMOVED FROM COMPOST SOCK WHEN A MAXIMUM DEPTH OF 6" IS OBSERVED OR AS NEEDED.
4. CONSTRUCTION ENTRY MAT SHALL BE INSPECTED WEEKLY AND AFTER ALL RAIN EVENTS. SEE DETAIL FOR MAINTENANCE REQUIREMENTS.
5. DAMAGED OR DETERIORATED COMPOST SOCK AREAS SHALL BE REPLACED IMMEDIATELY.
6. EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETED AND ALL DISTURBED AREAS ARE STABILIZED.
7. SILT SAKS SHALL BE INSTALLED AT ALL CATCH BASINS EXISTING AND PROPOSED AND SHALL BE INSPECTED WEEKLY AND AFTER ALL RAIN EVENTS.
8. CLEANING OF SILT SAKS SHALL BE COMPLETED AS NECESSARY.
9. THE WATER QUALITY UNITS SHALL BE CLEANED WITH A VACUUM TRUCK.

INSPECTION AND MAINTENANCE SCHEDULE:

1. INSPECTIONS SHALL BE CONDUCTED BY THE APPLICANTS ENGINEER, CONTRACTOR AND / OR REPRESENTATIVES OF THE TOWN AS NECESSARY. AT A MINIMUM INSPECTIONS SHALL BE CONDUCTED ON A MONTHLY BASIS.
2. MONTHLY INSPECTIONS SHALL INCLUDE THE PARKING LOT SURFACE TO DETERMINE IF ACCUMULATED SEDIMENTS ARE TO BE REMOVED.
3. INSPECTIONS OF THE WATER QUALITY UNITS TO DETERMINE DEPTH OF SEDIMENT AND REQUIRED CLEANING.
4. INSPECTION OF THE EXISTING AND PROPOSED CATCH BASINS TO DETERMINE THE DEPTH OF SEDIMENT AND REQUIRED CLEANING.
5. INSPECTION OF POND 10 AND POND 11 TO DETERMINE IF CLEANING IS NECESSARY.

OPERATION AND MAINTENANCE SCHEDULE

CONSTRUCTION PHASE:

1. THE EROSION CONTROL BARRIERS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER ALL STORM EVENTS.
2. ONCE THE PARKING LOT HAS BEEN PAVED DAILY INSPECTIONS SHALL BE CONDUCTED TO DETERMINE THE NECESSITY TO REMOVE ANY ACCUMULATED SEDIMENT. THE REMOVAL OF THE ACCUMULATED SEDIMENT SHALL BE COMPLETED ON THE DAY THE DETERMINATION IS MADE.
3. SILT SAKS SHALL BE INSTALLED AT ALL STORMCEPTOR AND CDS UNITS AS WELL AS ALL EXISTING AND PROPOSED CATCH BASINS. SILT SAKS, ONCE INSTALLED SHALL BE INSPECTED ON A WEEKLY BASIS AND CLEANED AS NECESSARY.
4. THE WATER QUALITY UNITS SHALL BE INSPECTED ON A WEEKLY BASIS AND CLEANED WHEN THE SEDIMENT DEPTH REACHES 8"
5. THE PONDS SHALL BE INSPECTED AFTER EACH STORM EVENT AND CLEANED WHEN 2" OF SEDIMENT HAS ACCUMULATED AT THE INLET. ANY TRASH OR CONSTRUCTION DEBRIS SHALL BE IMMEDIATELY REMOVED.

ADDITIONAL EROSION CONTROLS MAY BE REQUIRED DEPENDING ON ACTUAL FIELD CONDITIONS DURING CONSTRUCTION.

LONG TERM:

1. THE PARKING LOT SHALL BE SWEEPED TWICE PER YEAR WITH ONE BEING AFTER THE LAST WINTER SANDING.
2. THE WATER QUALITY UNITS SHALL BE INSPECTED 4 TIMES PER YEAR AND SEDIMENT REMOVED WHEN THE DEPTH REACHES 8 INCHES.
3. THE PONDS SHALL BE INSPECTED AND PREVENTIVE MAINTENANCE PERFORMED TWICE PER YEAR. THE PONDS SHALL BE INSPECTED AFTER EVERY STORM EVENT EXCEEDING 1 INCH OF RAINFALL FOR THE FIRST 3 MONTHS AND THEN TWICE PER YEAR THEREAFTER AND WHEN THERE ARE DISCHARGES THROUGH THE HIGH OUTLET.
4. DURING INSPECTIONS OF STORM-WATER FACILITIES ANY TRASH OR DEBRIS DISCOVERED SHALL BE IMMEDIATELY REMOVED.

SITE PLAN
OPERATION AND MAINTENANCE PLAN AND
AND STORMWATER FACILITIES PLAN
 162 GROVE STREET
 FRANKLIN, MASSACHUSETTS
 PREPARED FOR
 NEW ENGLAND TREATMENT ACCESS, LLC
 5 FORGE PARKWAY
 FRANKLIN, MASSACHUSETTS
 MAY 21, 2020
 SCALE: 1" = 30'

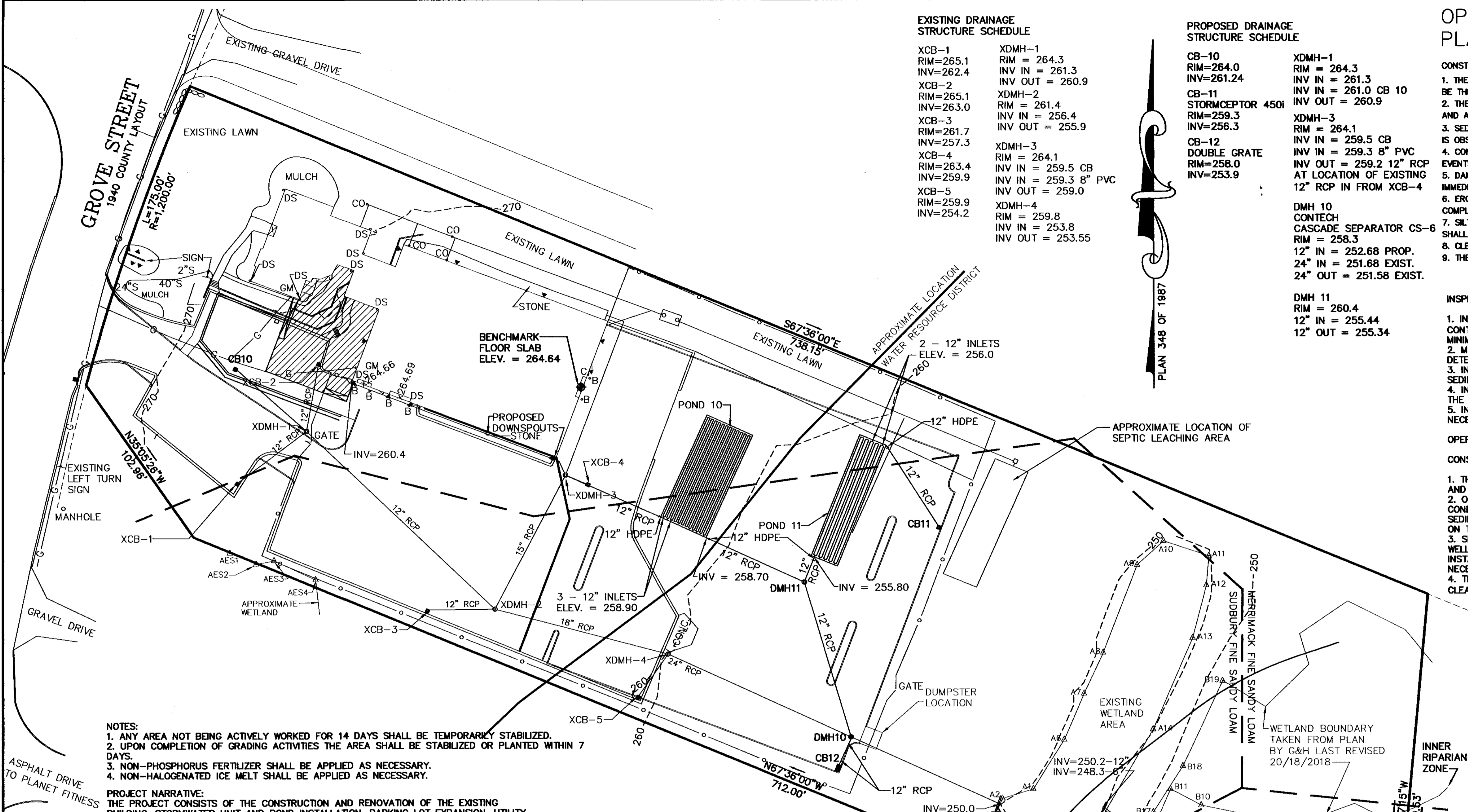
PROPOSED DRAINAGE STRUCTURE SCHEDULE

CB-10 RIM=264.0 INV=261.24	XDMH-1 RIM = 264.3 INV IN = 261.3 INV OUT = 260.9
CB-11 STORMCEPTOR 450i RIM=259.3 INV=256.3	XDMH-2 RIM = 261.4 INV IN = 256.4 INV OUT = 255.9
CB-12 DOUBLE GRATE RIM=258.0 INV=253.9	XDMH-3 RIM = 264.1 INV IN = 259.5 CB INV IN = 259.3 8" PVC INV OUT = 259.0
	XDMH-4 RIM = 259.8 INV IN = 253.8 INV OUT = 253.55
	DMH 10 CONTECH CASCADE SEPARATOR CS-6 RIM = 258.3 12" IN = 252.68 PROP. 24" IN = 251.68 EXIST. 24" OUT = 251.58 EXIST.
	DMH 11 RIM = 260.4 12" IN = 255.44 12" OUT = 255.34

EXISTING DRAINAGE STRUCTURE SCHEDULE

XCB-1 RIM=265.1 INV=262.4	XDMH-1 RIM = 264.3 INV IN = 261.3 INV OUT = 260.9
XCB-2 RIM=265.1 INV=263.0	XDMH-2 RIM = 261.4 INV IN = 256.4 INV OUT = 255.9
XCB-3 RIM=261.7 INV=257.3	XDMH-3 RIM = 264.1 INV IN = 259.5 CB INV IN = 259.3 8" PVC INV OUT = 259.0
XCB-4 RIM=263.4 INV=259.9	XDMH-4 RIM = 259.8 INV IN = 253.8 INV OUT = 253.55
XCB-5 RIM=259.9 INV=254.2	

PLAN 348 OF 1987



- NOTES:**
1. ANY AREA NOT BEING ACTIVELY WORKED FOR 14 DAYS SHALL BE TEMPORARILY STABILIZED.
 2. UPON COMPLETION OF GRADING ACTIVITIES THE AREA SHALL BE STABILIZED OR PLANTED WITHIN 7 DAYS.
 3. NON-PHOSPHORUS FERTILIZER SHALL BE APPLIED AS NECESSARY.
 4. NON-HALOGENATED ICE MELT SHALL BE APPLIED AS NECESSARY.

PROJECT NARRATIVE:
 THE PROJECT CONSISTS OF THE CONSTRUCTION AND RENOVATION OF THE EXISTING BUILDING, STORMWATER UNIT AND POND INSTALLATION, PARKING LOT EXPANSION, UTILITY CONNECTIONS AND LANDSCAPING. UPON RECEIPT OF ALL NECESSARY APPROVALS THE APPLICANT WILL FILE FOR AND OBTAIN THE NECESSARY ADDITIONAL PERMITS INCLUDING WATER CONNECTION PERMITS, STREET OPENING PERMITS AND BUILDING PERMIT. UPON SECURING ALL THE NECESSARY PERMITS THE PROJECT WILL MOVE TO THE CONSTRUCTION PHASE AND WILL BE COMPLETED BASED ON THE CONSTRUCTION SEQUENCE.

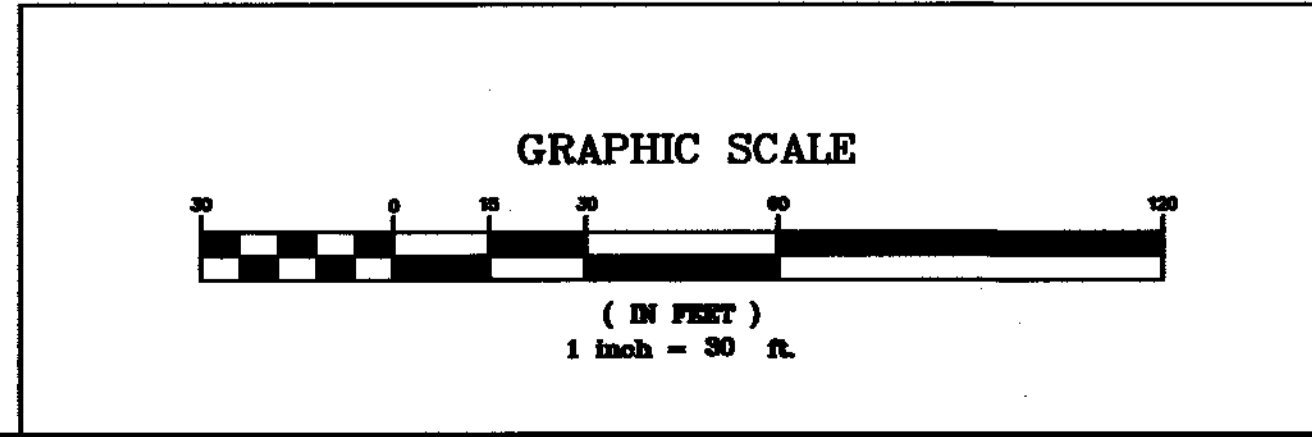
- CONSTRUCTION SEQUENCE:**
1. INSTALL COMPOST SOCK, SILT SAKS AND ENTRY MAT.
 2. RECORD ORDER OF CONDITIONS AND INSTALL DEP SIGN.
 3. EXCAVATE FOR BUILDING ADDITION FOUNDATION.
 4. FORM AND POUR BUILDING FOOTINGS AND FOUNDATION.
 5. UPON ADEQUATE CURING OF THE FOUNDATION CONCRETE THE FOUNDATION SHALL BE BACKFILLED TO SUBGRADE.
 6. CONSTRUCT BUILDING SIMULTANEOUSLY WITH THE FOLLOWING SITE WORK.
 7. BRING THE REMAINDER OF THE SITE TO SUBGRADE.
 8. INSTALL THE UNDERGROUND UTILITIES - WATER, GAS AND DRAINAGE.
 9. UPON COMPLETION OF THE UNDERGROUND UTILITIES, BRING THE PARKING AREAS TO PROPER GRADES WITH GRAVEL.
 10. PAVE THE PARKING AREAS WITH THE BINDER COURSE.
 11. INSTALL THE CURBING, THE DUMPSTER PAD AND THE FENCE.
 12. LOAM ALL DISTURBED AREAS.
 13. PLANT SITE TREES.
 14. PAVE THE PARKING AREA WITH THE TOP COURSE.
 15. IF NECESSARY COMPLETE AN AS-BUILT PLAN AND SUBMIT A FORM H.

EROSION CONTROL NOTES:

1. COMPOST SOCK SHALL BE INSTALLED PRIOR TO TREE CLEARING OR SITE WORK COMMENCING.
2. ENTRY MAT TO BE INSTALLED.
3. COMPOST SOCK TO REMAIN IN CONTACT WITH THE EARTH. REPAIR OR RESET AS NECESSARY.
4. NO SLOPES GREATER THAN 3' HORIZONTAL TO 1' VERTICAL ARE PROPOSED.
5. WATER QUALITY UNITS, CATCH BASINS, UNDERGROUND PONDS AND PARKING AREA TO BE CLEANED ONCE CONSTRUCTION IS COMPLETED.
6. ALL SEDIMENT COLLECTED DURING THE CONSTRUCTION PHASE OR POST CONSTRUCTION PHASE SHALL BE DISPOSED OF TO AN APPROVED LOCATION.
7. AFTER ALL DISTURBED AREAS HAVE BEEN STABILIZED THE EROSION CONTROL MEASURES SHALL BE REMOVED.
8. DAMAGED OR DETERIORATED EROSION CONTROL MEASURES SHALL BE REPAIRED OR REPLACED IMMEDIATELY AFTER THEY HAVE BEEN IDENTIFIED.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL INSPECTIONS.
10. DUST CONTROL WILL BE BY SPRAYING WATER AS NECESSARY. THE USE OF OILS, PETROLEUM PRODUCTS OR TOXIC LIQUIDS FOR DUST CONTROL IS PROHIBITED.

SITE PLAN APPROVAL REQUIRED
FRANKLIN PLANNING BOARD

DATE _____



NO.	DATE	DESCRIPTION	BY
1	7/8/20	REVIEW COMMENTS	RRG

DATE	FIELD BY:	INT.
4/20	FIELD BOOK	BL
5/20	CALCS BY:	RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

UNITED CONSULTANTS INC.
 850 FRANKLIN STREET SUITE 11D
 WRENTHAM, MASSACHUSETTS 02093
 508-384-6560 FAX 508-384-6566

DATE
MAY 21, 2020
 SCALE
1" = 30'
 PROJECT
UC1435
 SHEET
1 of 1

DRAINAGE ANALYSIS

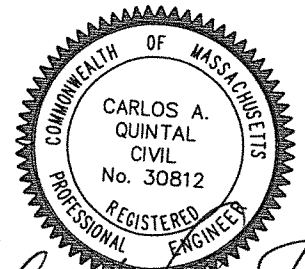
FOR
162 Grove Street

LOCATED IN
FRANKLIN, MASSACHUSETTS

PREPARED FOR
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MA

PREPARED BY
UNITED CONSULTANTS, INC.
850 FRANKLIN STREET, SUITE 11D
WRENTHAM, MA. 02093

DATE: MAY 21, 2020
Revised: July 8, 2020



Carlos A. Quintal
7/9/2020

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APPENDIX A

I. DESCRIPTION

This report is offered in support of the stormwater management system designed for the “Site Plan – 162 Grove Street” located in Franklin, Massachusetts. The primary goals of this system are to collect the stormwater runoff generated by the existing and proposed impervious building and parking areas and treat it prior to discharge to the existing detention pond and the two proposed underground infiltration ponds. Additionally, the site consists of an undeveloped area which will remain in its wooded condition. This undeveloped wooded area is a mix of uplands and wetlands and was not included in this analysis. The study point for the pre-development vs post-development conditions is the inlet to the existing detention pond. (Pond 1 in the report)

The existing stormwater system will be modified with two catch basing being eliminated and an existing drain manhole being re-directed to proposed Pond 10. Additionally, a portion of the proposed parking lot stormwater will be directed to Pond 11 and the remainder will be directed to the existing detention pond. The stormwater from the proposed parking lot that is directed to the existing detention pond will be directed through a deep sump hooded catch basin and a WQU for TSS removal.

The existing site driveway and parking area stormwater system will remain as is and will be directed to a Water Quality Unit that has been added to the existing 24” drain line and will then continue to be directed to the existing detention pond.

Both the pre-development and post-development storm-water conditions flowing into the existing detention pond summarized in Appendix B. This design will allow for the reduction of the rate and volume of runoff at the downgradient existing detention pond. The required volume of storm-water as required by the Massachusetts State Storm-water Standards has been provided.

II. Purpose

The purpose of this report is to examine the hydrological and hydraulic aspects of the proposed “162 Grove Street” Site Plan. This report was developed for review by the Town of Franklin Planning Board, Conservation Commission, Zoning Board of Appeal and Massachusetts Department of Environmental Protection to obtain the necessary permits to allow the project to proceed.

This report considers the overall hydrological impact of proposed, additional development upon the local watersheds with specific emphasis directed toward the adjacent and immediate downstream areas. The hydrology and criteria are consistent with the Town of Franklin Planning Board, Conservation Commission and the Massachusetts Department of Environmental Protection Storm Water Management Policies.

III. Pre-Development Conditions

The site consists of an existing building and parking area located on a 174,351+/- square foot parcel of land located off of Grove Street in Franklin, MA. The site is currently developed with a building and parking area. The upland soils for the site were taken from the soil survey of Norfolk and Suffolk counties. The soils are classified as Merrimack Fine Sandy Loam which has a hydrologic soil group A and Sudbury Fine Sandy Loam hydrologic soil group B. Soil testing was conducted on the site to determine soil types and permeability rates. See the soil logs and permeability test results located in Appendix F. Three permeability tests were conducted in the areas of the two proposed ponds. Utilizing a Hydrocad computer model the pre-development and post development conditions were calculated. The proposed development is located in areas of both the HSG A and HSG B which led us to utilize an HSG of A (Merrimack) and an HSG B (Sudbury) for the pre-development and post-

development modeling. A comparison of the pre-development vs. post development rate and volume of runoff can be found in Appendix B.

IV. Post Development Conditions

The proposed development will consist of the construction of single level addition to the existing building as well as interior renovation to the existing building. Additional vehicle parking areas and storm-water systems have been proposed for the site. The proposed storm-water system has two infiltration pond areas. The underground pond 10 will provide storm-water infiltration the existing building and the proposed addition. A portion of the proposed parking area will be directed to catch basin 11 which will then be directed to Pond 11. The remainder of the proposed parking are will be directed to CB 12 which after water quality treatment will be connected to the existing drainage system and will outlet into the existing detention pond. The proposed parking area will receive storm-water treatment via a Stormceptor and a Contech Cascade water quality unit. Ponds 10 and 11 will provide storm-water infiltration and will assist with flow attenuation for the site. These areas will receive pre-treatment via a Stormceptor 450i unit and Contech Cascade unit. The site will also have two infiltration ponds to promote groundwater re-charge. Municipal utility connections are existing for the site water supply and there is an existing septic system on the site. The project will utilize the existing driveway entrance from Grove Street which will be revised to accommodate the proposed building addition and courtyard area. Utilizing the same computer model as the existing conditions we have modeled the changes in surfaces and ground cover and have calculated the post development conditions.

All calculations for the above have been included in this report. Pre-development calculations are located in Appendix C. Post-development calculations are located in Appendix D.

V. Conclusion

Storm-water from building and the proposed parking area will be captured by a Stormceptor unit then piped through the manifold and into the underground ponds 10 and 11 or connected to the existing drainage system. The existing drainage system as well as the outlet overflow from Ponds 10 and 11 are directed to the Contech Cascade water quality unit prior to entering the existing detention pond. The comparison in Appendix B summarizes the rate and volumes of runoff entering the existing detention pond in both the pre-development and post-development conditions. This comparison indicates that there is not an increase in the rate or volume of runoff during the 2-year 10-year or 100-year storm events.

VI. Stormwater Management Standards

LID Measures

- No disturbance is proposed to any Wetland Resource Area. Ground water infiltration is proposed to mimic pre-development conditions.

Standard 1: No New Untreated Discharges

No new untreated discharges are proposed.

The proposed building addition and parking area expansion have been designed to capture the storm-water from the paved areas, treat it through a Water Quality Device (Stormceptor STC 450i unit) or a (Contech Cascade unit) and discharge the storm-water to underground Pond 11. The remaining parking expansion area will be directed to a Contech Cascade unit and discharged to the existing site drainage system and will outlet into the existing detention pond. The two storm-water treatment trains will provide TSS removal rates of 80%.

Standard 2: Peak Rate Attenuation

The drainage system has been designed to match or slightly reduce the rate of storm-water runoff from the site when comparing the pre-development conditions to the post development conditions. See Appendix B of this report for a summary of the design storms.

Standard 3: Recharge

- Soil testing has been completed. See Appendix F or this report.
 - Pond 10 and Pond 11 were designed based on the Static Method. The existing roof and north side of the existing building will be re-directed to Pond 10. A portion of the parking expansion area runoff will be discharged to pond 11.
 - The required water recharge volume has been provided.
 - Infiltration rates are based on Rawls rate for sand and gravel and is 8.27 in / hr. Field permeability rates ranged from 17.28 in / hr. to 73.8 in / hr. with the lowest 50% rate of 8.64 in / hr.
 - Building addition and parking expansion area – Merrimack - Use A soils
A soil – 0.60 inches x 8,344 sq. ft. impervious = 417.2 cubic feet
Parking expansion area Sudbury – Use B soils
B soil – 0.35 inches x 20,685 sq. ft. impervious = 603.3 cubic feet
Total storage required 1,021 cubic feet
Storage provided in Pond 10 = 1,437 cubic feet.
Storage provided in Pond 11 = 1,524 cubic feet
Total storage provided = 2,961
- The two Recharge systems have been designed to store and infiltrate the required recharge volume.
- See Appendix G for a summary of drain times for Pond 10 and Pond 11. Ponds 10 and 11 are drained down by hour 25. This is less than the 72 hours as provided in the Stormwater management standards Chapter 5.
 - The drainage system has been designed to infiltrate the required water recharge volume. The soil report provides the depths of test pits and the indication of ESHGW based on mottling.

Standard 4: Water Quality

- The owner will include the necessary restrictions in the building lease agreements. The owner will be responsible for compliance with standard four requirements.
- Refer to sheet 6 for the Inspection and Maintenance Schedule and the Operation and Maintenance Schedule and refer to Appendix I for the O&M.
- See Appendix E for the Manufactures Stormceptor and CDS Unit TSS removal rates. A portion of the site is located within a zone II. Pond 10 and Pond 11 were designed with an infiltration rate of 8.27 inches per hour based on the Rawls Rates. This led to the Stormceptor unit and the CDS unit being modeled with a 1 inch WQV.
- The proposed project will include a Stormceptor Water Quality Unit and a Contech Cascade Water Quality Unit all of which will provide TSS removal. The summary of the Manufacturers Predicted Net Annual results as well as the TSS Removal Worksheet are included in Appendix E.

Standard 5: Land uses with higher potential pollutant loads

Not applicable.

Standard 6: Critical Areas

The site is located within a Zone II water resource district. The site soils have a rapid infiltration rate.

Standard 7: Re-developments and Other Projects

A portion of the site and site stormwater system are to remain in their current condition. A Contech Cascade Water Quality Unit has been added to the existing 24" drain line and will provide an increase in TSS removal

Standard 8: Construction Period Pollution Prevention and Erosion Sedimentation Control

- Refer to sheet 6 for the Inspection and Maintenance Schedule and the Operation and Maintenance Schedule.
- The project will be covered by a NPDES Construction General Permit.

Standard 9: Operation and Maintenance Plan

- Refer to sheet 6 for the Inspection and Maintenance Schedule and the Operation and Maintenance Schedule.
- The owner will be responsible for the storm-water management system, implementation of the operation and maintenance, the maintenance costs, and completion of the maintenance logs.
- Refer to sheet 6 for the Inspection and Maintenance Schedule and the Operation and Maintenance Schedule.
- Refer to Appendix I for the Operation and Maintenance Plan.

Standard 10: Prohibition of Illicit Discharges

- Owner to be responsible for compliance with avoiding illicit discharges. The owner or owner's representative will provide a signed illicit discharge prior to commencing with construction.
- The site will be connected to an onsite septic system.

APPENDIX B

Pre-Development vs. Post Development Rate and Volume of Runoff

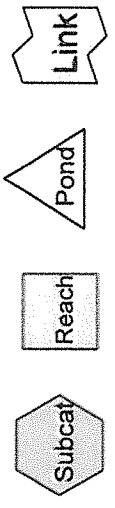
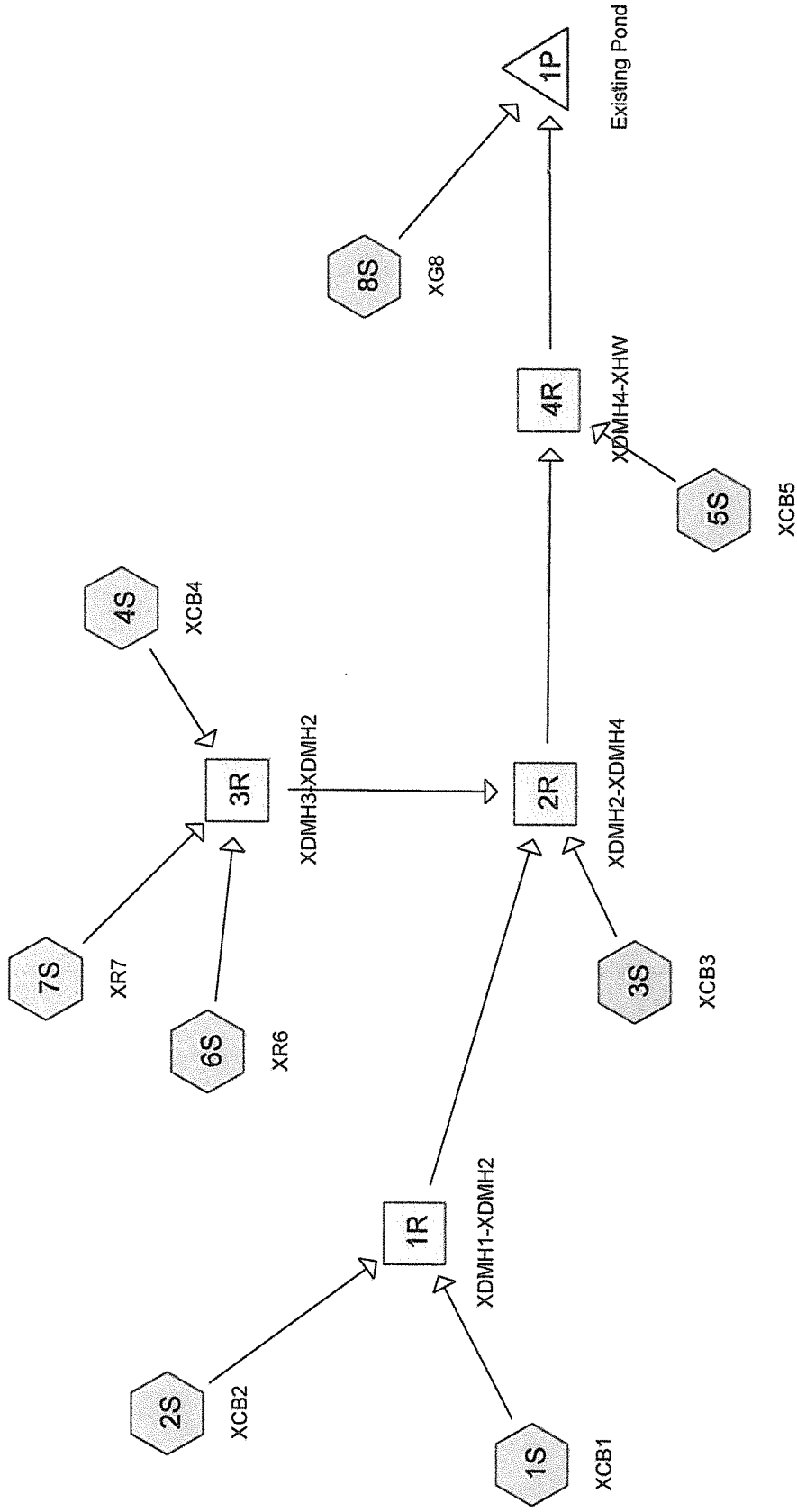
This analysis was prepared to show the summary of the pre-development and post development rate and volume of runoff as required by the Town of Franklin Storm-water Requirements.

The pre-development watershed areas were analyzed and the post-development watersheds and ponds were analyzed and the inlet to the existing detention pond (Pond 1) is the comparison location. The below is a summary of the studied storm events:

2 year storm event (CFS)			2 year storm event (A.F.)		
Pre		Post	Pre		Post
P1 inlet	vs	P1 inlet	P1 inlet	vs	P1 inlet
3.16		2.99	0.259		0.258
10 year storm event (CFS)			10 year storm event (A.F.)		
Pre		Post	Pre		Post
P1 inlet	vs	P1 inlet	P1 inlet	vs	P1 inlet
6.32		5.07	0.487		0.439
100 year storm event (CFS)			100 year storm event (A.F.)		
Pre		Post	Pre		Post
P1 inlet	vs	P1 inlet	P1 inlet	vs	P1 inlet
11.69		9.31	0.875		0.780

A reduction in the rate and volume of runoff has been realized with the proposed storm-water systems.

APPENDIX C



Drainage Diagram for UC1435-PRE
 Prepared by CAQ/rfg 4/18/2020
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2 YR PRE-DEVELOPMENT

Subcatchment 1S: XCB1

Runoff = 0.04 cfs @ 12.11 hrs, Volume= 0.003 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
1,332	98	Paved parking & roofs
1,681	39	>75% Grass cover, Good, HSG A
42	61	>75% Grass cover, Good, HSG B
3,055	65	Weighted Average
1,723		Pervious Area
1,332		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	21	0.0550	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.7	23	0.0887	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	19	0.1050	2.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0350	3.80		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9					Direct Entry, Min TC
0.1	44	0.0250	7.77	6.10	Circular Channel (pipe), XCB1-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	150	Total			

Subcatchment 2S: XCB2

Runoff = 0.03 cfs @ 12.14 hrs, Volume= 0.004 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
1,833	98	Paved parking & roofs
3,355	39	>75% Grass cover, Good, HSG A
5,188	60	Weighted Average
3,355		Pervious Area
1,833		Impervious Area

UC1435-PRE

Type III 24-hr 2YR Rainfall=3.25"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	12	0.0240	1.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	8	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	32	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	59	0.0680	5.29		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	34	0.0500	10.99	8.63	Circular Channel (pipe), XCB2-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	195	Total			

Subcatchment 3S: XCB3

Runoff = 0.92 cfs @ 12.10 hrs, Volume= 0.062 af, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
15,728	98	Paved parking & roofs
5,353	39	>75% Grass cover, Good, HSG A
2,281	61	>75% Grass cover, Good, HSG B
23,362	81	Weighted Average
7,634		Pervious Area
15,728		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0470	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	74	0.0710	5.41		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	45	0.0440	4.26		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	104	0.0420	4.16		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2					Direct Entry, Min TC
0.1	33	0.0272	8.10	6.37	Circular Channel (pipe), XCB3-XDMH2 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	306	Total			

Subcatchment 4S: XCB4

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
4,124	98	Paved parking & roofs
4,124		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.0	10	0.0400	9.83	7.72	Circular Channel (pipe), XCB4-XDMH3 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	10	Total			

Subcatchment 5S: XCB5

Runoff = 1.02 cfs @ 12.09 hrs, Volume= 0.077 af, Depth> 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
14,330	98	Paved parking & roofs
383	61	>75% Grass cover, Good, HSG B
14,713	97	Weighted Average
383		Pervious Area
14,330		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.1	25	0.0160	6.22	4.88	Circular Channel (pipe), XCB5-XDMH4 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	25	Total			

Subcatchment 6S: XR6

Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

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Type III 24-hr 2YR Rainfall=3.25"

Prepared by CAQ/rrg

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Area (sf)	CN	Description
4,820	98	Paved parking & roofs
348	39	>75% Grass cover, Good, HSG A
5,168	94	Weighted Average
348		Pervious Area
4,820		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. TC
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XCBROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
6.5	128	Total			

Subcatchment 7S: XR7

Runoff = 0.05 cfs @ 12.38 hrs, Volume= 0.008 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
6,215	98	Paved parking & roofs
12,529	39	>75% Grass cover, Good, HSG A
3,295	30	Woods, Good, HSG A
22,039	54	Weighted Average
15,824		Pervious Area
6,215		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Subcatchment 8S: XG8

Runoff = 0.64 cfs @ 12.15 hrs, Volume= 0.058 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

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Type III 24-hr 2YR Rainfall=3.25"

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Area (sf)	CN	Description
8,972	72	Dirt roads, HSG A
19,713	82	Dirt roads, HSG B
5,206	39	>75% Grass cover, Good, HSG A
231	61	>75% Grass cover, Good, HSG B
3,370	30	Woods, Good, HSG A
21,625	55	Woods, Good, HSG B
59,117	64	Weighted Average
59,117		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

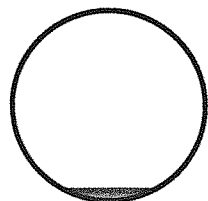
Reach 1R: XDMH1-XDMH2

Inflow Area = 0.189 ac, Inflow Depth > 0.44" for 2YR event
 Inflow = 0.07 cfs @ 12.12 hrs, Volume= 0.007 af
 Outflow = 0.07 cfs @ 12.16 hrs, Volume= 0.007 af, Atten= 4%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.88 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 1.48 fps, Avg. Travel Time= 1.6 min

Peak Storage= 4 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.07'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.94 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 139.0' Slope= 0.0324 '/'
 Inlet Invert= 260.90', Outlet Invert= 256.40'



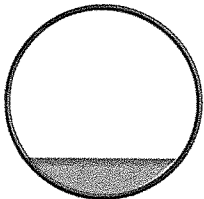
Reach 2R: XDMH2-XDMH4

Inflow Area = 1.445 ac, Inflow Depth > 1.03" for 2YR event
 Inflow = 1.61 cfs @ 12.10 hrs, Volume= 0.124 af
 Outflow = 1.59 cfs @ 12.11 hrs, Volume= 0.124 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.03 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.20 fps, Avg. Travel Time= 0.7 min

Peak Storage= 25 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.31'
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 16.92 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 95.0' Slope= 0.0221 '/
 Inlet Invert= 255.90', Outlet Invert= 253.80'



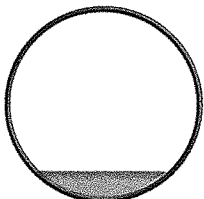
Reach 3R: XDMH3-XDMH2

Inflow Area = 0.719 ac, Inflow Depth > 0.91" for 2YR event
 Inflow = 0.63 cfs @ 12.09 hrs, Volume= 0.055 af
 Outflow = 0.62 cfs @ 12.10 hrs, Volume= 0.055 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.35 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.12 fps, Avg. Travel Time= 0.6 min

Peak Storage= 9 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.19'
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 12.62 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 80.0' Slope= 0.0325 '/
 Inlet Invert= 259.00', Outlet Invert= 256.40'



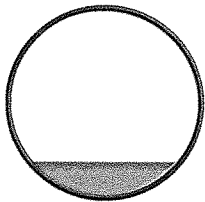
Reach 4R: XDMH4-XHW

Inflow Area = 1.783 ac, Inflow Depth > 1.35" for 2YR event
 Inflow = 2.60 cfs @ 12.10 hrs, Volume= 0.201 af
 Outflow = 2.54 cfs @ 12.11 hrs, Volume= 0.201 af, Atten= 2%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.25 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 2.33 fps, Avg. Travel Time= 1.4 min

Peak Storage= 82 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.38'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.90 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 197.0' Slope= 0.0180 '/'
 Inlet Invert= 253.55', Outlet Invert= 250.00'



Pond 1P: Existing Pond

Inflow Area = 3.140 ac, Inflow Depth > 0.99" for 2YR event
 Inflow = 3.16 cfs @ 12.12 hrs, Volume= 0.259 af
 Outflow = 0.71 cfs @ 12.60 hrs, Volume= 0.230 af, Atten= 77%, Lag= 28.9 min
 Primary = 0.71 cfs @ 12.60 hrs, Volume= 0.230 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 249.12' @ 12.60 hrs Surf.Area= 6,545 sf Storage= 4,666 cf

Plug-Flow detention time= 115.2 min calculated for 0.229 af (88% of inflow)
 Center-of-Mass det. time= 79.0 min (869.3 - 790.3)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	11,166 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	1,494	0	0
249.00	6,327	3,911	3,911
250.00	8,184	7,256	11,166

Device	Routing	Invert	Outlet Devices
#1	Primary	248.30'	6.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 247.40' S= 0.0360 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished
#2	Primary	250.20'	12.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500

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Type III 24-hr 2YR Rainfall=3.25"

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Outlet Invert= 249.40' S= 0.0320 '/' Cc= 0.900
n= 0.012 Concrete pipe, finished

Primary OutFlow Max=0.71 cfs @ 12.60 hrs HW=249.12' (Free Discharge)

↑1=Culvert (Inlet Controls 0.71 cfs @ 3.63 fps)

└2=Culvert (Controls 0.00 cfs)

10 YR PRE-DEVELOPMENT

Subcatchment 1S: XCB1

Runoff = 0.11 cfs @ 12.10 hrs, Volume= 0.008 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
1,332	98	Paved parking & roofs
1,681	39	>75% Grass cover, Good, HSG A
42	61	>75% Grass cover, Good, HSG B
3,055	65	Weighted Average
1,723		Pervious Area
1,332		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	21	0.0550	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.7	23	0.0887	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	19	0.1050	2.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0350	3.80		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9					Direct Entry, Min TC
0.1	44	0.0250	7.77	6.10	Circular Channel (pipe), XCB1-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	150	Total			

Subcatchment 2S: XCB2

Runoff = 0.14 cfs @ 12.11 hrs, Volume= 0.010 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
1,833	98	Paved parking & roofs
3,355	39	>75% Grass cover, Good, HSG A
5,188	60	Weighted Average
3,355		Pervious Area
1,833		Impervious Area

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Type III 24-hr 10YR Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	12	0.0240	1.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	8	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	32	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	59	0.0680	5.29		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	34	0.0500	10.99	8.63	Circular Channel (pipe), XCB2-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	195	Total			

Subcatchment 3S: XCB3

Runoff = 1.67 cfs @ 12.09 hrs, Volume= 0.114 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
15,728	98	Paved parking & roofs
5,353	39	>75% Grass cover, Good, HSG A
2,281	61	>75% Grass cover, Good, HSG B
23,362	81	Weighted Average
7,634		Pervious Area
15,728		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0470	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	74	0.0710	5.41		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	45	0.0440	4.26		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	104	0.0420	4.16		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2					Direct Entry, Min TC
0.1	33	0.0272	8.10	6.37	Circular Channel (pipe), XCB3-XDMH2 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	306	Total			

Subcatchment 4S: XCB4

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.033 af, Depth> 4.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
4,124	98	Paved parking & roofs
4,124		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.0	10	0.0400	9.83	7.72	Circular Channel (pipe), XCB4-XDMH3 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	10	Total			

Subcatchment 5S: XCB5

Runoff = 1.50 cfs @ 12.09 hrs, Volume= 0.114 af, Depth> 4.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
14,330	98	Paved parking & roofs
383	61	>75% Grass cover, Good, HSG B
14,713	97	Weighted Average
383		Pervious Area
14,330		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.1	25	0.0160	6.22	4.88	Circular Channel (pipe), XCB5-XDMH4 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	25	Total			

Subcatchment 6S: XR6

Runoff = 0.50 cfs @ 12.09 hrs, Volume= 0.037 af, Depth> 3.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

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Type III 24-hr 10YR Rainfall=4.70"

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Area (sf)	CN	Description
4,820	98	Paved parking & roofs
348	39	>75% Grass cover, Good, HSG A
5,168	94	Weighted Average
348		Pervious Area
4,820		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. TC
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XCBROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
6.5	128	Total			

Subcatchment 7S: XR7

Runoff = 0.31 cfs @ 12.15 hrs, Volume= 0.029 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
6,215	98	Paved parking & roofs
12,529	39	>75% Grass cover, Good, HSG A
3,295	30	Woods, Good, HSG A
22,039	54	Weighted Average
15,824		Pervious Area
6,215		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Subcatchment 8S: XG8

Runoff = 1.89 cfs @ 12.12 hrs, Volume= 0.143 af, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
8,972	72	Dirt roads, HSG A
19,713	82	Dirt roads, HSG B
5,206	39	>75% Grass cover, Good, HSG A
231	61	>75% Grass cover, Good, HSG B
3,370	30	Woods, Good, HSG A
21,625	55	Woods, Good, HSG B
59,117	64	Weighted Average
59,117		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

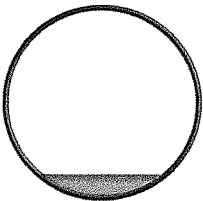
Reach 1R: XDMH1-XDMH2

Inflow Area = 0.189 ac, Inflow Depth > 1.13" for 10YR event
 Inflow = 0.25 cfs @ 12.11 hrs, Volume= 0.018 af
 Outflow = 0.24 cfs @ 12.12 hrs, Volume= 0.018 af, Atten= 3%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.14 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 1.82 fps, Avg. Travel Time= 1.3 min

Peak Storage= 8 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.13'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.94 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 139.0' Slope= 0.0324 '/'
 Inlet Invert= 260.90', Outlet Invert= 256.40'



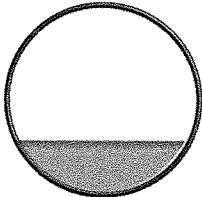
Reach 2R: XDMH2-XDMH4

Inflow Area = 1.445 ac, Inflow Depth > 1.91" for 10YR event
 Inflow = 3.08 cfs @ 12.10 hrs, Volume= 0.231 af
 Outflow = 3.05 cfs @ 12.11 hrs, Volume= 0.230 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.28 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.64 fps, Avg. Travel Time= 0.6 min

Peak Storage= 40 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.43'
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 16.92 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 95.0' Slope= 0.0221 '/
 Inlet Invert= 255.90', Outlet Invert= 253.80'



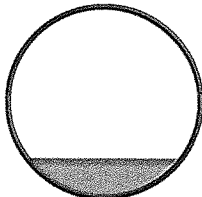
Reach 3R: XDMH3-XDMH2

Inflow Area = 0.719 ac, Inflow Depth > 1.65" for 10YR event
 Inflow = 1.20 cfs @ 12.10 hrs, Volume= 0.099 af
 Outflow = 1.19 cfs @ 12.11 hrs, Volume= 0.099 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.47 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.51 fps, Avg. Travel Time= 0.5 min

Peak Storage= 15 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.26'
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 12.62 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 80.0' Slope= 0.0325 '/
 Inlet Invert= 259.00', Outlet Invert= 256.40'



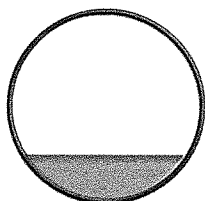
Reach 4R: XDMH4-XHW

Inflow Area = 1.783 ac, Inflow Depth > 2.32" for 10YR event
 Inflow = 4.53 cfs @ 12.10 hrs, Volume= 0.345 af
 Outflow = 4.44 cfs @ 12.11 hrs, Volume= 0.345 af, Atten= 2%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.35 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 2.74 fps, Avg. Travel Time= 1.2 min

Peak Storage= 122 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.50'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.90 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 197.0' Slope= 0.0180 '/'
 Inlet Invert= 253.55', Outlet Invert= 250.00'



Pond 1P: Existing Pond

Inflow Area = 3.140 ac, Inflow Depth > 1.86" for 10YR event
 Inflow = 6.32 cfs @ 12.12 hrs, Volume= 0.487 af
 Outflow = 1.04 cfs @ 12.69 hrs, Volume= 0.451 af, Atten= 84%, Lag= 34.7 min
 Primary = 1.04 cfs @ 12.69 hrs, Volume= 0.451 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 249.75' @ 12.69 hrs Surf.Area= 7,721 sf Storage= 9,184 cf

Plug-Flow detention time= 124.1 min calculated for 0.450 af (92% of inflow)
 Center-of-Mass det. time= 98.7 min (885.2 - 786.6)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	11,166 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	1,494	0	0
249.00	6,327	3,911	3,911
250.00	8,184	7,256	11,166

Device	Routing	Invert	Outlet Devices
#1	Primary	248.30'	6.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 247.40' S= 0.0360 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished
#2	Primary	250.20'	12.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500

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Type III 24-hr 10YR Rainfall=4.70"

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Outlet Invert= 249.40' S= 0.0320 '/' Cc= 0.900
n= 0.012 Concrete pipe, finished

Primary OutFlow Max=1.04 cfs @ 12.69 hrs HW=249.75' (Free Discharge)

└─1=Culvert (Inlet Controls 1.04 cfs @ 5.28 fps)

└─2=Culvert (Controls 0.00 cfs)

100 YR PRE-DEVELOPMENT

Subcatchment 1S: XCB1

Runoff = 0.23 cfs @ 12.10 hrs, Volume= 0.016 af, Depth> 2.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
1,332	98	Paved parking & roofs
1,681	39	>75% Grass cover, Good, HSG A
42	61	>75% Grass cover, Good, HSG B
3,055	65	Weighted Average
1,723		Pervious Area
1,332		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	21	0.0550	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.7	23	0.0887	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	19	0.1050	2.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0350	3.80		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9					Direct Entry, Min TC
0.1	44	0.0250	7.77	6.10	Circular Channel (pipe), XCB1-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	150	Total			

Subcatchment 2S: XCB2

Runoff = 0.33 cfs @ 12.10 hrs, Volume= 0.022 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
1,833	98	Paved parking & roofs
3,355	39	>75% Grass cover, Good, HSG A
5,188	60	Weighted Average
3,355		Pervious Area
1,833		Impervious Area

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Type III 24-hr 100YR Rainfall=6.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0240	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	12	0.0240	1.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	8	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	32	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	59	0.0680	5.29		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	34	0.0500	10.99	8.63	Circular Channel (pipe), XCB2-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	195	Total			

Subcatchment 3S: XCB3

Runoff = 2.80 cfs @ 12.09 hrs, Volume= 0.194 af, Depth> 4.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
15,728	98	Paved parking & roofs
5,353	39	>75% Grass cover, Good, HSG A
2,281	61	>75% Grass cover, Good, HSG B
23,362	81	Weighted Average
7,634		Pervious Area
15,728		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0470	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	74	0.0710	5.41		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	45	0.0440	4.26		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	104	0.0420	4.16		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.2					Direct Entry, Min TC
0.1	33	0.0272	8.10	6.37	Circular Channel (pipe), XCB3-XDMH2 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	306	Total			

Subcatchment 4S: XCB4

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 0.048 af, Depth> 6.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
4,124	98	Paved parking & roofs
4,124		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.0	10	0.0400	9.83	7.72	Circular Channel (pipe), XCB4-XDMH3 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	10	Total			

Subcatchment 5S: XCB5

Runoff = 2.19 cfs @ 12.09 hrs, Volume= 0.169 af, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
14,330	98	Paved parking & roofs
383	61	>75% Grass cover, Good, HSG B
14,713	97	Weighted Average
383		Pervious Area
14,330		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.1	25	0.0160	6.22	4.88	Circular Channel (pipe), XCB5-XDMH4 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	25	Total			

Subcatchment 6S: XR6

Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.057 af, Depth> 5.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

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Type III 24-hr 100YR Rainfall=6.80"

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Area (sf)	CN	Description
4,820	98	Paved parking & roofs
348	39	>75% Grass cover, Good, HSG A
5,168	94	Weighted Average
348		Pervious Area
4,820		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. TC
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XCBROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
6.5	128	Total			

Subcatchment 7S: XR7

Runoff = 0.94 cfs @ 12.13 hrs, Volume= 0.073 af, Depth> 1.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
6,215	98	Paved parking & roofs
12,529	39	>75% Grass cover, Good, HSG A
3,295	30	Woods, Good, HSG A
22,039	54	Weighted Average
15,824		Pervious Area
6,215		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Subcatchment 8S: XG8

Runoff = 4.12 cfs @ 12.12 hrs, Volume= 0.297 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
8,972	72	Dirt roads, HSG A
19,713	82	Dirt roads, HSG B
5,206	39	>75% Grass cover, Good, HSG A
231	61	>75% Grass cover, Good, HSG B
3,370	30	Woods, Good, HSG A
21,625	55	Woods, Good, HSG B
59,117	64	Weighted Average
59,117		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

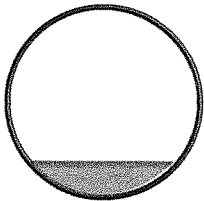
Reach 1R: XDMH1-XDMH2

Inflow Area = 0.189 ac, Inflow Depth > 2.43" for 100YR event
 Inflow = 0.56 cfs @ 12.10 hrs, Volume= 0.038 af
 Outflow = 0.55 cfs @ 12.11 hrs, Volume= 0.038 af, Atten= 2%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.31 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 2.13 fps, Avg. Travel Time= 1.1 min

Peak Storage= 15 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.19'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.94 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 139.0' Slope= 0.0324 '/
 Inlet Invert= 260.90', Outlet Invert= 256.40'



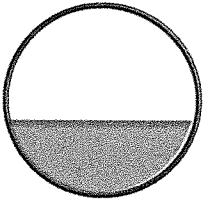
Reach 2R: XDMH2-XDMH4

Inflow Area = 1.445 ac, Inflow Depth > 3.40" for 100YR event
 Inflow = 5.59 cfs @ 12.10 hrs, Volume= 0.410 af
 Outflow = 5.55 cfs @ 12.10 hrs, Volume= 0.409 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 8.59 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 3.15 fps, Avg. Travel Time= 0.5 min

Peak Storage= 62 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.59'
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 16.92 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 95.0' Slope= 0.0221 '/'
 Inlet Invert= 255.90', Outlet Invert= 253.80'



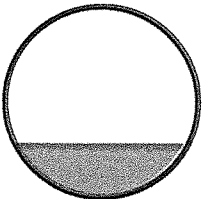
Reach 3R: XDMH3-XDMH2

Inflow Area = 0.719 ac, Inflow Depth > 2.96" for 100YR event
 Inflow = 2.28 cfs @ 12.10 hrs, Volume= 0.177 af
 Outflow = 2.26 cfs @ 12.11 hrs, Volume= 0.177 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.79 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.95 fps, Avg. Travel Time= 0.5 min

Peak Storage= 23 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.36'
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 12.62 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 80.0' Slope= 0.0325 '/'
 Inlet Invert= 259.00', Outlet Invert= 256.40'



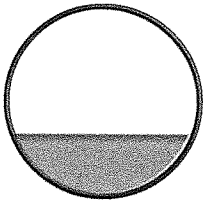
Reach 4R: XDMH4-XHW

Inflow Area = 1.783 ac, Inflow Depth > 3.89" for 100YR event
 Inflow = 7.71 cfs @ 12.10 hrs, Volume= 0.578 af
 Outflow = 7.57 cfs @ 12.11 hrs, Volume= 0.578 af, Atten= 2%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 8.55 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 3.19 fps, Avg. Travel Time= 1.0 min

Peak Storage= 178 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.66'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.90 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 197.0' Slope= 0.0180 '/
 Inlet Invert= 253.55', Outlet Invert= 250.00'



Pond 1P: Existing Pond

Inflow Area = 3.140 ac, Inflow Depth > 3.34" for 100YR event
 Inflow = 11.69 cfs @ 12.11 hrs, Volume= 0.875 af
 Outflow = 15.64 cfs @ 12.20 hrs, Volume= 0.821 af, Atten= 0%, Lag= 5.2 min
 Primary = 15.64 cfs @ 12.20 hrs, Volume= 0.821 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 261.44' @ 12.20 hrs Surf.Area= 8,184 sf Storage= 11,166 cf

Plug-Flow detention time= 106.5 min calculated for 0.818 af (94% of inflow)
 Center-of-Mass det. time= 84.7 min (865.5 - 780.8)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	11,166 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	1,494	0	0
249.00	6,327	3,911	3,911
250.00	8,184	7,256	11,166

Device	Routing	Invert	Outlet Devices
#1	Primary	248.30'	6.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 247.40' S= 0.0360 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished
#2	Primary	250.20'	12.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500

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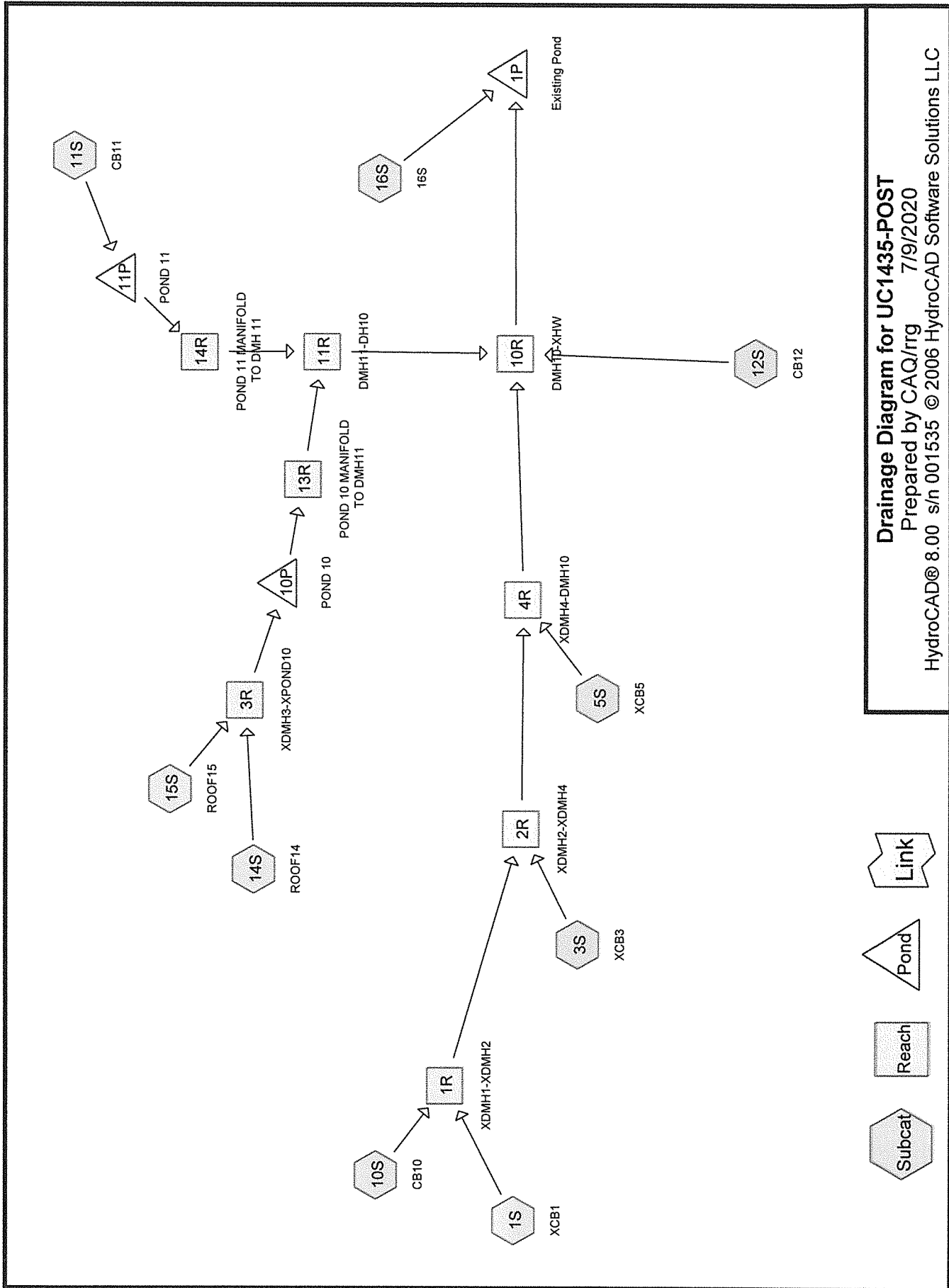
Outlet Invert= 249.40' S= 0.0320 '/ Cc= 0.900
n= 0.012 Concrete pipe, finished

Primary OutFlow Max=15.64 cfs @ 12.20 hrs HW=261.44' (Free Discharge)

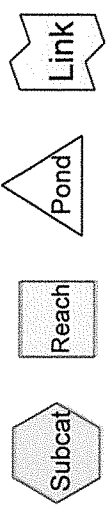
└─1=Culvert (Barrel Controls 3.25 cfs @ 16.55 fps)

└─2=Culvert (Inlet Controls 12.39 cfs @ 15.78 fps)

APPENDIX D



Drainage Diagram for UC1435-POST
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2 YR POST-DEVELOPMENT

UC1435-POST

Type III 24-hr 2YR Rainfall=3.25"

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Subcatchment 1S: XCB1

Runoff = 0.02 cfs @ 12.12 hrs, Volume= 0.002 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
938	98	Paved parking & roofs
1,497	39	>75% Grass cover, Good, HSG A
42	61	>75% Grass cover, Good, HSG B
2,477	62	Weighted Average
1,539		Pervious Area
938		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	21	0.0550	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.7	23	0.0887	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	19	0.1050	2.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0350	3.80		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9					Direct Entry, Min TC
0.1	44	0.0250	7.77	6.10	Circular Channel (pipe), XCB1-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	150	Total			

Subcatchment 3S: XCB3

Runoff = 0.55 cfs @ 12.10 hrs, Volume= 0.043 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
12,260	98	Paved parking & roofs
8,920	39	>75% Grass cover, Good, HSG A
2,281	61	>75% Grass cover, Good, HSG B
23,461	72	Weighted Average
11,201		Pervious Area
12,260		Impervious Area

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Type III 24-hr 2YR Rainfall=3.25"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0410	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.0	3	0.0410	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	13	0.1230	2.45		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	22	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	31	0.0560	1.66		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	62	0.0540	4.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6	102	0.0210	2.94		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4					Direct Entry, Min TC
0.1	33	0.0272	8.10	6.37	Circular Channel (pipe), XCB3-XDMH2 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	316	Total			

Subcatchment 5S: XCB5

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.070 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
12,331	98	Paved parking & roofs
662	61	>75% Grass cover, Good, HSG B
12,993	96	Weighted Average
662		Pervious Area
12,331		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.1	25	0.0160	6.22	4.88	Circular Channel (pipe), XCB5-XDMH4 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	25	Total			

Subcatchment 10S: CB10

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

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Type III 24-hr 2YR Rainfall=3.25"

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Area (sf)	CN	Description
1,903	98	Paved parking & roofs
1,903		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN. TC
0.2	48	0.0050	3.47	2.73	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	48	Total			

Subcatchment 11S: CB11

Runoff = 0.82 cfs @ 12.09 hrs, Volume= 0.067 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
11,616	98	Paved parking & roofs
74	61	>75% Grass cover, Good, HSG B
11,690	98	Weighted Average
74		Pervious Area
11,616		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN. TC
0.3	60	0.0050	3.47	2.73	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.3	60	Total			

Subcatchment 12S: CB12

Runoff = 1.49 cfs @ 12.09 hrs, Volume= 0.122 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
20,891	98	Paved parking & roofs
216	61	>75% Grass cover, Good, HSG B
21,107	98	Weighted Average
216		Pervious Area
20,891		Impervious Area

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Type III 24-hr 2YR Rainfall=3.25"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, TEST
0.0	14	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	14	Total			

Subcatchment 14S: ROOF14

Runoff = 0.60 cfs @ 12.09 hrs, Volume= 0.048 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
8,585	98	Paved parking & roofs
348	39	>75% Grass cover, Good, HSG A
8,933	96	Weighted Average
348		Pervious Area
8,585		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. TC
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XCBROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
6.5	128	Total			

Subcatchment 15S: ROOF15

Runoff = 0.05 cfs @ 12.38 hrs, Volume= 0.010 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
6,215	98	Paved parking & roofs
12,639	39	>75% Grass cover, Good, HSG A
3,295	30	Woods, Good, HSG A
22,149	54	Weighted Average
15,934		Pervious Area
6,215		Impervious Area

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Type III 24-hr 2YR Rainfall=3.25"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XDRAIN-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Subcatchment 16S: 16S

Runoff = 0.03 cfs @ 12.46 hrs, Volume= 0.010 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.25"

Area (sf)	CN	Description
5,286	39	>75% Grass cover, Good, HSG A
4,621	61	>75% Grass cover, Good, HSG B
3,435	30	Woods, Good, HSG A
18,702	55	Woods, Good, HSG B
32,044	51	Weighted Average
32,044		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Reach 1R: XDMH1-XDMH2

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.101 ac, Inflow Depth = 1.60" for 2YR event
 Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af
 Outflow = 0.15 cfs @ 12.11 hrs, Volume= 0.013 af, Atten= 3%, Lag= 1.0 min

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Type III 24-hr 2YR Rainfall=3.25"

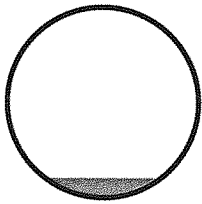
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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.63 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 1.9 min

Peak Storage= 6 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.94 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 139.0' Slope= 0.0324 '/
Inlet Invert= 260.90', Outlet Invert= 256.40'



Reach 2R: XDMH2-XDMH4

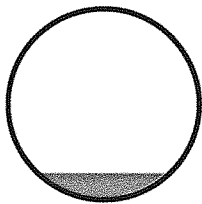
[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.639 ac, Inflow Depth = 1.06" for 2YR event
Inflow = 0.70 cfs @ 12.10 hrs, Volume= 0.056 af
Outflow = 0.69 cfs @ 12.11 hrs, Volume= 0.056 af, Atten= 2%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.72 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.49 fps, Avg. Travel Time= 1.1 min

Peak Storage= 14 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 16.92 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 95.0' Slope= 0.0221 '/
Inlet Invert= 255.90', Outlet Invert= 253.80'



Reach 3R: XDMH3-XPOND10

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.714 ac, Inflow Depth = 0.97" for 2YR event
Inflow = 0.61 cfs @ 12.10 hrs, Volume= 0.058 af
Outflow = 0.60 cfs @ 12.10 hrs, Volume= 0.058 af, Atten= 1%, Lag= 0.5 min

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Type III 24-hr 2YR Rainfall=3.25"

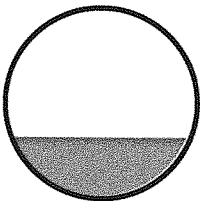
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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.80 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 0.8 min

Peak Storage= 11 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 50.0' Slope= 0.0050 '/'
Inlet Invert= 259.00', Outlet Invert= 258.75'



Reach 4R: XDMH4-DMH10

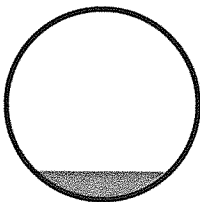
[52] Hint: Inlet conditions not evaluated
[61] Hint: Submerged 2% of Reach 2R bottom

Inflow Area = 0.937 ac, Inflow Depth = 1.61" for 2YR event
Inflow = 1.57 cfs @ 12.10 hrs, Volume= 0.126 af
Outflow = 1.54 cfs @ 12.11 hrs, Volume= 0.126 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.36 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 1.0 min

Peak Storage= 31 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.71 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 105.0' Slope= 0.0178 '/'
Inlet Invert= 253.55', Outlet Invert= 251.68'



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Type III 24-hr 2YR Rainfall=3.25"

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Reach 10R: DMH10-XHW

[52] Hint: Inlet conditions not evaluated

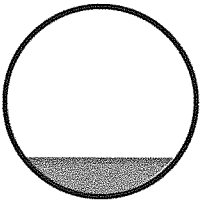
[61] Hint: Submerged 17% of Reach 4R bottom

Inflow Area =	2.404 ac,	Inflow Depth =	1.24"	for 2YR event
Inflow =	3.02 cfs @	12.10 hrs,	Volume=	0.248 af
Outflow =	2.99 cfs @	12.10 hrs,	Volume=	0.248 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.52 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.12 fps, Avg. Travel Time= 0.7 min

Peak Storage= 41 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.41'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.84 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 88.0' Slope= 0.0180 '/'
 Inlet Invert= 251.58', Outlet Invert= 250.00'



Reach 11R: DMH11-DH10

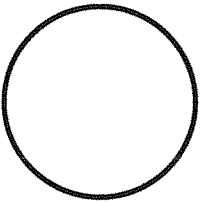
[52] Hint: Inlet conditions not evaluated

Inflow Area =	0.982 ac,	Inflow Depth =	0.00"	for 2YR event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.83 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 85.0' Slope= 0.0313 '/'
 Inlet Invert= 255.34', Outlet Invert= 252.68'



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Type III 24-hr 2YR Rainfall=3.25"

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Reach 13R: POND 10 MANIFOLD TO DMH11

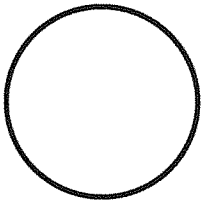
[52] Hint: Inlet conditions not evaluated

Inflow Area =	0.714 ac,	Inflow Depth =	0.00"	for 2YR event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.58 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 66.0' Slope= 0.0494 '/
 Inlet Invert= 258.70', Outlet Invert= 255.44'



Reach 14R: POND 11 MANIFOLD TO DMH 11

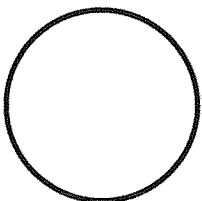
[52] Hint: Inlet conditions not evaluated

Inflow Area =	0.268 ac,	Inflow Depth =	0.00"	for 2YR event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 12.0' Slope= 0.0300 '/
 Inlet Invert= 255.80', Outlet Invert= 255.44'



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Type III 24-hr 2YR Rainfall=3.25"

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Pond 1P: Existing Pond

Inflow Area = 3.140 ac, Inflow Depth = 0.99" for 2YR event
 Inflow = 2.99 cfs @ 12.10 hrs, Volume= 0.258 af
 Outflow = 0.70 cfs @ 12.53 hrs, Volume= 0.242 af, Atten= 77%, Lag= 25.9 min
 Primary = 0.70 cfs @ 12.53 hrs, Volume= 0.242 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 249.09' @ 12.53 hrs Surf.Area= 6,499 sf Storage= 4,504 cf

Plug-Flow detention time= 155.5 min calculated for 0.242 af (94% of inflow)
 Center-of-Mass det. time= 123.7 min (915.3 - 791.5)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	11,166 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	1,494	0	0
249.00	6,327	3,911	3,911
250.00	8,184	7,256	11,166

Device	Routing	Invert	Outlet Devices
#1	Primary	248.30'	6.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 247.40' S= 0.0360 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished
#2	Primary	250.20'	12.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 249.40' S= 0.0320 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=0.70 cfs @ 12.53 hrs HW=249.09' (Free Discharge)

1=Culvert (Inlet Controls 0.70 cfs @ 3.55 fps)
 2=Culvert (Controls 0.00 cfs)

Pond 10P: POND 10

[85] Warning: Oscillations may require Finer Routing>1

Inflow Area = 0.714 ac, Inflow Depth = 0.97" for 2YR event
 Inflow = 0.60 cfs @ 12.10 hrs, Volume= 0.058 af
 Outflow = 0.35 cfs @ 12.05 hrs, Volume= 0.058 af, Atten= 41%, Lag= 0.0 min
 Discarded = 0.35 cfs @ 12.05 hrs, Volume= 0.058 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 258.48' @ 12.25 hrs Surf.Area= 0.042 ac Storage= 0.003 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 1.5 min (809.2 - 807.7)

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Type III 24-hr 2YR Rainfall=3.25"

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Volume	Invert	Avail.Storage	Storage Description
#1	258.30'	0.020 af	29.73'W x 62.00'L x 1.50'H Prismaoid 0.063 af Overall - 0.013 af Embedded = 0.050 af x 40.0% Voids
#2	258.80'	0.013 af	12.0"D x 60.00'L Horizontal Cylinder x 12 Inside #1
		0.033 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	258.29'	8.270 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0.000 ac
#2	Primary	259.20'	8.0" Vert. Orifice/Grate X 5.00 C= 0.600

Discarded OutFlow Max=0.35 cfs @ 12.05 hrs HW=258.34' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=258.30' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 11P: POND 11

Inflow Area = 0.268 ac, Inflow Depth = 3.02" for 2YR event
 Inflow = 0.82 cfs @ 12.09 hrs, Volume= 0.067 af
 Outflow = 0.22 cfs @ 11.80 hrs, Volume= 0.067 af, Atten= 74%, Lag= 0.0 min
 Discarded = 0.22 cfs @ 11.80 hrs, Volume= 0.067 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 255.93' @ 12.45 hrs Surf.Area= 0.026 ac Storage= 0.013 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 11.9 min (768.2 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1	254.90'	0.021 af	15.60'W x 72.00'L x 2.60'H Prismaoid 0.067 af Overall - 0.014 af Embedded = 0.053 af x 40.0% Voids
#2	255.50'	0.014 af	18.0"D x 70.00'L Horizontal Cylinder x 5 Inside #1
		0.035 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.89'	8.270 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0.000 ac
#2	Primary	256.30'	8.0" Vert. Orifice/Grate X 5.00 C= 0.600

Discarded OutFlow Max=0.22 cfs @ 11.80 hrs HW=254.94' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=254.90' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

10 YR POST-DEVELOPMENT

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Type III 24-hr 10YR Rainfall=4.70"

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Subcatchment 1S: XCB1

Runoff = 0.07 cfs @ 12.10 hrs, Volume= 0.006 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
938	98	Paved parking & roofs
1,497	39	>75% Grass cover, Good, HSG A
42	61	>75% Grass cover, Good, HSG B
2,477	62	Weighted Average
1,539		Pervious Area
938		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	21	0.0550	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.7	23	0.0887	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	19	0.1050	2.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0350	3.80		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9					Direct Entry, Min TC
0.1	44	0.0250	7.77	6.10	Circular Channel (pipe), XCB1-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	150	Total			

Subcatchment 3S: XCB3

Runoff = 1.20 cfs @ 12.10 hrs, Volume= 0.088 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
12,260	98	Paved parking & roofs
8,920	39	>75% Grass cover, Good, HSG A
2,281	61	>75% Grass cover, Good, HSG B
23,461	72	Weighted Average
11,201		Pervious Area
12,260		Impervious Area

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Type III 24-hr 10YR Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0410	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.0	3	0.0410	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	13	0.1230	2.45		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	22	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	31	0.0560	1.66		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	62	0.0540	4.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6	102	0.0210	2.94		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4					Direct Entry, Min TC
0.1	33	0.0272	8.10	6.37	Circular Channel (pipe), XCB3-XDMH2 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	316	Total			

Subcatchment 5S: XCB5

Runoff = 1.31 cfs @ 12.09 hrs, Volume= 0.105 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
12,331	98	Paved parking & roofs
662	61	>75% Grass cover, Good, HSG B
12,993	96	Weighted Average
662		Pervious Area
12,331		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.1	25	0.0160	6.22	4.88	Circular Channel (pipe), XCB5-XDMH4 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	25	Total			

Subcatchment 10S: CB10

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

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Type III 24-hr 10YR Rainfall=4.70"

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Area (sf)	CN	Description
1,903	98	Paved parking & roofs
1,903		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN. TC
0.2	48	0.0050	3.47	2.73	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	48	Total			

Subcatchment 11S: CB11

Runoff = 1.20 cfs @ 12.09 hrs, Volume= 0.100 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
11,616	98	Paved parking & roofs
74	61	>75% Grass cover, Good, HSG B
11,690	98	Weighted Average
74		Pervious Area
11,616		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN. TC
0.3	60	0.0050	3.47	2.73	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.3	60	Total			

Subcatchment 12S: CB12

Runoff = 2.17 cfs @ 12.09 hrs, Volume= 0.180 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
20,891	98	Paved parking & roofs
216	61	>75% Grass cover, Good, HSG B
21,107	98	Weighted Average
216		Pervious Area
20,891		Impervious Area

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Type III 24-hr 10YR Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, TEST
0.0	14	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	14	Total			

Subcatchment 14S: ROOF14

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
8,585	98	Paved parking & roofs
348	39	>75% Grass cover, Good, HSG A
8,933	96	Weighted Average
348		Pervious Area
8,585		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. TC
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XCBROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
6.5	128	Total			

Subcatchment 15S: ROOF15

Runoff = 0.31 cfs @ 12.15 hrs, Volume= 0.033 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
6,215	98	Paved parking & roofs
12,639	39	>75% Grass cover, Good, HSG A
3,295	30	Woods, Good, HSG A
22,149	54	Weighted Average
15,934		Pervious Area
6,215		Impervious Area

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Type III 24-hr 10YR Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XDRAIN-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Subcatchment 16S: 16S

Runoff = 0.30 cfs @ 12.17 hrs, Volume= 0.038 af, Depth= 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.70"

Area (sf)	CN	Description
5,286	39	>75% Grass cover, Good, HSG A
4,621	61	>75% Grass cover, Good, HSG B
3,435	30	Woods, Good, HSG A
18,702	55	Woods, Good, HSG B
32,044	51	Weighted Average
32,044		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Reach 1R: XDMH1-XDMH2

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.101 ac, Inflow Depth = 2.65" for 10YR event
 Inflow = 0.27 cfs @ 12.09 hrs, Volume= 0.022 af
 Outflow = 0.26 cfs @ 12.11 hrs, Volume= 0.022 af, Atten= 2%, Lag= 0.8 min

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Type III 24-hr 10YR Rainfall=4.70"

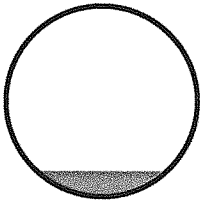
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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.27 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.41 fps, Avg. Travel Time= 1.6 min

Peak Storage= 9 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.94 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 139.0' Slope= 0.0324 '/'
Inlet Invert= 260.90', Outlet Invert= 256.40'



Reach 2R: XDMH2-XDMH4

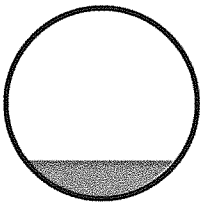
[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.639 ac, Inflow Depth = 2.08" for 10YR event
Inflow = 1.46 cfs @ 12.10 hrs, Volume= 0.111 af
Outflow = 1.44 cfs @ 12.11 hrs, Volume= 0.111 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.87 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.74 fps, Avg. Travel Time= 0.9 min

Peak Storage= 24 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 16.92 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 95.0' Slope= 0.0221 '/'
Inlet Invert= 255.90', Outlet Invert= 253.80'



Reach 3R: XDMH3-XPOND10

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.714 ac, Inflow Depth = 1.77" for 10YR event
Inflow = 1.17 cfs @ 12.11 hrs, Volume= 0.105 af
Outflow = 1.15 cfs @ 12.11 hrs, Volume= 0.105 af, Atten= 1%, Lag= 0.4 min

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Type III 24-hr 10YR Rainfall=4.70"

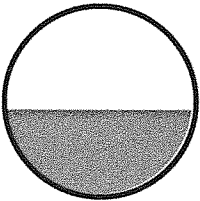
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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.34 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.16 fps, Avg. Travel Time= 0.7 min

Peak Storage= 17 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 50.0' Slope= 0.0050 '/'
Inlet Invert= 259.00', Outlet Invert= 258.75'



Reach 4R: XDMH4-DMH10

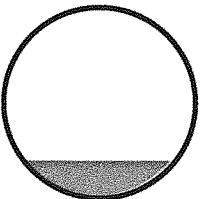
[52] Hint: Inlet conditions not evaluated
[61] Hint: Submerged 7% of Reach 2R bottom

Inflow Area = 0.937 ac, Inflow Depth = 2.76" for 10YR event
Inflow = 2.74 cfs @ 12.10 hrs, Volume= 0.216 af
Outflow = 2.71 cfs @ 12.10 hrs, Volume= 0.216 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.33 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.99 fps, Avg. Travel Time= 0.9 min

Peak Storage= 46 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.71 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 105.0' Slope= 0.0178 '/'
Inlet Invert= 253.55', Outlet Invert= 251.68'



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Reach 10R: DMH10-XHW

[52] Hint: Inlet conditions not evaluated

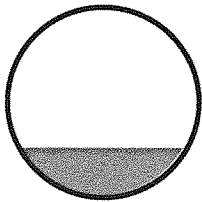
[61] Hint: Submerged 22% of Reach 4R bottom

Inflow Area = 2.404 ac, Inflow Depth = 2.00" for 10YR event
Inflow = 4.86 cfs @ 12.10 hrs, Volume= 0.401 af
Outflow = 4.83 cfs @ 12.10 hrs, Volume= 0.401 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.49 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.42 fps, Avg. Travel Time= 0.6 min

Peak Storage= 57 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.84 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 88.0' Slope= 0.0180 '/'
Inlet Invert= 251.58', Outlet Invert= 250.00'



Reach 11R: DMH11-DH10

[52] Hint: Inlet conditions not evaluated

[61] Hint: Submerged 1% of Reach 13R bottom

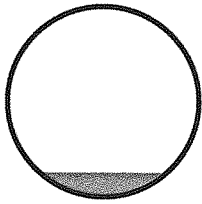
[61] Hint: Submerged 8% of Reach 14R bottom

Inflow Area = 0.982 ac, Inflow Depth = 0.06" for 10YR event
Inflow = 0.24 cfs @ 12.33 hrs, Volume= 0.005 af
Outflow = 0.24 cfs @ 12.35 hrs, Volume= 0.005 af, Atten= 1%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.08 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.66 fps, Avg. Travel Time= 0.5 min

Peak Storage= 5 cf @ 12.34 hrs, Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.83 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 85.0' Slope= 0.0313 '/'
Inlet Invert= 255.34', Outlet Invert= 252.68'



Reach 13R: POND 10 MANIFOLD TO DMH11

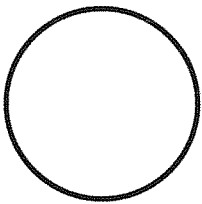
[52] Hint: Inlet conditions not evaluated

Inflow Area =	0.714 ac,	Inflow Depth =	0.00"	for 10YR event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.58 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 66.0' Slope= 0.0494 '/
 Inlet Invert= 258.70', Outlet Invert= 255.44'



Reach 14R: POND 11 MANIFOLD TO DMH 11

[52] Hint: Inlet conditions not evaluated

Inflow Area =	0.268 ac,	Inflow Depth =	0.22"	for 10YR event
Inflow =	0.24 cfs @	12.33 hrs,	Volume=	0.005 af
Outflow =	0.24 cfs @	12.33 hrs,	Volume=	0.005 af, Atten= 1%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.02 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 2.96 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.33 hrs, Average Depth at Peak Storage= 0.13'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

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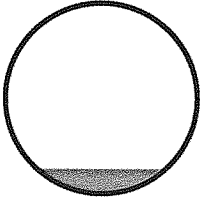
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Type III 24-hr 10YR Rainfall=4.70"

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12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 12.0' Slope= 0.0300 '/'
 Inlet Invert= 255.80', Outlet Invert= 255.44'



Pond 1P: Existing Pond

Inflow Area = 3.140 ac, Inflow Depth = 1.68" for 10YR event
 Inflow = 5.07 cfs @ 12.10 hrs, Volume= 0.439 af
 Outflow = 0.95 cfs @ 12.61 hrs, Volume= 0.424 af, Atten= 81%, Lag= 30.3 min
 Primary = 0.95 cfs @ 12.61 hrs, Volume= 0.424 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 249.55' @ 12.61 hrs Surf.Area= 7,351 sf Storage= 7,680 cf

Plug-Flow detention time= 141.5 min calculated for 0.424 af (97% of inflow)
 Center-of-Mass det. time= 120.6 min (910.4 - 789.9)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	11,166 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	1,494	0	0
249.00	6,327	3,911	3,911
250.00	8,184	7,256	11,166

Device	Routing	Invert	Outlet Devices
#1	Primary	248.30'	6.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 247.40' S= 0.0360 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished
#2	Primary	250.20'	12.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 249.40' S= 0.0320 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=0.95 cfs @ 12.61 hrs HW=249.55' (Free Discharge)

1=Culvert (Inlet Controls 0.95 cfs @ 4.82 fps)
 2=Culvert (Controls 0.00 cfs)

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Type III 24-hr 10YR Rainfall=4.70"

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Pond 10P: POND 10

[62] Warning: Submerged 14% of Reach 3R inlet

Inflow Area = 0.714 ac, Inflow Depth = 1.77" for 10YR event
 Inflow = 1.15 cfs @ 12.11 hrs, Volume= 0.105 af
 Outflow = 0.35 cfs @ 11.95 hrs, Volume= 0.105 af, Atten= 69%, Lag= 0.0 min
 Discarded = 0.35 cfs @ 11.95 hrs, Volume= 0.105 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 259.14' @ 12.50 hrs Surf.Area= 0.042 ac Storage= 0.016 af

Plug-Flow detention time= 9.0 min calculated for 0.105 af (100% of inflow)
 Center-of-Mass det. time= 9.0 min (818.2 - 809.2)

Volume	Invert	Avail.Storage	Storage Description
#1	258.30'	0.020 af	29.73'W x 62.00'L x 1.50'H Prismaoid 0.063 af Overall - 0.013 af Embedded = 0.050 af x 40.0% Voids
#2	258.80'	0.013 af	12.0"D x 60.00'L Horizontal Cylinder x 12 Inside #1
		0.033 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	258.29'	8.270 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0.000 ac
#2	Primary	259.20'	8.0" Vert. Orifice/Grate X 5.00 C= 0.600

Discarded OutFlow Max=0.35 cfs @ 11.95 hrs HW=258.33' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=258.30' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 11P: POND 11

Inflow Area = 0.268 ac, Inflow Depth = 4.46" for 10YR event
 Inflow = 1.20 cfs @ 12.09 hrs, Volume= 0.100 af
 Outflow = 0.46 cfs @ 12.33 hrs, Volume= 0.100 af, Atten= 62%, Lag= 14.6 min
 Discarded = 0.22 cfs @ 11.70 hrs, Volume= 0.095 af
 Primary = 0.24 cfs @ 12.33 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 256.42' @ 12.33 hrs Surf.Area= 0.026 ac Storage= 0.021 af

Plug-Flow detention time= 19.5 min calculated for 0.100 af (100% of inflow)
 Center-of-Mass det. time= 19.5 min (768.8 - 749.3)

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Type III 24-hr 10YR Rainfall=4.70"

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Volume	Invert	Avail.Storage	Storage Description
#1	254.90'	0.021 af	15.60'W x 72.00'L x 2.60'H Prismaoid 0.067 af Overall - 0.014 af Embedded = 0.053 af x 40.0% Voids
#2	255.50'	0.014 af	18.0"D x 70.00'L Horizontal Cylinder x 5 Inside #1
		0.035 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.89'	8.270 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0.000 ac
#2	Primary	256.30'	8.0" Vert. Orifice/Grate X 5.00 C= 0.600

Discarded OutFlow Max=0.22 cfs @ 11.70 hrs HW=254.94' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.24 cfs @ 12.33 hrs HW=256.42' (Free Discharge)

↑2=Orifice/Grate (Orifice Controls 0.24 cfs @ 1.16 fps)

100 YR POST-DEVELOPMENT

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Type III 24-hr 100YR Rainfall=6.80"

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Subcatchment 1S: XCB1

Runoff = 0.17 cfs @ 12.10 hrs, Volume= 0.013 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
938	98	Paved parking & roofs
1,497	39	>75% Grass cover, Good, HSG A
42	61	>75% Grass cover, Good, HSG B
2,477	62	Weighted Average
1,539		Pervious Area
938		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	21	0.0550	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.7	23	0.0887	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	19	0.1050	2.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0350	3.80		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.9					Direct Entry, Min TC
0.1	44	0.0250	7.77	6.10	Circular Channel (pipe), XCB1-XDMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	150	Total			

Subcatchment 3S: XCB3

Runoff = 2.26 cfs @ 12.09 hrs, Volume= 0.164 af, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
12,260	98	Paved parking & roofs
8,920	39	>75% Grass cover, Good, HSG A
2,281	61	>75% Grass cover, Good, HSG B
23,461	72	Weighted Average
11,201		Pervious Area
12,260		Impervious Area

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Type III 24-hr 100YR Rainfall=6.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0410	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.0	3	0.0410	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	13	0.1230	2.45		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	22	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	31	0.0560	1.66		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	62	0.0540	4.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6	102	0.0210	2.94		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4					Direct Entry, Min TC
0.1	33	0.0272	8.10	6.37	Circular Channel (pipe), XCB3-XDMH2 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	316	Total			

Subcatchment 5S: XCB5

Runoff = 1.92 cfs @ 12.09 hrs, Volume= 0.157 af, Depth= 6.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
12,331	98	Paved parking & roofs
662	61	>75% Grass cover, Good, HSG B
12,993	96	Weighted Average
662		Pervious Area
12,331		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min TC
0.1	25	0.0160	6.22	4.88	Circular Channel (pipe), XCB5-XDMH4 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.1	25	Total			

Subcatchment 10S: CB10

Runoff = 0.28 cfs @ 12.09 hrs, Volume= 0.024 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

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Type III 24-hr 100YR Rainfall=6.80"

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Area (sf)	CN	Description
1,903	98	Paved parking & roofs
1,903		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN. TC
0.2	48	0.0050	3.47	2.73	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	48	Total			

Subcatchment 11S: CB11

Runoff = 1.74 cfs @ 12.09 hrs, Volume= 0.147 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
11,616	98	Paved parking & roofs
74	61	>75% Grass cover, Good, HSG B
11,690	98	Weighted Average
74		Pervious Area
11,616		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN. TC
0.3	60	0.0050	3.47	2.73	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.3	60	Total			

Subcatchment 12S: CB12

Runoff = 3.16 cfs @ 12.09 hrs, Volume= 0.265 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
20,891	98	Paved parking & roofs
216	61	>75% Grass cover, Good, HSG B
21,107	98	Weighted Average
216		Pervious Area
20,891		Impervious Area

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Type III 24-hr 100YR Rainfall=6.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, TEST
0.0	14	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	14	Total			

Subcatchment 14S: ROOF14

Runoff = 1.31 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 6.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
8,585	98	Paved parking & roofs
348	39	>75% Grass cover, Good, HSG A
8,933	96	Weighted Average
348		Pervious Area
8,585		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Min. TC
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XCBROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
6.5	128	Total			

Subcatchment 15S: ROOF15

Runoff = 0.95 cfs @ 12.13 hrs, Volume= 0.081 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
6,215	98	Paved parking & roofs
12,639	39	>75% Grass cover, Good, HSG A
3,295	30	Woods, Good, HSG A
22,149	54	Weighted Average
15,934		Pervious Area
6,215		Impervious Area

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Type III 24-hr 100YR Rainfall=6.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XDRAIN-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Subcatchment 16S: 16S

Runoff = 1.13 cfs @ 12.13 hrs, Volume= 0.101 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.80"

Area (sf)	CN	Description
5,286	39	>75% Grass cover, Good, HSG A
4,621	61	>75% Grass cover, Good, HSG B
3,435	30	Woods, Good, HSG A
18,702	55	Woods, Good, HSG B
32,044	51	Weighted Average
32,044		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.1	87	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	29	0.0880	2.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	128	0.0086	4.17	1.46	Circular Channel (pipe), XROOF-XDMH3 Diam= 8.0" Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
7.9	294	Total			

Reach 1R: XDMH1-XDMH2

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.101 ac, Inflow Depth = 4.35" for 100YR event
 Inflow = 0.45 cfs @ 12.09 hrs, Volume= 0.036 af
 Outflow = 0.44 cfs @ 12.10 hrs, Volume= 0.036 af, Atten= 2%, Lag= 0.7 min

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Type III 24-hr 100YR Rainfall=6.80"

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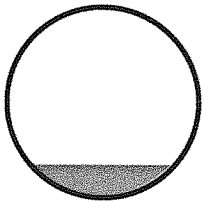
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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.99 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.61 fps, Avg. Travel Time= 1.4 min

Peak Storage= 13 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.94 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 139.0' Slope= 0.0324 '/'
Inlet Invert= 260.90', Outlet Invert= 256.40'



Reach 2R: XDMH2-XDMH4

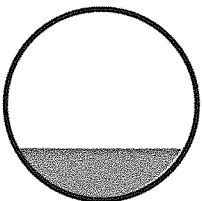
[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.639 ac, Inflow Depth = 3.77" for 100YR event
Inflow = 2.70 cfs @ 12.10 hrs, Volume= 0.201 af
Outflow = 2.68 cfs @ 12.10 hrs, Volume= 0.201 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.01 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.04 fps, Avg. Travel Time= 0.8 min

Peak Storage= 37 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 16.92 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 95.0' Slope= 0.0221 '/'
Inlet Invert= 255.90', Outlet Invert= 253.80'



Reach 3R: XDMH3-XPOND10

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.714 ac, Inflow Depth = 3.18" for 100YR event
Inflow = 2.23 cfs @ 12.11 hrs, Volume= 0.189 af
Outflow = 2.21 cfs @ 12.11 hrs, Volume= 0.189 af, Atten= 1%, Lag= 0.4 min

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Type III 24-hr 100YR Rainfall=6.80"

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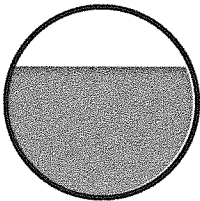
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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.87 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 0.6 min

Peak Storage= 29 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.69'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 50.0' Slope= 0.0050 '/'
Inlet Invert= 259.00', Outlet Invert= 258.75'



Reach 4R: XDMH4-DMH10

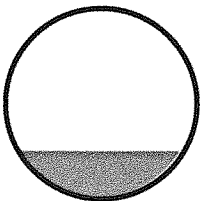
[52] Hint: Inlet conditions not evaluated
[61] Hint: Submerged 12% of Reach 2R bottom

Inflow Area = 0.937 ac, Inflow Depth = 4.58" for 100YR event
Inflow = 4.59 cfs @ 12.10 hrs, Volume= 0.358 af
Outflow = 4.54 cfs @ 12.10 hrs, Volume= 0.358 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.35 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.28 fps, Avg. Travel Time= 0.8 min

Peak Storage= 66 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.71 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
Length= 105.0' Slope= 0.0178 '/'
Inlet Invert= 253.55', Outlet Invert= 251.68'



Reach 10R: DMH10-XHW

[52] Hint: Inlet conditions not evaluated

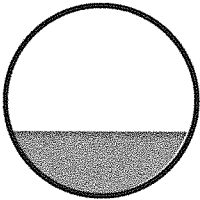
[61] Hint: Submerged 31% of Reach 4R bottom

Inflow Area = 2.404 ac, Inflow Depth = 3.39" for 100YR event
 Inflow = 8.27 cfs @ 12.13 hrs, Volume= 0.679 af
 Outflow = 8.22 cfs @ 12.14 hrs, Volume= 0.679 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 8.68 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.77 fps, Avg. Travel Time= 0.5 min

Peak Storage= 83 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.68'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 32.84 cfs

24.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 88.0' Slope= 0.0180 '/'
 Inlet Invert= 251.58', Outlet Invert= 250.00'



Reach 11R: DMH11-DH10

[52] Hint: Inlet conditions not evaluated

[88] Warning: Qout>Qin may require Finer Routing>1

[61] Hint: Submerged 10% of Reach 13R bottom

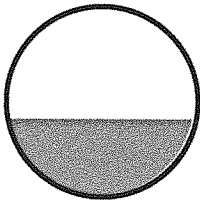
[61] Hint: Submerged 86% of Reach 14R bottom

Inflow Area = 0.982 ac, Inflow Depth = 0.69" for 100YR event
 Inflow = 2.36 cfs @ 12.20 hrs, Volume= 0.056 af
 Outflow = 2.38 cfs @ 12.20 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.94 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 4.46 fps, Avg. Travel Time= 0.3 min

Peak Storage= 26 cf @ 12.20 hrs, Average Depth at Peak Storage= 0.41'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.83 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 85.0' Slope= 0.0313 '/'
 Inlet Invert= 255.34', Outlet Invert= 252.68'



Reach 13R: POND 10 MANIFOLD TO DMH11

[52] Hint: Inlet conditions not evaluated

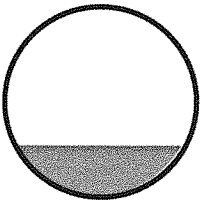
[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area = 0.714 ac, Inflow Depth = 0.54" for 100YR event
 Inflow = 1.35 cfs @ 12.21 hrs, Volume= 0.032 af
 Outflow = 1.37 cfs @ 12.21 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 8.00 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 4.61 fps, Avg. Travel Time= 0.2 min

Peak Storage= 11 cf @ 12.21 hrs, Average Depth at Peak Storage= 0.27'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.58 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 66.0' Slope= 0.0494 '
 Inlet Invert= 258.70', Outlet Invert= 255.44'



Reach 14R: POND 11 MANIFOLD TO DMH 11

[52] Hint: Inlet conditions not evaluated

Inflow Area = 0.268 ac, Inflow Depth = 1.07" for 100YR event
 Inflow = 1.28 cfs @ 12.16 hrs, Volume= 0.024 af
 Outflow = 1.28 cfs @ 12.16 hrs, Volume= 0.024 af, Atten= 1%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.50 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 3.76 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.17 hrs, Average Depth at Peak Storage= 0.30'
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

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Type III 24-hr 100YR Rainfall=6.80"

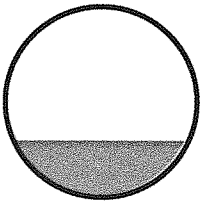
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12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished
 Length= 12.0' Slope= 0.0300 '/'
 Inlet Invert= 255.80', Outlet Invert= 255.44'



Pond 1P: Existing Pond

[93] Warning: Storage range exceeded by 2.56'
 [85] Warning: Oscillations may require Finer Routing>1
 [63] Warning: Exceeded Reach 10R inflow depth by 0.43' @ 12.30 hrs

Inflow Area = 3.140 ac, Inflow Depth = 2.98" for 100YR event
 Inflow = 9.34 cfs @ 12.14 hrs, Volume= 0.780 af
 Outflow = 7.10 cfs @ 12.29 hrs, Volume= 0.764 af, Atten= 24%, Lag= 9.2 min
 Primary = 7.10 cfs @ 12.29 hrs, Volume= 0.764 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 252.56' @ 12.29 hrs Surf.Area= 8,184 sf Storage= 11,166 cf

Plug-Flow detention time= 123.0 min calculated for 0.764 af (98% of inflow)
 Center-of-Mass det. time= 112.0 min (896.0 - 784.0)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	11,166 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	1,494	0	0
249.00	6,327	3,911	3,911
250.00	8,184	7,256	11,166

Device	Routing	Invert	Outlet Devices
#1	Primary	248.30'	6.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 247.40' S= 0.0360 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished
#2	Primary	250.20'	12.0" x 25.0' long Culvert CMP, square edge headwall, Ke= 0.500 Outlet Invert= 249.40' S= 0.0320 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished

Primary OutFlow Max=6.76 cfs @ 12.29 hrs HW=252.39' (Free Discharge)

1=Culvert (Inlet Controls 1.85 cfs @ 9.43 fps)
 2=Culvert (Inlet Controls 4.91 cfs @ 6.26 fps)

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Type III 24-hr 100YR Rainfall=6.80"

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Pond 10P: POND 10

[85] Warning: Oscillations may require Finer Routing>1

[63] Warning: Exceeded Reach 3R inflow depth by 0.05' @ 12.60 hrs

Inflow Area = 0.714 ac, Inflow Depth = 3.18" for 100YR event
 Inflow = 2.21 cfs @ 12.11 hrs, Volume= 0.189 af
 Outflow = 1.70 cfs @ 12.21 hrs, Volume= 0.189 af, Atten= 23%, Lag= 6.0 min
 Discarded = 0.35 cfs @ 11.75 hrs, Volume= 0.157 af
 Primary = 1.35 cfs @ 12.21 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 259.49' @ 12.21 hrs Surf.Area= 0.042 ac Storage= 0.026 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 11.3 min (817.9 - 806.6)

Volume	Invert	Avail.Storage	Storage Description
#1	258.30'	0.020 af	29.73'W x 62.00'L x 1.50'H Prismatoid 0.063 af Overall - 0.013 af Embedded = 0.050 af x 40.0% Voids
#2	258.80'	0.013 af	12.0"D x 60.00'L Horizontal Cylinder x 12 Inside #1
		0.033 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	258.29'	8.270 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0.000 ac
#2	Primary	259.20'	8.0" Vert. Orifice/Grate X 5.00 C= 0.600

Discarded OutFlow Max=0.35 cfs @ 11.75 hrs HW=258.32' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=1.29 cfs @ 12.21 hrs HW=259.49' (Free Discharge)

↑2=Orifice/Grate (Orifice Controls 1.29 cfs @ 1.82 fps)

Pond 11P: POND 11

Inflow Area = 0.268 ac, Inflow Depth = 6.56" for 100YR event
 Inflow = 1.74 cfs @ 12.09 hrs, Volume= 0.147 af
 Outflow = 1.50 cfs @ 12.16 hrs, Volume= 0.147 af, Atten= 14%, Lag= 4.4 min
 Discarded = 0.22 cfs @ 11.60 hrs, Volume= 0.123 af
 Primary = 1.28 cfs @ 12.16 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 256.59' @ 12.17 hrs Surf.Area= 0.026 ac Storage= 0.024 af

Plug-Flow detention time= 17.7 min calculated for 0.147 af (100% of inflow)
 Center-of-Mass det. time= 17.7 min (761.3 - 743.6)

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Type III 24-hr 100YR Rainfall=6.80"

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Volume	Invert	Avail.Storage	Storage Description
#1	254.90'	0.021 af	15.60'W x 72.00'L x 2.60'H Prismaoid 0.067 af Overall - 0.014 af Embedded = 0.053 af x 40.0% Voids
#2	255.50'	0.014 af	18.0"D x 70.00'L Horizontal Cylinder x 5 Inside #1
		0.035 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	254.89'	8.270 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0.000 ac
#2	Primary	256.30'	8.0" Vert. Orifice/Grate X 5.00 C= 0.600

Discarded OutFlow Max=0.22 cfs @ 11.60 hrs HW=254.93' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=1.17 cfs @ 12.16 hrs HW=256.57' (Free Discharge)

↑2=Orifice/Grate (Orifice Controls 1.17 cfs @ 1.77 fps)

APPENDIX E

INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: 162 Grove Street Franklin

A	B	C	D	E
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Stormwater WDO	65%	1.00	65%	35%
Infiltration Pond	80% w/ 94% pre-treatment	100%	80%	20%
Controlled cascade way	65%	20%	13%	7%
Retention Basin	50% w/ pre-treatment	7%	3%	4%

Total TSS Removal =

96

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 162 Grove St.
 Prepared By: BAR
 Date: 7/8/20

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: 162 Grove Street Franklin

A	B	C	D	E
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump 1400 lbs CIB	25%	1.00	25%	75%
Concrete Casinade wall	65%	75%	48.75%	27%
Retention Basin	50 w/ pre treatment	27%	13%	14%

TSS Removal Calculation Worksheet

Separate Form Needs to be Completed for Each Outlet or BMP Train

86%

Total TSS Removal =

Project: 162 Grove St.
 Prepared By: R.A.G.
 Date: 7/8/20

*Equals remaining load from previous BMP (E) which enters the BMP

Brief Stormceptor Sizing Report - CB 11

Project Information & Location			
Project Name	162 Grove St	Project Number	649226
City	Franklin	State/ Province	Massachusetts
Country	United States of America	Date	5/21/2020
Designer Information		EOR Information (optional)	
Name	Jim Lyons	Name	Rick Goodreau
Company	Contech ES	Company	UCI
Phone #	413-246-5151	Phone #	508-922-1063
Email	jlyons@conteches.com	Email	rick@uci850.com

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	CB 11
Target TSS Removal (%)	80
TSS Removal (%) Provided	92
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	% TSS Removal Provided
STC 450i	92
STC 900	96
STC 1200	96
STC 1800	96
STC 2400	97
STC 3600	98
STC 4800	98
STC 6000	98
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	99

Sizing Details			
Drainage Area		Water Quality Objective	
Total Area (acres)	0.27	TSS Removal (%)	80.0
Imperviousness %	100.0	Runoff Volume Capture (%)	
Rainfall		Oil Spill Capture Volume (Gal)	
Station Name	BLUE HILL	Peak Conveyed Flow Rate (CFS)	
State/Province	Massachusetts	Water Quality Flow Rate (CFS)	
Station ID #	0736	Up Stream Storage	
Years of Records	58	Storage (ac-ft)	Discharge (cfs)
Latitude	42°12'44"N	0.000	0.000
Longitude	71°6'53"W	Up Stream Flow Diversion	
		Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD) The selected PSD defines TSS removal		
OK-110		
Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes
<ul style="list-style-type: none"> Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
<https://www.conteches.com/technical-guides/search?filter=1WBC005EYX>

**Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method**



162 Grove Street
Franklin, MA
DMH-10

CASCADE
separator™

AREA	1.72	acres	CASCADE MODEL	CS-6	
WEIGHTED C	0.95		PARTICLE SIZE	110	microns
TC	6.00	minutes	RAINFALL STATION	68	

Rainfall Intensity ¹ (in/hr)	Percent Rainfall Volume ¹	Hydraulic Loading Rate (gpm/ft ²)	Removal Efficiency (%)	Incremental Removal (%)
0.02	9.3%	0.52	100.0	9.3
0.04	9.5%	1.04	100.0	9.5
0.06	8.7%	1.55	100.0	8.7
0.08	10.1%	2.07	100.0	10.1
0.10	7.2%	2.59	100.0	7.2
0.12	6.0%	3.11	100.0	6.0
0.14	6.3%	3.62	100.0	6.3
0.16	5.6%	4.14	100.0	5.6
0.18	4.7%	4.66	100.0	4.7
0.20	3.6%	5.18	100.0	3.6
0.25	8.2%	6.47	100.0	8.2
0.50	14.9%	12.94	99.7	14.9
0.75	3.2%	19.41	93.7	3.0
1.00	1.2%	25.88	87.6	1.1
1.50	0.7%	38.82	75.4	0.5
2.00	0.8%	51.76	63.2	0.5

99.1

Removal Efficiency Adjustment ² =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	92.7%

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
 2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

APPENDIX G

UC1435-POST

Prepared by CAQ/rrg

HydroCAD® 8.00 s/n 001535 © 2006 HydroCAD Software Solutions LLC

Type III 24-hr 100YR Rainfall=6.80"

Page 2

7/9/2020

Hydrograph for Pond 10P: POND 10

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	258.30	0.00	0.00	0.00
2.50	0.00	0.000	258.30	0.00	0.00	0.00
5.00	0.01	0.000	258.30	0.01	0.01	0.00
7.50	0.03	0.000	258.30	0.03	0.03	0.00
10.00	0.06	0.000	258.30	0.06	0.06	0.00
12.50	0.66	0.022	259.36	0.79	0.35	0.44
15.00	0.13	0.000	258.31	0.13	0.13	0.00
17.50	0.07	0.000	258.30	0.07	0.07	0.00
20.00	0.05	0.000	258.30	0.05	0.05	0.00
22.50	0.04	0.000	258.30	0.04	0.04	0.00
25.00	0.00	0.000	258.30	0.00	0.00	0.00
27.50	0.00	0.000	258.30	0.00	0.00	0.00
30.00	0.00	0.000	258.30	0.00	0.00	0.00
32.50	0.00	0.000	258.30	0.00	0.00	0.00
35.00	0.00	0.000	258.30	0.00	0.00	0.00
37.50	0.00	0.000	258.30	0.00	0.00	0.00
40.00	0.00	0.000	258.30	0.00	0.00	0.00
42.50	0.00	0.000	258.30	0.00	0.00	0.00
45.00	0.00	0.000	258.30	0.00	0.00	0.00
47.50	0.00	0.000	258.30	0.00	0.00	0.00
50.00	0.00	0.000	258.30	0.00	0.00	0.00
52.50	0.00	0.000	258.30	0.00	0.00	0.00
55.00	0.00	0.000	258.30	0.00	0.00	0.00
57.50	0.00	0.000	258.30	0.00	0.00	0.00
60.00	0.00	0.000	258.30	0.00	0.00	0.00
62.50	0.00	0.000	258.30	0.00	0.00	0.00
65.00	0.00	0.000	258.30	0.00	0.00	0.00
67.50	0.00	0.000	258.30	0.00	0.00	0.00
70.00	0.00	0.000	258.30	0.00	0.00	0.00

UC1435-POST

Prepared by CAQ/rrg

HydroCAD® 8.00 s/n 001535 © 2006 HydroCAD Software Solutions LLC

Type III 24-hr 100YR Rainfall=6.80"

Page 3

7/9/2020

Hydrograph for Pond 11P: POND 11

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	254.90	0.00	0.00	0.00
2.50	0.01	0.000	254.90	0.01	0.01	0.00
5.00	0.02	0.000	254.90	0.02	0.02	0.00
7.50	0.04	0.000	254.90	0.04	0.04	0.00
10.00	0.09	0.000	254.91	0.09	0.09	0.00
12.50	0.38	0.021	256.42	0.45	0.22	0.24
15.00	0.07	0.000	254.91	0.05	0.05	0.00
17.50	0.03	0.000	254.90	0.04	0.04	0.00
20.00	0.02	0.000	254.90	0.02	0.02	0.00
22.50	0.02	0.000	254.90	0.02	0.02	0.00
25.00	0.00	0.000	254.90	0.00	0.00	0.00
27.50	0.00	0.000	254.90	0.00	0.00	0.00
30.00	0.00	0.000	254.90	0.00	0.00	0.00
32.50	0.00	0.000	254.90	0.00	0.00	0.00
35.00	0.00	0.000	254.90	0.00	0.00	0.00
37.50	0.00	0.000	254.90	0.00	0.00	0.00
40.00	0.00	0.000	254.90	0.00	0.00	0.00
42.50	0.00	0.000	254.90	0.00	0.00	0.00
45.00	0.00	0.000	254.90	0.00	0.00	0.00
47.50	0.00	0.000	254.90	0.00	0.00	0.00
50.00	0.00	0.000	254.90	0.00	0.00	0.00
52.50	0.00	0.000	254.90	0.00	0.00	0.00
55.00	0.00	0.000	254.90	0.00	0.00	0.00
57.50	0.00	0.000	254.90	0.00	0.00	0.00
60.00	0.00	0.000	254.90	0.00	0.00	0.00
62.50	0.00	0.000	254.90	0.00	0.00	0.00
65.00	0.00	0.000	254.90	0.00	0.00	0.00
67.50	0.00	0.000	254.90	0.00	0.00	0.00
70.00	0.00	0.000	254.90	0.00	0.00	0.00

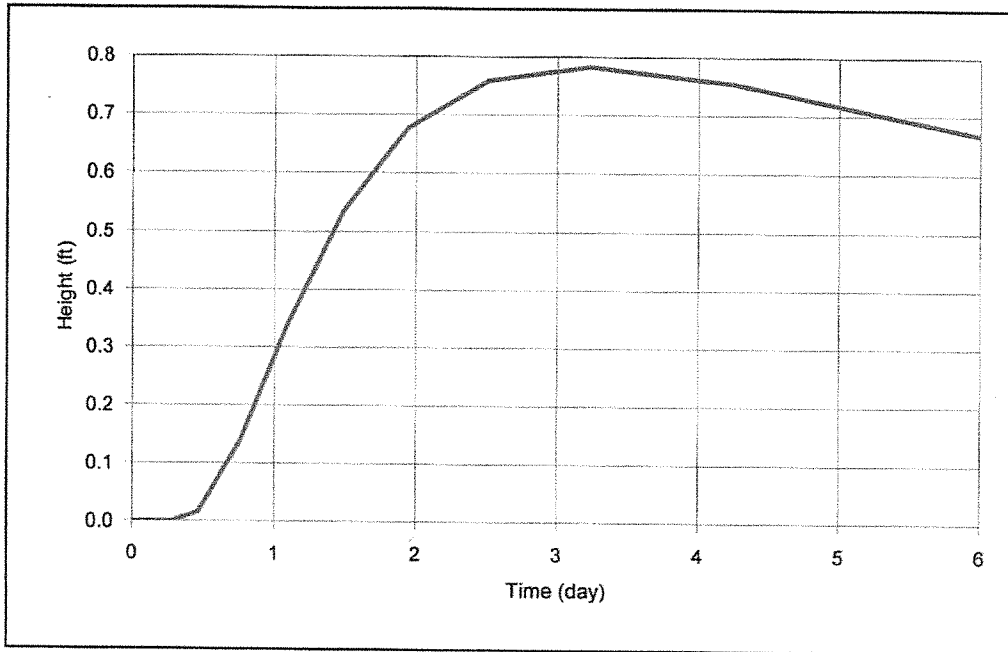
APPENDIX H

Reference Well: USGS 420544071173701 MA-NNW 27R Norfolk, MA

TP No.	TP Date	TP Elev.	S _C	S _R	OW _R	OW _C	OW _{MAX}	S _H	ESHGW Elev.
3	4/17/2020	261.12	6.8	4.2	3.56	5.08	3.48	4.95	256.2
4	4/17/2020	260.77	6.7	4.2	3.56	5.08	3.48	4.78	256.0
5	4/17/2020	258.89	8.0	4.2	3.56	5.08	3.48	6.11	252.8
							3.48	#DIV/0!	#DIV/0!

S_R* value assumes a probability of 5% (i.e. the estimated value should only be exceeded once every 20 years).

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CAQ Eng'g. Assoc., Inc.

PROJECT: - pond 10

ANALYST: CAQ

DATE: 7/1/2020 TIME: 7:57:01 PM

INPUT PARAMETERS

Application rate: 14.85 c.ft/day/sq. ft

Duration of application: 0.2 day

Total simulation time: 6 day

Fillable porosity: 0.2

Hydraulic conductivity: 15.89 ft/day

Initial saturated thickness: 4 ft

Length of application area: 62 ft

Width of application area: 29.73 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 62 ft

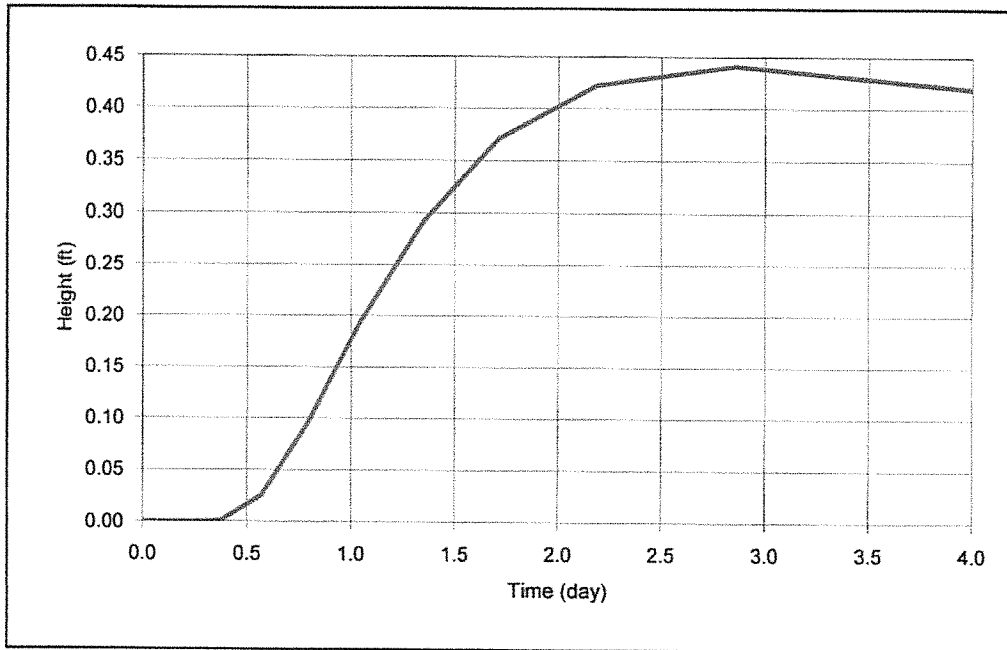
Y coordinate: 0 ft

Total volume applied: 5474.482 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0
0	0
0	0
0	0
0	0
0.1	0
0.1	0
0.1	0
0.1	0
0.2	0
0.3	0
0.5	0.02
0.8	0.14
1.1	0.34
1.5	0.54
1.9	0.68
2.5	0.76
3.2	0.78
4.3	0.76
6	0.67

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: CAQ Eng'g. Assoc., Inc.

PROJECT: - pond 11

ANALYST: CAQ

DATE: 7/1/2020 TIME: 8:02:56 PM

INPUT PARAMETERS

Application rate: 18.75 c.ft/day/sq. ft

Duration of application: 0.2 day

Total simulation time: 4 day

Fillable porosity: 0.2

Hydraulic conductivity: 25 ft/day

Initial saturated thickness: 4 ft

Length of application area: 72 ft

Width of application area: 15.6 ft

No constant head boundary used

Groundwater mounding @

X coordinate: 72 ft

Y coordinate: 0 ft

Total volume applied: 4212 cft

MODEL RESULTS

Time (day)	Mound Height (ft)
0	0
0	0
0	0
0	0
0	0
0	0
0.1	0
0.1	0
0.1	0
0.1	0
0.2	0
0.3	0
0.4	0
0.6	0.02
0.8	0.09
1	0.19
1.3	0.29
1.7	0.37
2.2	0.42
2.9	0.44
4	0.42

APPENDIX I

CHECKLIST FOR DESIGNERS

Site Planning

Checklist for Designers

GOALS and NEEDS addressed:

1. Create a visually appealing community
2. Stabilize and increase property values
3. Encourage low impact development
4. Preserve the Town's historic and cultural heritage
5. Protect Franklin's natural environment, including habitat, water resources, and ecosystem services

•••••
FRANKLIN POLICY:

- Subdivision plans and site plans for all forms of development shall adhere to the principles of environmental and aesthetic compatibility and energy-efficient design.
-

BEST DEVELOPMENT PRACTICES	Incorporated into Project?
The site plan should be designed to address the following to the maximum extent practicable	
Unique natural features have been preserved <i>(the development program should either avoid altering or showcase significant natural features)</i>	<input checked="" type="checkbox"/> N/A
Native vegetation planted in disturbed areas as needed to enhance or restore habitat	<input checked="" type="checkbox"/>
Historic and cultural resources have been preserved <i>(the development program should either avoid altering or showcase significant historic and cultural features)</i>	<input checked="" type="checkbox"/> N/A
Clearing, grading, and building placement consider viewsheds	<input checked="" type="checkbox"/>
Cut and fill have been minimized	<input checked="" type="checkbox"/>
Buildings blend into the natural topography	<input checked="" type="checkbox"/>
Buildings are oriented to the sun and wind for maximum energy efficiency <i>Vegetated protection from northwest (winter) winds is provided</i> <i>Deciduous species planted or retained close to the East, South and West building edges</i>	<input checked="" type="checkbox"/> E/W/W building
Conforms to §185-31 of the Town of Franklin Zoning Code and/ or Chapter 300 of the Town of Franklin Subdivision Regulations	<input checked="" type="checkbox"/> w/w/w/w

Stormwater Management

Checklist for Designers

GOALS and NEEDS addressed:

1. Protect local and regional wetlands and water bodies
2. Maximize groundwater recharge to retain a viable local groundwater supply
3. Minimize pollutants in stormwater runoff

FRANKLIN POLICIES:

- (A) All new development and redevelopment projects in Franklin shall meet the following stormwater management performance standards.
- i. Post-development peak discharge rates and volumes from the site shall not exceed pre-development peak discharge rates and volumes from the site.
 - ii. The stormwater management system shall remove at least 80% of the average annual load of total suspended solids (TSS), at least 80% of the phosphorus loading and at least 60% of nitrogen loading from the post-development stormwater created on site.
 - iii. All drainage facilities proposed shall utilize best management practices as outlined in the Massachusetts Stormwater Management Standards.
 - iv. All sites will have an Operation and Maintenance plan to insure future compliance.
- (B) Non-structural stormwater management systems should be used wherever site conditions allow.

BEST DEVELOPMENT PRACTICES	Incorporated into Project?
The site plan should be designed to address the following to the maximum extent practicable	
Vegetated swales <i>(recommended to convey runoff from roadways & parking lots)</i>	<input type="checkbox"/>
Vegetated filter strips <i>(recommended to filter and infiltrate runoff from roadways, parking lots, and driveways; use along roadsides and parking lots)</i>	<input type="checkbox"/>
Constructed wetlands <i>(preferred method for stormwater retention & pollutant removal)</i>	<input type="checkbox"/>
Bioretention cells <i>(rain gardens) (recommended on residential lots and parking lot islands)</i>	<input type="checkbox"/>
Pervious paving surfaces <i>(recommended in overflow parking and low-traffic areas)</i>	<input type="checkbox"/>
Sediment Forebays <i>(use in combination with other BDP)</i>	<input type="checkbox"/>
Roof gardens <i>(encouraged on flat or gently sloped commercial and industrial rooftops)</i>	<input type="checkbox"/>
Retention/Detention basins <i>(may be used in series with other practices to provide pre-treatment)</i>	<input checked="" type="checkbox"/>
Recharge Systems <i>(suitable for all areas of development)</i>	<input checked="" type="checkbox"/>
Drain pipe/catch basin systems <i>(as required to collect runoff when other systems are not practical)</i>	<input checked="" type="checkbox"/>
If utilizing drain pipe and/or catch basin systems, have you documented that other systems are infeasible?	<input checked="" type="checkbox"/>

Erosion and Sedimentation Control

Checklist for Designers

GOALS and NEEDS addressed:

1. Minimize clearing and regrading;
2. Prevent erosion and sedimentation.

FRANKLIN POLICIES:

- (A) Any proposed project on a previously undeveloped site shall accommodate the development program in a way that minimizes clearing and re-grading, especially in areas of steep slopes, erosion-prone soils, or sensitive vegetation. For redevelopment projects, the site plan shall concentrate development in previously-disturbed areas to the extent possible.
- (B) As a condition of approval, every proposed project shall submit and adhere to an erosion control plan that addresses soil stabilization, sediment retention, perimeter protection, construction scheduling, traffic area stabilization and dust control.
- (C) If the proposed project is in an area under conservation jurisdiction, the project will require permitting deemed appropriate by the Conservation Commission.

BEST DEVELOPMENT PRACTICES	Incorporated into Project?
The site plan should be designed to address the following to the maximum extent practicable.	
Clearing and re-grading have been minimized	<input checked="" type="checkbox"/>
Plan identifies sensitive areas to be protected and areas that are suitable for development	<input checked="" type="checkbox"/>
Conservation Permits have been obtained <i>(when applicable)</i>	<input type="checkbox"/> WILL BE Filing Per
The erosion and sedimentation control plan addresses:	
• Soil stabilization <i>(cover or stabilize erodible surfaces not in immediate use)</i>	<input checked="" type="checkbox"/>
• Sediment retention <i>(runoff interceptors and sediment traps/ponds)</i>	<input type="checkbox"/> NA
• Perimeter protection <i>(vegetated buffers, compost socks or straw wattles at limit of work)</i>	<input checked="" type="checkbox"/>
• Construction scheduling <i>(minimize disturbed area at any given time)</i>	<input checked="" type="checkbox"/>
• Traffic area stabilization <i>(crushed rock or similar at construction vehicle entrance and parking areas)</i>	<input checked="" type="checkbox"/>
• Dust control <i>(plan for stabilizing dry, dust-prone surfaces when necessary)</i>	<input checked="" type="checkbox"/>
• Vegetation <i>(preserve existing vegetation and/or identify areas to be revegetated including proposed planting species, quantity and planting specifications)</i>	<input checked="" type="checkbox"/>

Landscape Design

Checklist for Designers

GOALS and NEEDS addressed:

1. Stabilize water use at a sustainable level
2. Create landscapes that minimize habitat destruction and maximize habitat value
3. Encourage the development of landscapes that provide environmental quality and visual relief through the planting of native or naturalized species

FRANKLIN POLICIES:

- (A) Site plans and landscape plans for all proposed projects shall take appropriate steps, as outlined in the Guidebook, to minimize water use for irrigation and to allow for natural recharge of groundwater. Landscape plans shall follow the guidelines in the Guidebook for selecting species that are most appropriate to the site conditions.
- (B) Native and habitat-creating species shall be used in all landscape plans to the maximum extent possible while still meeting the site's landscaping needs. Invasive species may not be planted in Franklin under any condition. Refer to the Massachusetts Prohibited Plant list for more information.
- (C) Actively promote the Town of Franklin's Water Conservation Measures.

BEST DEVELOPMENT PRACTICES	Incorporated into Project?
The site plan must address all of the following principles.	
Retain and Recharge water on site (<i>install bio-retention cells, vegetated filter strips and minimize lawn areas where feasible</i>)	<input checked="" type="checkbox"/>
Preserve natural vegetation to the maximum extent practicable	<input checked="" type="checkbox"/>
Irrigation system is water efficient (<i>if an in-ground irrigation system is proposed, it is a water efficient system with timers and automatic sensors to prevent overwatering</i>)	<input type="checkbox"/> N/A
Preserve soil permeability (<i>minimize disturbing existing landscapes. Prepare new planting beds in accordance to the Planting Bed Guidelines on p. 13, and install 1-2" of shredded pine bark mulch on new planting areas</i>)	<input checked="" type="checkbox"/>
Minimize the use of turf grass (<i>when applicable, reduce the size of the lawn area; instead, plant a bio-retention cell, use alternative, drought tolerant groundcover</i>)	<input checked="" type="checkbox"/>
Specify variety of native and naturalized species (<i>species from the plant list have been incorporated into the landscape design, and no invasive species are used. Refer to the Plant Species Section and the Massachusetts Prohibited Plant List</i>)	<input checked="" type="checkbox"/>
Species are appropriate to the soil, site, and microclimate conditions (<i>select appropriate species from the plant list in this guidebook</i>)	<input checked="" type="checkbox"/>

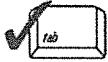
APPENDIX J



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

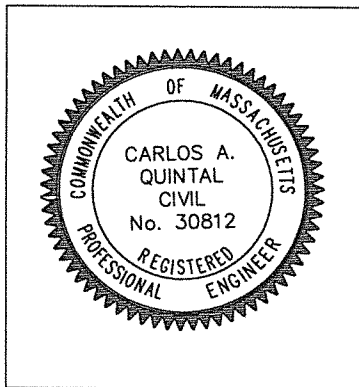
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Carlos A. Quintal
Signature and Date 7/9/2020

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
 - Credit 1
 - Credit 2
 - Credit 3
- Use of "country drainage" versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): _____

Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted *prior to* the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does *not* cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has *not* been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

APPENDIX K

Operation and Maintenance Plan

Good House Keeping Measures

1. The parking area and driveway will receive the minimum amount of sand and salt. Snow will be stored at the locations shown on the site plan.
2. The site consists of mulch with trees, turf lawn area and existing wooded areas. These areas will be assessed by the owner's landscape professional to determine the minimum amounts of fertilizers, herbicides and pesticides necessary and shall only apply the minimums necessary.
3. The site will be stabilized with landscaped areas with mulch and turf lawn. This will improve the existing site coverage.

Long Term Pollution Prevention Plan

The owner shall employ good housekeeping measures, which include removing trash and debris from the site, keeping trash in receptacles and complying with the long term operation and maintenance plan.

The owner does not plan to store materials or waste products on the site.

The owner will not allow vehicles to be washed on site.

The owner will have routine inspections and maintenance completed for the Storm-water BMP's. See sheet 6 for details and schedule.

The owner will hire a licensed company to deal with any spills that may occur on the site.

The owner will employ a landscape professional to determine and apply the minimum amounts of fertilizers, herbicides and pesticides.

The site is serviced by Town water and an onsite septic system.

No floor drains are proposed.

The owner will apply the minimum amount of sand and salt necessary. The parking area will be swept immediately following the last winter sanding.

Sand piles will not be stored on site.

Operation and Maintenance Plan

An operation and maintenance schedule for the construction period and the post-development period has been provided on sheet 6.

During the construction period and after completion the Owner, shall be responsible for the operation and maintenance of the site and the drainage system.

Upon completion of the construction work the property owner shall be responsible for the maintenance of the drainage facilities.

The yearly estimated operation and maintenance budget is \$2,500.00

Yearly Inspection and Maintenance Log

Page 1

162 Grove Street
Franklin, Massachusetts

Parking Lot Sweeping - Annually

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Notes:

Catch Basin Sumps – Inspect 4 Times per year

Remove sediment when it reaches a depth of two feet.

Remove hydrocarbons and debris when discovered.

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Notes:

Contech Casade Separator CS-9 Unit – Inspect 4 Times per year –

Remove sediment when it reaches 75% capacity in the isolation sump

Remove hydrocarbons and debris when discovered.

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Notes:

Stormceptor – Inspect 4 Times per year
Remove sediment when it reaches a depth of eight inches.
Remove hydrocarbons and debris when discovered.

Date: _____
Date: _____
Date: _____
Date: _____

Performed By: _____
Performed By: _____
Performed By: _____
Performed By: _____

Notes:

Underground Pond 10 – 4 times per year
Maintenance

- Preventative Maintenance – twice a year
- Inspect to ensure proper functioning – after major storm events for three months after completion of construction, twice per year thereafter and when there is a discharge through the high outlet.
- Inspect and clean pre-treatment devices – twice per year and after major storm events.

Date: _____
Date: _____
Date: _____
Date: _____

Performed By: _____
Performed By: _____
Performed By: _____
Performed By: _____

Notes:

Pond 1 – 4 times per year

- Maintenance Preventative Maintenance – twice a year
- Inspect to ensure proper functioning – after major storm events for three months after completion of construction, twice per year thereafter and when there is a discharge through the high outlet.
- Mow the buffer area, side slopes, remove trash and debris, remove grass clippings and accumulated organic matter – twice per year – obtain necessary permits prior to commencing with regulated work
- Inspect and clean pre-treatment devices – twice per year and after major storm events.

Date: _____
Date: _____
Date: _____
Date: _____

Performed By: _____
Performed By: _____
Performed By: _____
Performed By: _____

Notes:

Landscape Area Inspection – 4 times per year

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Date: _____

Performed By: _____

Notes:

APPENDIX L

In Compliance with DEP Storm-water Management Standard 10

162 Grove Street – Franklin MA

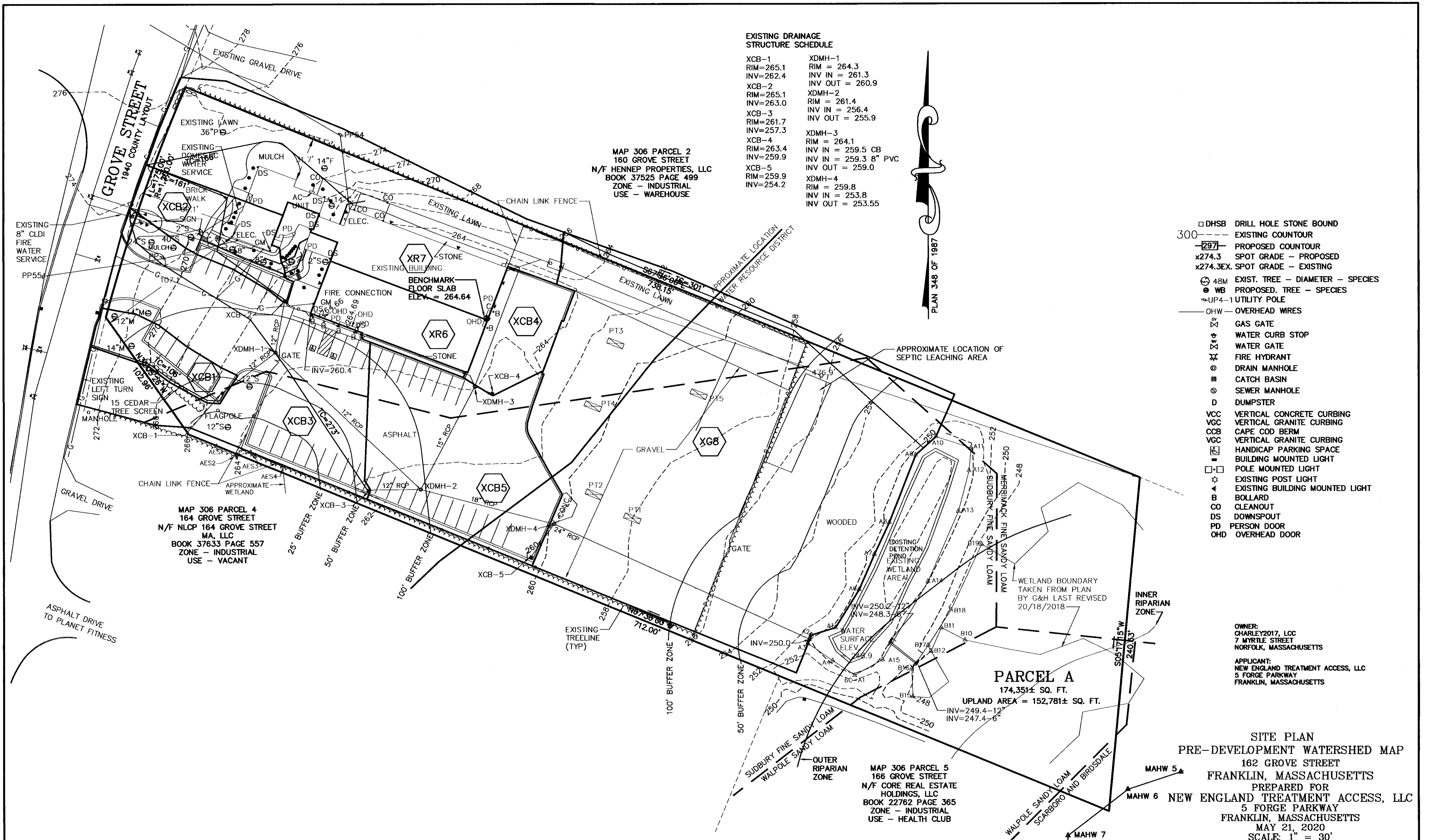
No Illicit discharges to the storm-water management system, including wastewater discharges and discharges of storm-water contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease are proposed and shall not be allowed.

The site map located in Appendix I shall be part of this Illicit Discharge Compliance Statement.

Charley2017, LLC, owner, is the responsible party.

Owner

APPENDIX M



EXISTING DRAINAGE STRUCTURE SCHEDULE

XCB-1	XDMH-1
RIM=265.1	RIM = 264.3
INV=262.4	INV IN = 261.3
XCB-2	INV OUT = 260.9
RIM=265.1	XDMH-2
INV=263.0	RIM = 261.4
XCB-3	INV IN = 256.4
RIM=261.7	INV OUT = 255.9
INV=257.3	XDMH-3
XCB-4	RIM = 264.1
RIM=263.4	INV IN = 259.5 CB
INV=259.9	INV IN = 259.3 8" PVC
XCB-5	INV OUT = 259.0
RIM=259.9	XDMH-4
INV=254.2	RIM = 259.8
	INV IN = 253.8
	INV OUT = 253.55

MAP 306 PARCEL 2
160 GROVE STREET
N/F HENNEP PROPERTIES, LLC
BOOK 37525 PAGE 499
ZONE - INDUSTRIAL
USE - WAREHOUSE

MAP 306 PARCEL 4
164 GROVE STREET
N/F NLCP 164 GROVE STREET
MA, LLC
BOOK 37633 PAGE 557
ZONE - INDUSTRIAL
USE - VACANT

MAP 306 PARCEL 5
166 GROVE STREET
N/F CORE REAL ESTATE
HOLDINGS, LLC
BOOK 22762 PAGE 365
ZONE - INDUSTRIAL
USE - HEALTH CLUB

PARCEL A
174,351± SQ. FT.
UPLAND AREA = 152,781± SQ. FT.

- DHSB DRILL HOLE STONE BOUND
- EXISTING COUNTOUR
- 297- PROPOSED COUNTOUR
- x274.3 SPOT GRADE - PROPOSED
- x274.3EX SPOT GRADE - EXISTING
- ⊙ 48M EXIST. TREE - DIAMETER - SPECIES
- ⊙ WB PROPOSED. TREE - SPECIES
- ⊙ UP4-1 UTILITY POLE
- OHW OVERHEAD WIRES
- ⊕ GAS GATE
- ⊕ WATER CURB STOP
- ⊕ WATER GATE
- ⊕ FIRE HYDRANT
- ⊕ DRAIN MANHOLE
- ⊕ CATCH BASIN
- ⊕ SEWER MANHOLE
- D DUMPSTER
- VCC VERTICAL CONCRETE CURBING
- VGC VERTICAL GRANITE CURBING
- CCB CAPE COD BERM
- VGC VERTICAL GRANITE CURBING
- HANDICAP PARKING SPACE
- BUILDING MOUNTED LIGHT
- POLE MOUNTED LIGHT
- ☆ EXISTING POST LIGHT
- ▲ EXISTING BUILDING MOUNTED LIGHT
- B BOLLARD
- CO CLEANOUT
- DS DOWNSPOUT
- PD PERSON DOOR
- OHD OVERHEAD DOOR

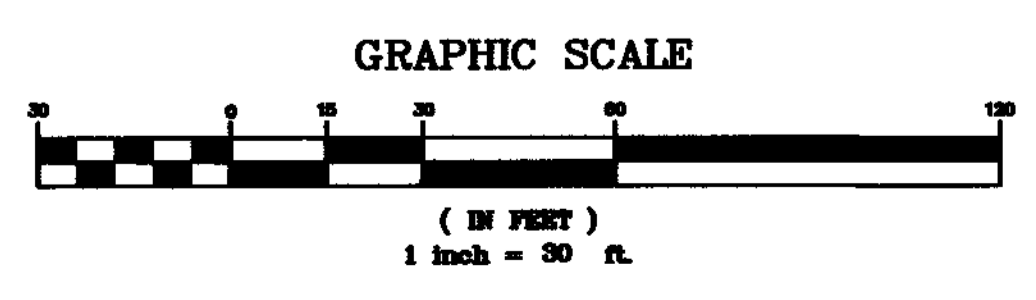
OWNER:
CHARLEY2017, LLC
7 MYRTLE STREET
NORFOLK, MASSACHUSETTS

APPLICANT:
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MASSACHUSETTS

SITE PLAN
PRE-DEVELOPMENT WATERSHED MAP
162 GROVE STREET
FRANKLIN, MASSACHUSETTS
PREPARED FOR
NEW ENGLAND TREATMENT ACCESS, LLC
5 FORGE PARKWAY
FRANKLIN, MASSACHUSETTS
MAY 21, 2020
SCALE: 1" = 30'

**SITE PLAN APPROVAL
REQUIRED
FRANKLIN PLANNING BOARD**

DATE	

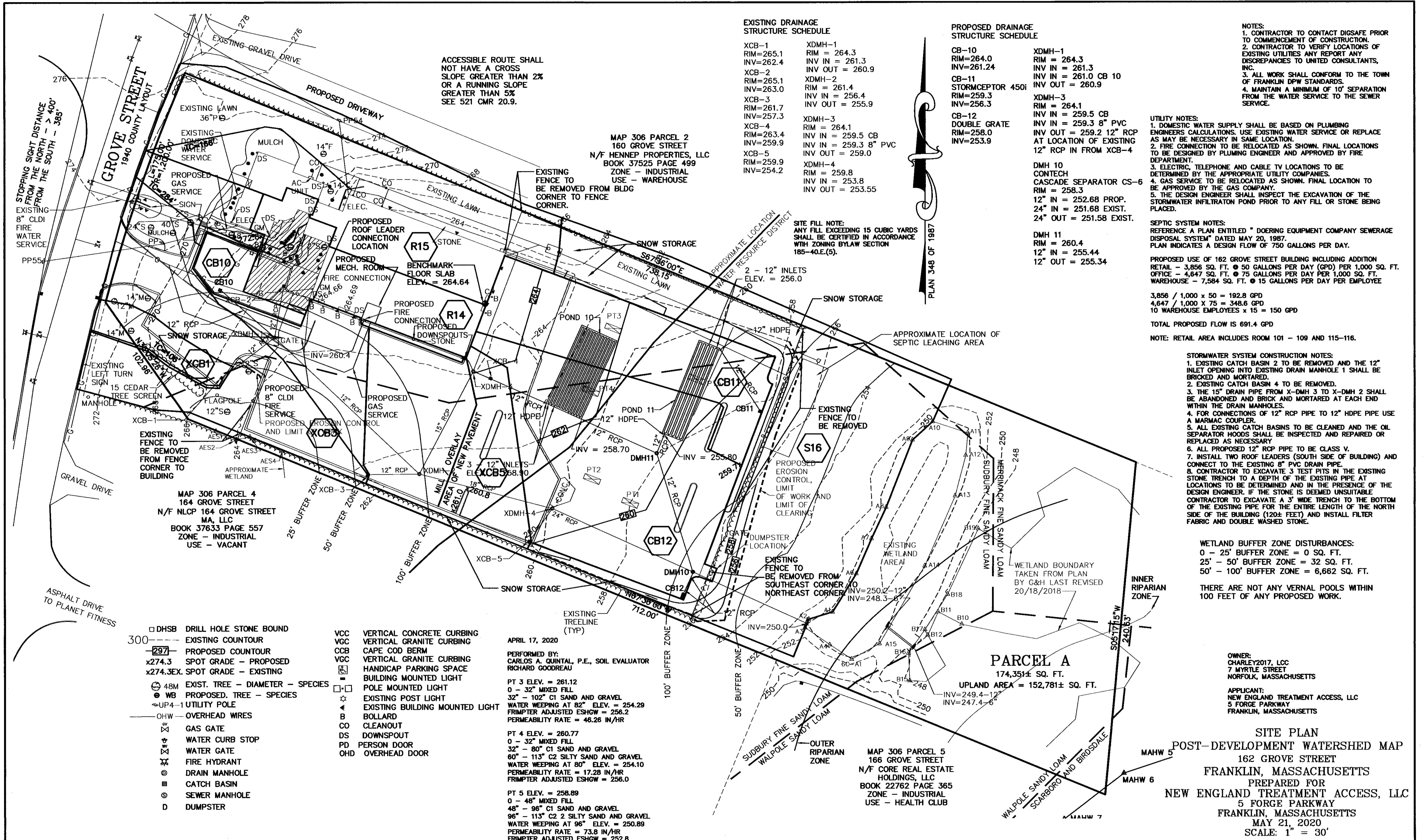


NO.	DATE	DESCRIPTION	BY
1	7/8/20	REVIEW COMMENTS	RRG

DATE	FIELD BY:	INT.
4/20		BL
BK#	FIELD BOOK	PG#
5/20		RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

**UNITED
CONSULTANTS
INC.**
850 FRANKLIN STREET SUITE 11D
WRENTHAM, MASSACHUSETTS 02093
508-384-6660 FAX 508-384-6666

DATE	MAY 21, 2020
SCALE	1" = 30'
PROJECT	UC1435
SHEET	1 of 1



ACCESSIBLE ROUTE SHALL NOT HAVE A CROSS SLOPE GREATER THAN 2% OR A RUNNING SLOPE GREATER THAN 5% SEE 521 CMR 20.9.

MAP 306 PARCEL 2
160 GROVE STREET
N/F HENNEP PROPERTIES, LLC
BOOK 37525 PAGE 499
ZONE - INDUSTRIAL
USE - WAREHOUSE

MAP 306 PARCEL 4
164 GROVE STREET
N/F NLCP 164 GROVE STREET
MA, LLC
BOOK 37633 PAGE 557
ZONE - INDUSTRIAL
USE - VACANT

EXISTING DRAINAGE STRUCTURE SCHEDULE

XCB-1 RIM=265.1 INV=262.4	XDMH-1 RIM = 264.3 INV IN = 261.3 INV OUT = 260.9
XCB-2 RIM=265.1 INV=263.0	XDMH-2 RIM = 261.4 INV IN = 256.4 INV OUT = 255.9
XCB-3 RIM=261.7 INV=257.3	XDMH-3 RIM = 264.1 INV IN = 259.5 CB INV IN = 259.3 8" PVC INV OUT = 259.0
XCB-4 RIM=263.4 INV=259.9	XDMH-4 RIM = 259.8 INV IN = 253.8 INV OUT = 253.55
XCB-5 RIM=259.9 INV=254.2	

PROPOSED DRAINAGE STRUCTURE SCHEDULE

CB-10 RIM=264.0 INV=261.24	XDMH-1 RIM = 264.3 INV IN = 261.3 INV OUT = 260.9
CB-11 STORMCEPTOR 4501 RIM=259.3 INV=256.3	XDMH-3 RIM = 264.1 INV IN = 259.5 CB INV IN = 259.3 8" PVC INV OUT = 259.2 12" RCP AT LOCATION OF EXISTING 12" RCP IN FROM XCB-4
CB-12 DOUBLE GRATE RIM=258.0 INV=253.9	DMH 10 CONTECH CASCADE SEPARATOR CS-6 RIM = 258.3 12" IN = 252.68 PROP. 24" IN = 251.68 EXIST. 24" OUT = 251.58 EXIST.
	DMH 11 RIM = 260.4 12" IN = 255.44 12" OUT = 255.34

NOTES:
1. CONTRACTOR TO CONTACT DIGSAFE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
2. CONTRACTOR TO VERIFY LOCATIONS OF EXISTING UTILITIES ANY REPORT ANY DISCREPANCIES TO UNITED CONSULTANTS, INC.
3. ALL WORK SHALL CONFORM TO THE TOWN OF FRANKLIN DPW STANDARDS.
4. MAINTAIN A MINIMUM OF 10' SEPARATION FROM THE WATER SERVICE TO THE SEWER SERVICE.

UTILITY NOTES:
1. DOMESTIC WATER SUPPLY SHALL BE BASED ON PLUMBING ENGINEERS CALCULATIONS. USE EXISTING WATER SERVICE OR REPLACE AS MAY BE NECESSARY IN SAME LOCATION.
2. FIRE CONNECTION TO BE RELOCATED AS SHOWN. FINAL LOCATIONS TO BE DESIGNED BY PLUMBING ENGINEER AND APPROVED BY FIRE DEPARTMENT.
3. ELECTRIC, TELEPHONE AND CABLE TV LOCATIONS TO BE DETERMINED BY THE APPROPRIATE UTILITY COMPANIES.
4. GAS SERVICE TO BE RELOCATED AS SHOWN. FINAL LOCATION TO BE APPROVED BY THE GAS COMPANY.
5. THE DESIGN ENGINEER SHALL INSPECT THE EXCAVATION OF THE STORMWATER INFILTRATOR POND PRIOR TO ANY FILL OR STONE BEING PLACED.

SEPTIC SYSTEM NOTES:
REFERENCE A PLAN ENTITLED "DOERING EQUIPMENT COMPANY SEWERAGE DISPOSAL SYSTEM" DATED MAY 20, 1987.
PLAN INDICATES A DESIGN FLOW OF 750 GALLONS PER DAY.

PROPOSED USE OF 162 GROVE STREET BUILDING INCLUDING ADDITION
RETAIL - 3,856 SQ. FT. @ 50 GALLONS PER DAY (GPD) PER 1,000 SQ. FT.
OFFICE - 4,647 SQ. FT. @ 75 GALLONS PER DAY PER 1,000 SQ. FT.
WAREHOUSE - 7,584 SQ. FT. @ 15 GALLONS PER DAY PER EMPLOYEE

3,856 / 1,000 x 50 = 192.8 GPD
4,647 / 1,000 x 75 = 348.6 GPD
10 WAREHOUSE EMPLOYEES x 15 = 150 GPD
TOTAL PROPOSED FLOW IS 691.4 GPD

NOTE: RETAIL AREA INCLUDES ROOM 101 - 109 AND 115-116.

SITE FILL NOTE:
ANY FILL EXCEEDING 15 CUBIC YARDS SHALL BE CERTIFIED IN ACCORDANCE WITH ZONING BYLAW SECTION 185-40.E.(5).

STORMWATER SYSTEM CONSTRUCTION NOTES:
1. EXISTING CATCH BASIN 2 TO BE REMOVED AND THE 12" INLET OPENING INTO EXISTING DRAIN MANHOLE 1 SHALL BE BRICKED AND MORTARED.
2. EXISTING CATCH BASIN 4 TO BE REMOVED.
3. THE 15" DRAIN PIPE FROM X-DMH 3 TO X-DMH 2 SHALL BE ABANDONED AND BRICK AND MORTARED AT EACH END WITHIN THE DRAIN MANHOLES.
4. FOR CONNECTIONS OF 12" RCP PIPE TO 12" HDPE PIPE USE A WARMAC COUPLER.
5. ALL EXISTING CATCH BASINS TO BE CLEANED AND THE OIL SEPARATOR HOODS SHALL BE INSPECTED AND REPAIRED OR REPLACED AS NECESSARY.
6. ALL PROPOSED 12" RCP PIPE TO BE CLASS V.
7. INSTALL TWO ROOF LEADERS (SOUTH SIDE OF BUILDING) AND CONNECT TO THE EXISTING 8" PVC DRAIN PIPE.
8. CONTRACTOR TO EXCAVATE 3 TEST PITS IN THE EXISTING STONE TRENCH TO A DEPTH OF THE EXISTING PIPE AT LOCATIONS TO BE DETERMINED AND IN THE PRESENCE OF THE DESIGN ENGINEER. IF THE STONE IS DEEMED UNSUITABLE CONTRACTOR TO EXCAVATE A 3' WIDE TRENCH TO THE BOTTOM OF THE EXISTING PIPE FOR THE ENTIRE LENGTH OF THE NORTH SIDE OF THE BUILDING (120± FEET) AND INSTALL FILTER FABRIC AND DOUBLE WASHED STONE.

WETLAND BUFFER ZONE DISTURBANCES:
0 - 25' BUFFER ZONE = 0 SQ. FT.
25' - 50' BUFFER ZONE = 32 SQ. FT.
50' - 100' BUFFER ZONE = 6,662 SQ. FT.

THERE ARE NOT ANY VERNAL POOLS WITHIN 100 FEET OF ANY PROPOSED WORK.

- DHSB DRILL HOLE STONE BOUND
- 300 --- EXISTING COUNTOUR
- 297- PROPOSED COUNTOUR
- x274.3 SPOT GRADE - PROPOSED
- x274.3EX. SPOT GRADE - EXISTING
- ⊙ 48M EXIST. TREE - DIAMETER - SPECIES
- ⊙ WB PROPOSED. TREE - SPECIES
- UP4-1 UTILITY POLE
- OHW OVERHEAD WIRES
- ⊗ GAS GATE
- ⊗ WATER CURB STOP
- ⊗ WATER GATE
- ⊗ FIRE HYDRANT
- ⊗ DRAIN MANHOLE
- ⊗ CATCH BASIN
- ⊗ SEWER MANHOLE
- D DUMPSTER

- VCC VERTICAL CONCRETE CURBING
- VGC VERTICAL GRANITE CURBING
- CCB CAPE COD BERM
- VGC VERTICAL GRANITE CURBING
- ⊗ HANDICAP PARKING SPACE
- ⊗ BUILDING MOUNTED LIGHT
- ⊗ POLE MOUNTED LIGHT
- ⊗ EXISTING POST LIGHT
- ⊗ EXISTING BUILDING MOUNTED LIGHT
- B BOLLARD
- CO CLEANOUT
- DS DOWNSPOUT
- PD PERSON DOOR
- OHD OVERHEAD DOOR

APRIL 17, 2020
PERFORMED BY:
CARLOS A. QUINTAL, P.E., SOIL EVALUATOR
RICHARD GOODREAU

PT 3 ELEV. = 261.12
0 - 32" MIXED FILL
32" - 102" C1 SAND AND GRAVEL
WATER WEEPING AT 82" ELEV. = 254.29
FRIMPTER ADJUSTED ESHGW = 256.2
PERMEABILITY RATE = 46.26 IN/HR

PT 4 ELEV. = 260.77
0 - 32" MIXED FILL
32" - 80" C1 SAND AND GRAVEL
60" - 113" C2 SILTY SAND AND GRAVEL
WATER WEEPING AT 80" ELEV. = 254.10
FRIMPTER ADJUSTED ESHGW = 256.0
PERMEABILITY RATE = 17.28 IN/HR

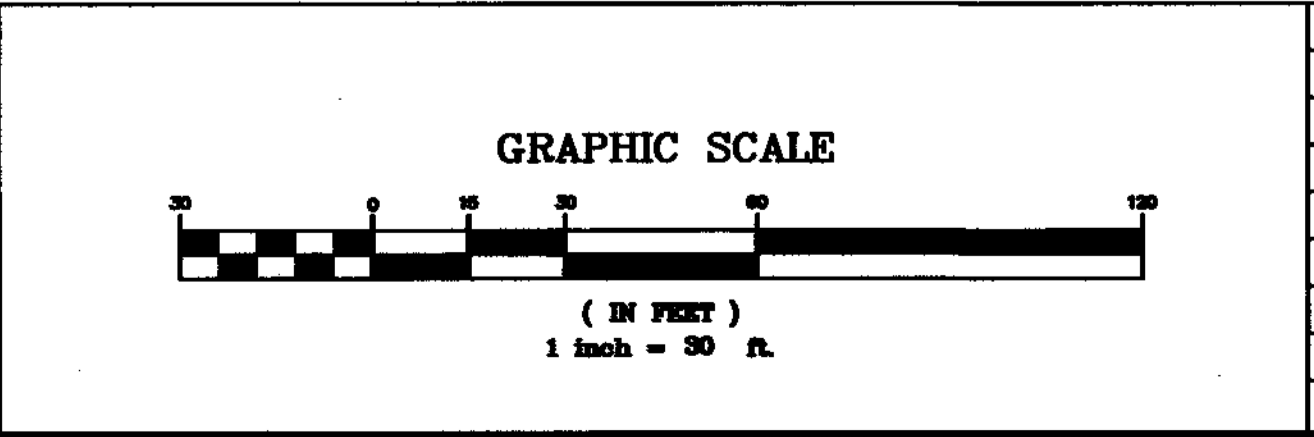
PT 5 ELEV. = 258.89
0 - 48" MIXED FILL
48" - 96" C1 SAND AND GRAVEL
96" - 113" C2 SILTY SAND AND GRAVEL
WATER WEEPING AT 96" ELEV. = 250.89
FRIMPTER ADJUSTED ESHGW = 252.8

PARCEL A
174,351± SQ. FT.
UPLAND AREA = 152,781± SQ. FT.

MAP 306 PARCEL 5
166 GROVE STREET
N/F CORE REAL ESTATE HOLDINGS, LLC
BOOK 22762 PAGE 365
ZONE - INDUSTRIAL
USE - HEALTH CLUB

SITE PLAN APPROVAL REQUIRED
FRANKLIN PLANNING BOARD

DATE	



NO.	DATE	REVIEW COMMENTS	RRG	BY
1	7/8/20			

DATE	FIELD BY:	INT.
4/20		BL
5/20	FIELD BOOK	PG# 63
5/20	CALCS BY:	RRG
5/20	DESIGNED BY:	RRG
5/20	DRAWN BY:	COMP
5/20	CHECKED BY:	CAQ

UNITED CONSULTANTS INC.
850 FRANKLIN STREET SUITE 11D
WRENTHAM, MASSACHUSETTS 02093
508-384-8560 FAX 508-384-8568

DATE
MAY 21, 2020

SCALE
1" = 30'

PROJECT
UC1435

SHEET
1 of 1

Appendix A
Traffic Count Data



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdilic.com

Grove Street
south of # 162 Driveway
City, State: Franklin, MA
Client: TetraTech/ S. Wood
Site Code: 143-276845-20002

PDI File #: 207444 ATR-A

Count Date:
Thursday, February 6, 2020

Volume

SB					NB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	4		12:00 PM	56	12:00 AM	3		12:00 PM	45	12:00 AM	7		12:00 PM	101			
12:15 AM	4		12:15 PM	52	12:15 AM	2		12:15 PM	35	12:15 AM	6		12:15 PM	87			
12:30 AM	7		12:30 PM	39	12:30 AM	3		12:30 PM	43	12:30 AM	10		12:30 PM	82			
12:45 AM	5	20	12:45 PM	51	198	12:45 AM	1	9	12:45 PM	72	195	12:45 AM	6	29	12:45 PM	123	393
1:00 AM	4		1:00 PM	26		1:00 AM	0		1:00 PM	60		1:00 AM	4		1:00 PM	86	
1:15 AM	3		1:15 PM	44		1:15 AM	1		1:15 PM	40		1:15 AM	4		1:15 PM	84	
1:30 AM	1		1:30 PM	41		1:30 AM	1		1:30 PM	45		1:30 AM	2		1:30 PM	86	
1:45 AM	1	9	1:45 PM	58	169	1:45 AM	1	3	1:45 PM	41	186	1:45 AM	2	12	1:45 PM	99	355
2:00 AM	0		2:00 PM	61		2:00 AM	3		2:00 PM	53		2:00 AM	3		2:00 PM	114	
2:15 AM	0		2:15 PM	85		2:15 AM	1		2:15 PM	28		2:15 AM	1		2:15 PM	113	
2:30 AM	1		2:30 PM	73		2:30 AM	7		2:30 PM	53		2:30 AM	8		2:30 PM	126	
2:45 AM	1	2	2:45 PM	65	284	2:45 AM	5	16	2:45 PM	54	188	2:45 AM	6	18	2:45 PM	119	472
3:00 AM	4		3:00 PM	94		3:00 AM	1		3:00 PM	42		3:00 AM	5		3:00 PM	136	
3:15 AM	2		3:15 PM	86		3:15 AM	3		3:15 PM	54		3:15 AM	5		3:15 PM	140	
3:30 AM	4		3:30 PM	97		3:30 AM	2		3:30 PM	38		3:30 AM	6		3:30 PM	135	
3:45 AM	8	18	3:45 PM	82	359	3:45 AM	4	10	3:45 PM	51	185	3:45 AM	12	28	3:45 PM	133	544
4:00 AM	3		4:00 PM	130		4:00 AM	6		4:00 PM	51		4:00 AM	9		4:00 PM	181	
4:15 AM	3		4:15 PM	100		4:15 AM	15		4:15 PM	63		4:15 AM	18		4:15 PM	163	
4:30 AM	4		4:30 PM	126		4:30 AM	12		4:30 PM	72		4:30 AM	16		4:30 PM	198	
4:45 AM	18	28	4:45 PM	118	474	4:45 AM	11	44	4:45 PM	65	251	4:45 AM	29	72	4:45 PM	183	725
5:00 AM	5		5:00 PM	139		5:00 AM	13		5:00 PM	55		5:00 AM	18		5:00 PM	194	
5:15 AM	9		5:15 PM	112		5:15 AM	21		5:15 PM	57		5:15 AM	30		5:15 PM	169	
5:30 AM	8		5:30 PM	81		5:30 AM	31		5:30 PM	53		5:30 AM	39		5:30 PM	134	
5:45 AM	11	33	5:45 PM	89	421	5:45 AM	40	105	5:45 PM	52	217	5:45 AM	51	138	5:45 PM	141	638
6:00 AM	15		6:00 PM	84		6:00 AM	53		6:00 PM	45		6:00 AM	68		6:00 PM	129	
6:15 AM	19		6:15 PM	55		6:15 AM	70		6:15 PM	34		6:15 AM	89		6:15 PM	89	
6:30 AM	20		6:30 PM	71		6:30 AM	100		6:30 PM	42		6:30 AM	120		6:30 PM	113	
6:45 AM	31	85	6:45 PM	43	253	6:45 AM	135	358	6:45 PM	32	153	6:45 AM	166	443	6:45 PM	75	406
7:00 AM	26		7:00 PM	63		7:00 AM	145		7:00 PM	42		7:00 AM	171		7:00 PM	105	
7:15 AM	29		7:15 PM	35		7:15 AM	151		7:15 PM	37		7:15 AM	180		7:15 PM	72	
7:30 AM	49		7:30 PM	40		7:30 AM	121		7:30 PM	20		7:30 AM	170		7:30 PM	60	
7:45 AM	37	141	7:45 PM	30	168	7:45 AM	122	539	7:45 PM	23	122	7:45 AM	159	680	7:45 PM	53	290
8:00 AM	42		8:00 PM	48		8:00 AM	91		8:00 PM	10		8:00 AM	133		8:00 PM	58	
8:15 AM	47		8:15 PM	38		8:15 AM	92		8:15 PM	18		8:15 AM	139		8:15 PM	56	
8:30 AM	41		8:30 PM	25		8:30 AM	78		8:30 PM	15		8:30 AM	119		8:30 PM	40	
8:45 AM	40	170	8:45 PM	28	139	8:45 AM	94	355	8:45 PM	9	52	8:45 AM	134	525	8:45 PM	37	191
9:00 AM	33		9:00 PM	19		9:00 AM	70		9:00 PM	11		9:00 AM	103		9:00 PM	30	
9:15 AM	32		9:15 PM	22		9:15 AM	48		9:15 PM	9		9:15 AM	80		9:15 PM	31	
9:30 AM	39		9:30 PM	26		9:30 AM	43		9:30 PM	10		9:30 AM	82		9:30 PM	36	
9:45 AM	24	128	9:45 PM	8	75	9:45 AM	47	208	9:45 PM	13	43	9:45 AM	71	336	9:45 PM	21	118
10:00 AM	34		10:00 PM	21		10:00 AM	41		10:00 PM	8		10:00 AM	75		10:00 PM	29	
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10:30 AM	36		10:30 PM	5		10:30 AM	35		10:30 PM	4		10:30 AM	71		10:30 PM	9	
10:45 AM	38	142	10:45 PM	5	45	10:45 AM	43	153	10:45 PM	4	22	10:45 AM	81	295	10:45 PM	9	67
11:00 AM	34		11:00 PM	5		11:00 AM	48		11:00 PM	3		11:00 AM	82		11:00 PM	8	
11:15 AM	42		11:15 PM	5		11:15 AM	25		11:15 PM	2		11:15 AM	67		11:15 PM	7	
11:30 AM	38		11:30 PM	0		11:30 AM	44		11:30 PM	1		11:30 AM	82		11:30 PM	1	
11:45 AM	38	152	11:45 PM	5	15	11:45 AM	40	157	11:45 PM	0	6	11:45 AM	78	309	11:45 PM	5	21
Total	928			2600		Total	1957			1620		Total	2885			4220	
Percent	26.30%			73.70%		Percent	54.71%			45.29%		Percent	40.61%			59.39%	
Day Total				3528		Day Total				3577		Day Total				7105	
Peak Hour	11:45 AM			4:30 PM		Peak Hour	6:45 AM			4:15 PM		Peak Hour	6:45 AM			4:30 PM	
Volume	185			495		Volume	552			255		Volume	687			744	
P.H.F.	0.826			0.890		P.H.F.	0.914			0.885		P.H.F.	0.954			0.939	



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdilic.com

Grove Street

south of # 162 Driveway

City, State: Franklin, MA

Client: TetraTech/ S. Wood

Site Code: 143-276845-20002

PDI File #: 207444 ATR-A

Count Date:

Friday, February 7, 2020

Volume

SB					NB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	4		12:00 PM	65	12:00 AM	4		12:00 PM	51	12:00 AM	8		12:00 PM	116			
12:15 AM	2		12:15 PM	58	12:15 AM	5		12:15 PM	54	12:15 AM	7		12:15 PM	112			
12:30 AM	8		12:30 PM	47	12:30 AM	1		12:30 PM	47	12:30 AM	9		12:30 PM	94			
12:45 AM	7	21	12:45 PM	44	214	12:45 AM	3	13	12:45 PM	58	210	12:45 AM	10	34	12:45 PM	102	424
1:00 AM	1		1:00 PM	60		1:00 AM	2		1:00 PM	62		1:00 AM	3		1:00 PM	122	
1:15 AM	5		1:15 PM	56		1:15 AM	0		1:15 PM	37		1:15 AM	5		1:15 PM	93	
1:30 AM	2		1:30 PM	54		1:30 AM	3		1:30 PM	52		1:30 AM	5		1:30 PM	106	
1:45 AM	2	10	1:45 PM	45	215	1:45 AM	0	5	1:45 PM	47	198	1:45 AM	2	15	1:45 PM	92	413
2:00 AM	3		2:00 PM	55		2:00 AM	2		2:00 PM	46		2:00 AM	5		2:00 PM	101	
2:15 AM	0		2:15 PM	80		2:15 AM	2		2:15 PM	40		2:15 AM	2		2:15 PM	120	
2:30 AM	1		2:30 PM	67		2:30 AM	4		2:30 PM	58		2:30 AM	5		2:30 PM	125	
2:45 AM	3	7	2:45 PM	74	276	2:45 AM	6	14	2:45 PM	45	189	2:45 AM	9	21	2:45 PM	119	465
3:00 AM	0		3:00 PM	92		3:00 AM	4		3:00 PM	46		3:00 AM	4		3:00 PM	138	
3:15 AM	3		3:15 PM	93		3:15 AM	1		3:15 PM	64		3:15 AM	4		3:15 PM	157	
3:30 AM	1		3:30 PM	121		3:30 AM	2		3:30 PM	50		3:30 AM	3		3:30 PM	171	
3:45 AM	5	9	3:45 PM	89	395	3:45 AM	2	9	3:45 PM	55	215	3:45 AM	7	18	3:45 PM	144	610
4:00 AM	3		4:00 PM	105		4:00 AM	4		4:00 PM	62		4:00 AM	7		4:00 PM	167	
4:15 AM	7		4:15 PM	82		4:15 AM	6		4:15 PM	77		4:15 AM	13		4:15 PM	159	
4:30 AM	6		4:30 PM	97		4:30 AM	11		4:30 PM	68		4:30 AM	17		4:30 PM	165	
4:45 AM	13	29	4:45 PM	100	384	4:45 AM	11	32	4:45 PM	71	278	4:45 AM	24	61	4:45 PM	171	662
5:00 AM	10		5:00 PM	117		5:00 AM	19		5:00 PM	48		5:00 AM	29		5:00 PM	165	
5:15 AM	13		5:15 PM	98		5:15 AM	17		5:15 PM	46		5:15 AM	30		5:15 PM	144	
5:30 AM	11		5:30 PM	83		5:30 AM	22		5:30 PM	59		5:30 AM	33		5:30 PM	142	
5:45 AM	19	53	5:45 PM	93	391	5:45 AM	37	95	5:45 PM	56	209	5:45 AM	56	148	5:45 PM	149	600
6:00 AM	14		6:00 PM	79		6:00 AM	54		6:00 PM	42		6:00 AM	68		6:00 PM	121	
6:15 AM	25		6:15 PM	55		6:15 AM	79		6:15 PM	56		6:15 AM	104		6:15 PM	111	
6:30 AM	12		6:30 PM	64		6:30 AM	85		6:30 PM	43		6:30 AM	97		6:30 PM	107	
6:45 AM	31	82	6:45 PM	47	245	6:45 AM	141	359	6:45 PM	37	178	6:45 AM	172	441	6:45 PM	84	423
7:00 AM	32		7:00 PM	41		7:00 AM	135		7:00 PM	29		7:00 AM	167		7:00 PM	70	
7:15 AM	44		7:15 PM	43		7:15 AM	131		7:15 PM	32		7:15 AM	175		7:15 PM	75	
7:30 AM	41		7:30 PM	49		7:30 AM	129		7:30 PM	31		7:30 AM	170		7:30 PM	80	
7:45 AM	36	153	7:45 PM	30	163	7:45 AM	121	516	7:45 PM	32	124	7:45 AM	157	669	7:45 PM	62	287
8:00 AM	45		8:00 PM	39		8:00 AM	81		8:00 PM	12		8:00 AM	126		8:00 PM	51	
8:15 AM	46		8:15 PM	32		8:15 AM	89		8:15 PM	20		8:15 AM	135		8:15 PM	52	
8:30 AM	45		8:30 PM	23		8:30 AM	82		8:30 PM	12		8:30 AM	127		8:30 PM	35	
8:45 AM	41	177	8:45 PM	22	116	8:45 AM	86	338	8:45 PM	20	64	8:45 AM	127	515	8:45 PM	42	180
9:00 AM	33		9:00 PM	17		9:00 AM	84		9:00 PM	22		9:00 AM	117		9:00 PM	39	
9:15 AM	40		9:15 PM	11		9:15 AM	56		9:15 PM	3		9:15 AM	96		9:15 PM	14	
9:30 AM	31		9:30 PM	25		9:30 AM	51		9:30 PM	3		9:30 AM	82		9:30 PM	28	
9:45 AM	39	143	9:45 PM	28	81	9:45 AM	57	248	9:45 PM	5	33	9:45 AM	96	391	9:45 PM	33	114
10:00 AM	41		10:00 PM	21		10:00 AM	48		10:00 PM	10		10:00 AM	89		10:00 PM	31	
10:15 AM	45		10:15 PM	10		10:15 AM	51		10:15 PM	4		10:15 AM	96		10:15 PM	14	
10:30 AM	53		10:30 PM	15		10:30 AM	53		10:30 PM	16		10:30 AM	106		10:30 PM	31	
10:45 AM	42	181	10:45 PM	10	56	10:45 AM	54	206	10:45 PM	3	33	10:45 AM	96	387	10:45 PM	13	89
11:00 AM	73		11:00 PM	5		11:00 AM	56		11:00 PM	4		11:00 AM	129		11:00 PM	9	
11:15 AM	60		11:15 PM	7		11:15 AM	58		11:15 PM	2		11:15 AM	118		11:15 PM	9	
11:30 AM	59		11:30 PM	9		11:30 AM	44		11:30 PM	2		11:30 AM	103		11:30 PM	11	
11:45 AM	74	266	11:45 PM	5	26	11:45 AM	54	212	11:45 PM	3	11	11:45 AM	128	478	11:45 PM	8	37
Total	1131			2562		Total	2047			1742		Total	3178			4304	
Percent	30.63%			69.37%		Percent	54.02%			45.98%		Percent	42.48%			57.52%	
Day Total				3693		Day Total				3789		Day Total				7482	
Peak Hour	11:00 AM			4:30 PM		Peak Hour	6:45 AM			4:00 PM		Peak Hour	6:45 AM			4:00 PM	
Volume	266			412		Volume	536			278		Volume	684			662	
P.H.F.	0.899			0.880		P.H.F.	0.950			0.903		P.H.F.	0.977			0.968	



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdilic.com

Grove Street
south of # 162 Driveway
City, State: Franklin, MA
Client: TetraTech/ S. Wood
Site Code: 143-276845-20002

PDI File #: 207444 ATR-A

Count Date:
Saturday, February 8, 2020

Volume

SB					NB					Combined							
Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min	Start Time:	15 min	60 min	15 min	60 min			
12:00 AM	2		12:00 PM	82	12:00 AM	1		12:00 PM	72	12:00 AM	3		12:00 PM	154			
12:15 AM	5		12:15 PM	75	12:15 AM	2		12:15 PM	74	12:15 AM	7		12:15 PM	149			
12:30 AM	6		12:30 PM	69	12:30 AM	1		12:30 PM	71	12:30 AM	7		12:30 PM	140			
12:45 AM	3	16	12:45 PM	67	293	12:45 AM	2	6	12:45 PM	62	279	12:45 AM	5	22	12:45 PM	129	572
1:00 AM	3		1:00 PM	58		1:00 AM	0		1:00 PM	53		1:00 AM	3		1:00 PM	111	
1:15 AM	1		1:15 PM	60		1:15 AM	1		1:15 PM	62		1:15 AM	2		1:15 PM	122	
1:30 AM	2		1:30 PM	58		1:30 AM	2		1:30 PM	37		1:30 AM	4		1:30 PM	95	
1:45 AM	2	8	1:45 PM	49	225	1:45 AM	2	5	1:45 PM	41	193	1:45 AM	4	13	1:45 PM	90	418
2:00 AM	2		2:00 PM	58		2:00 AM	2		2:00 PM	44		2:00 AM	4		2:00 PM	102	
2:15 AM	0		2:15 PM	61		2:15 AM	1		2:15 PM	54		2:15 AM	1		2:15 PM	115	
2:30 AM	1		2:30 PM	64		2:30 AM	0		2:30 PM	52		2:30 AM	1		2:30 PM	116	
2:45 AM	0	3	2:45 PM	56	239	2:45 AM	0	3	2:45 PM	73	223	2:45 AM	0	6	2:45 PM	129	462
3:00 AM	4		3:00 PM	78		3:00 AM	2		3:00 PM	39		3:00 AM	6		3:00 PM	117	
3:15 AM	4		3:15 PM	62		3:15 AM	3		3:15 PM	54		3:15 AM	7		3:15 PM	116	
3:30 AM	0		3:30 PM	55		3:30 AM	2		3:30 PM	31		3:30 AM	2		3:30 PM	86	
3:45 AM	0	8	3:45 PM	56	251	3:45 AM	2	9	3:45 PM	46	170	3:45 AM	2	17	3:45 PM	102	421
4:00 AM	1		4:00 PM	47		4:00 AM	1		4:00 PM	28		4:00 AM	2		4:00 PM	75	
4:15 AM	3		4:15 PM	61		4:15 AM	7		4:15 PM	44		4:15 AM	10		4:15 PM	105	
4:30 AM	5		4:30 PM	56		4:30 AM	3		4:30 PM	43		4:30 AM	8		4:30 PM	99	
4:45 AM	3	12	4:45 PM	50	214	4:45 AM	4	15	4:45 PM	50	165	4:45 AM	7	27	4:45 PM	100	379
5:00 AM	3		5:00 PM	52		5:00 AM	5		5:00 PM	37		5:00 AM	8		5:00 PM	89	
5:15 AM	4		5:15 PM	42		5:15 AM	6		5:15 PM	41		5:15 AM	10		5:15 PM	83	
5:30 AM	4		5:30 PM	48		5:30 AM	12		5:30 PM	35		5:30 AM	16		5:30 PM	83	
5:45 AM	5	16	5:45 PM	32	174	5:45 AM	19	42	5:45 PM	41	154	5:45 AM	24	58	5:45 PM	73	328
6:00 AM	7		6:00 PM	41		6:00 AM	20		6:00 PM	26		6:00 AM	27		6:00 PM	67	
6:15 AM	3		6:15 PM	40		6:15 AM	22		6:15 PM	34		6:15 AM	25		6:15 PM	74	
6:30 AM	5		6:30 PM	35		6:30 AM	37		6:30 PM	28		6:30 AM	42		6:30 PM	63	
6:45 AM	13	28	6:45 PM	20	136	6:45 AM	32	111	6:45 PM	32	120	6:45 AM	45	139	6:45 PM	52	256
7:00 AM	19		7:00 PM	20		7:00 AM	29		7:00 PM	24		7:00 AM	48		7:00 PM	44	
7:15 AM	22		7:15 PM	28		7:15 AM	25		7:15 PM	17		7:15 AM	47		7:15 PM	45	
7:30 AM	20		7:30 PM	22		7:30 AM	32		7:30 PM	13		7:30 AM	52		7:30 PM	35	
7:45 AM	14	75	7:45 PM	24	94	7:45 AM	57	143	7:45 PM	18	72	7:45 AM	71	218	7:45 PM	42	166
8:00 AM	20		8:00 PM	27		8:00 AM	34		8:00 PM	21		8:00 AM	54		8:00 PM	48	
8:15 AM	33		8:15 PM	23		8:15 AM	47		8:15 PM	11		8:15 AM	80		8:15 PM	34	
8:30 AM	20		8:30 PM	20		8:30 AM	35		8:30 PM	8		8:30 AM	55		8:30 PM	28	
8:45 AM	32	105	8:45 PM	17	87	8:45 AM	63	179	8:45 PM	11	51	8:45 AM	95	284	8:45 PM	28	138
9:00 AM	39		9:00 PM	17		9:00 AM	46		9:00 PM	9		9:00 AM	85		9:00 PM	26	
9:15 AM	35		9:15 PM	26		9:15 AM	68		9:15 PM	7		9:15 AM	103		9:15 PM	33	
9:30 AM	45		9:30 PM	13		9:30 AM	53		9:30 PM	9		9:30 AM	98		9:30 PM	22	
9:45 AM	50	169	9:45 PM	11	67	9:45 AM	50	217	9:45 PM	2	27	9:45 AM	100	386	9:45 PM	13	94
10:00 AM	46		10:00 PM	12		10:00 AM	52		10:00 PM	3		10:00 AM	98		10:00 PM	15	
10:15 AM	38		10:15 PM	17		10:15 AM	38		10:15 PM	9		10:15 AM	76		10:15 PM	26	
10:30 AM	43		10:30 PM	13		10:30 AM	47		10:30 PM	12		10:30 AM	90		10:30 PM	25	
10:45 AM	72	199	10:45 PM	9	51	10:45 AM	49	186	10:45 PM	5	29	10:45 AM	121	385	10:45 PM	14	80
11:00 AM	63		11:00 PM	19		11:00 AM	74		11:00 PM	5		11:00 AM	137		11:00 PM	24	
11:15 AM	54		11:15 PM	11		11:15 AM	57		11:15 PM	3		11:15 AM	111		11:15 PM	14	
11:30 AM	60		11:30 PM	4		11:30 AM	36		11:30 PM	2		11:30 AM	96		11:30 PM	6	
11:45 AM	56	233	11:45 PM	6	40	11:45 AM	49	216	11:45 PM	4	14	11:45 AM	105	449	11:45 PM	10	54
Total	872			1871		Total	1132			1497		Total	2004			3368	
Percent	31.79%			68.21%		Percent	43.06%			56.94%		Percent	37.30%			62.70%	
Day Total				2743		Day Total				2629		Day Total				5372	
Peak Hour	11:45 AM			12:00 PM		Peak Hour	11:45 AM			12:00 PM		Peak Hour	11:45 AM			12:00 PM	
Volume	282			293		Volume	266			279		Volume	548			572	
P.H.F.	0.860			0.893		P.H.F.	0.899			0.943		P.H.F.	0.890			0.929	

Grove Street
south of # 162 Driveway
City, State: Franklin, MA
Client: TetraTech/ S. Wood
Site Code: 143-276845-20002
Count Date: Thursday, February 6, 2020



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdilic.com

PDI File #: 207444 ATR-A

Speed (60-minute)

NB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 +	Total	85th %ile	Ave Speed
12:00 AM	0	0	1	1	1	5	1	0	0	0	0	0	0	9	38.8	34.3
1:00 AM	0	0	0	0	1	2	0	0	0	0	0	0	0	3	36.7	35.7
2:00 AM	0	0	0	1	7	8	0	0	0	0	0	0	0	16	36.8	34.0
3:00 AM	0	0	1	1	3	4	1	0	0	0	0	0	0	10	38.7	34.1
4:00 AM	0	0	5	5	14	10	8	2	0	0	0	0	0	44	40.6	33.6
5:00 AM	0	2	4	3	26	53	15	2	0	0	0	0	0	105	40.0	35.5
6:00 AM	2	0	13	32	142	135	32	2	0	0	0	0	0	358	38.0	33.9
7:00 AM	0	1	10	36	136	299	51	5	0	0	0	0	1	539	39.0	35.2
8:00 AM	1	0	13	33	97	167	43	1	0	0	0	0	0	355	39.0	34.8
9:00 AM	0	0	13	29	51	79	33	2	1	0	0	0	0	208	40.0	34.3
10:00 AM	0	1	13	8	29	72	28	2	0	0	0	0	0	153	40.0	35.2
11:00 AM	0	1	17	22	30	62	20	5	0	0	0	0	0	157	40.0	34.0
12:00 PM	0	0	24	23	36	76	31	4	0	0	0	0	1	195	40.0	34.5
1:00 PM	2	0	5	26	34	72	42	5	0	0	0	0	0	186	40.3	35.3
2:00 PM	0	0	19	23	30	82	33	1	0	0	0	0	0	188	40.0	34.3
3:00 PM	0	0	6	13	35	93	31	7	0	0	0	0	0	185	40.0	36.0
4:00 PM	0	3	19	38	43	104	42	2	0	0	0	0	0	251	40.0	34.3
5:00 PM	0	1	30	35	54	76	18	3	0	0	0	0	0	217	38.0	32.5
6:00 PM	0	0	26	21	39	48	14	3	2	0	0	0	0	153	39.0	32.6
7:00 PM	0	1	16	30	28	39	7	1	0	0	0	0	0	122	37.0	31.5
8:00 PM	0	0	8	16	8	16	4	0	0	0	0	0	0	52	38.4	31.3
9:00 PM	0	1	11	3	7	13	7	1	0	0	0	0	0	43	40.0	32.3
10:00 PM	0	0	3	3	5	6	4	1	0	0	0	0	0	22	41.9	33.6
11:00 PM	0	0	0	1	1	3	1	0	0	0	0	0	0	6	40.3	37.0
Total	5	11	257	403	857	1524	466	49	3	0	0	0	2	3577	39.0	34.3
Percent	0.14%	0.31%	7.18%	11.27%	23.96%	42.61%	13.03%	1.37%	0.08%	0.00%	0.00%	0.00%	0.06%			
AM Peak	6:00 AM	5:00 AM	11:00 AM	7:00 AM	6:00 AM	7:00 AM	7:00 AM	7:00 AM	9:00 AM				7:00 AM	7:00 AM		
Volume	2	2	17	36	142	299	51	5	1	0	0	0	1	539		
PM Peak	1:00 PM	4:00 PM	5:00 PM	4:00 PM	5:00 PM	4:00 PM	1:00 PM	3:00 PM	6:00 PM				12:00 PM	4:00 PM		
Volume	2	3	30	38	54	104	42	7	2	0	0	0	1	251		

15th Percentile:	27.0 MPH	Average Speed:	34.3 MPH	Posted Speed Limit:	35 MPH
50th Percentile:	35.0 MPH	10 MPH Pace:	31 to 40 MPH	Number of Vehicles > 35 MPH:	1723
85th Percentile:	39.0 MPH	Number in Pace:	2529	Percent of Vehicles > 35 MPH:	48.2%
95th Percentile:	42.0 MPH	Percent in Pace:	70.7%		

Grove Street
 south of # 162 Driveway
 City, State: Franklin, MA
 Client: TetraTech/ S. Wood
 Site Code: 143-276845-20002
 Count Date: Friday, February 7, 2020



PRECISION
 D A T A
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

PDI File #: 207444 ATR-A

Speed (60-minute)

NB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 +	Total	85th %ile	Ave Speed
12:00 AM	0	2	1	1	4	5	0	0	0	0	0	0	0	13	37.2	30.8
1:00 AM	0	0	0	0	0	3	1	0	1	0	0	0	0	5	44.8	40.0
2:00 AM	0	0	0	0	1	11	2	0	0	0	0	0	0	14	38.1	36.9
3:00 AM	0	0	0	1	2	3	2	1	0	0	0	0	0	9	41.8	37.4
4:00 AM	0	0	1	4	6	12	7	2	0	0	0	0	0	32	41.1	36.5
5:00 AM	0	1	4	9	21	32	26	2	0	0	0	0	0	95	41.0	35.6
6:00 AM	1	1	9	21	93	181	49	4	0	0	0	0	0	359	39.0	35.4
7:00 AM	0	1	17	44	124	250	77	2	1	0	0	0	0	516	40.0	35.1
8:00 AM	0	0	17	22	73	169	50	7	0	0	0	0	0	338	40.0	35.6
9:00 AM	2	2	26	23	53	97	42	3	0	0	0	0	0	248	40.0	34.1
10:00 AM	0	1	27	19	37	93	27	2	0	0	0	0	0	206	39.0	33.9
11:00 AM	2	0	23	28	31	85	39	4	0	0	0	0	0	212	40.0	34.2
12:00 PM	1	3	17	31	38	82	36	2	0	0	0	0	0	210	40.0	34.0
1:00 PM	1	2	17	24	44	71	36	3	0	0	0	0	0	198	40.0	34.1
2:00 PM	0	1	12	18	29	84	42	3	0	0	0	0	0	189	41.0	35.7
3:00 PM	0	1	18	16	31	99	44	6	0	0	0	0	0	215	41.0	35.5
4:00 PM	0	0	16	31	39	128	62	2	0	0	0	0	0	278	41.0	35.5
5:00 PM	1	0	17	25	58	68	38	2	0	0	0	0	0	209	40.0	34.0
6:00 PM	0	3	16	29	49	57	24	0	0	0	0	0	0	178	39.0	33.0
7:00 PM	0	0	9	15	26	55	17	1	1	0	0	0	0	124	39.6	34.5
8:00 PM	0	0	9	10	10	28	4	3	0	0	0	0	0	64	38.0	32.8
9:00 PM	0	0	7	2	7	11	5	1	0	0	0	0	0	33	40.4	33.2
10:00 PM	0	0	1	2	5	9	14	2	0	0	0	0	0	33	43.0	37.5
11:00 PM	0	0	1	0	5	2	2	1	0	0	0	0	0	11	40.0	34.7
Total	8	18	265	375	786	1635	646	53	3	0	0	0	0	3789	40.0	34.8
Percent	0.21%	0.48%	6.99%	9.90%	20.74%	43.15%	17.05%	1.40%	0.08%	0.00%	0.00%	0.00%	0.00%			
AM Peak	9:00 AM	12:00 AM	10:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	8:00 AM	1:00 AM						7:00 AM	
Volume	2	2	27	44	124	250	77	7	1	0	0	0	0	516		
PM Peak	12:00 PM	12:00 PM	3:00 PM	12:00 PM	5:00 PM	4:00 PM	4:00 PM	3:00 PM	7:00 PM						4:00 PM	
Volume	1	3	18	31	58	128	62	6	1	0	0	0	0	278		

15th Percentile:	28.0 MPH	Average Speed:	34.8 MPH	Posted Speed Limit:	35 MPH
50th Percentile:	36.0 MPH	10 MPH Pace:	32 to 41 MPH	Number of Vehicles > 35 MPH:	2026
85th Percentile:	40.0 MPH	Number in Pace:	2636	Percent of Vehicles > 35 MPH:	53.5%
95th Percentile:	42.0 MPH	Percent in Pace:	69.6%		

Grove Street
south of # 162 Driveway
City, State: Franklin, MA
Client: TetraTech/ S. Wood
Site Code: 143-276845-20002
Count Date: Saturday, February 8, 2020



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: 207444 ATR-A

Speed (60-minute)

NB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 +	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	0	1	4	1	0	0	0	0	0	0	6	39.5	37.7
1:00 AM	0	0	0	0	1	3	0	0	1	0	0	0	0	5	44.6	39.4
2:00 AM	0	0	0	0	2	0	1	0	0	0	0	0	0	3	38.9	35.7
3:00 AM	0	0	0	1	4	0	0	4	0	0	0	0	0	9	46.8	38.0
4:00 AM	0	0	0	2	3	3	7	0	0	0	0	0	0	15	43.0	36.9
5:00 AM	0	1	0	1	8	17	9	5	0	1	0	0	0	42	43.0	38.0
6:00 AM	1	0	1	3	27	37	38	4	0	0	0	0	0	111	42.0	37.6
7:00 AM	0	2	4	16	18	60	32	10	1	0	0	0	0	143	42.7	36.6
8:00 AM	1	0	13	17	18	64	60	6	0	0	0	0	0	179	42.0	36.2
9:00 AM	0	0	21	20	19	79	68	9	1	0	0	0	0	217	43.0	36.4
10:00 AM	1	1	20	22	15	74	44	7	2	0	0	0	0	186	42.0	35.3
11:00 AM	0	0	15	27	30	81	58	4	1	0	0	0	0	216	41.0	35.5
12:00 PM	3	2	27	32	38	122	47	7	1	0	0	0	0	279	40.3	34.7
1:00 PM	1	0	20	15	24	88	37	8	0	0	0	0	0	193	41.0	35.4
2:00 PM	0	0	15	28	32	86	59	2	1	0	0	0	0	223	41.0	35.6
3:00 PM	1	1	18	24	31	58	30	7	0	0	0	0	0	170	41.0	34.0
4:00 PM	0	0	11	14	30	57	45	8	0	0	0	0	0	165	42.0	36.0
5:00 PM	0	1	8	13	41	61	27	3	0	0	0	0	0	154	40.0	35.0
6:00 PM	0	1	7	12	37	43	17	2	1	0	0	0	0	120	40.0	34.4
7:00 PM	0	0	7	9	8	29	17	2	0	0	0	0	0	72	40.4	34.9
8:00 PM	0	0	0	3	14	18	13	1	2	0	0	0	0	51	43.0	37.3
9:00 PM	0	0	0	1	4	18	4	0	0	0	0	0	0	27	39.1	36.2
10:00 PM	0	0	0	1	10	11	6	1	0	0	0	0	0	29	40.8	36.3
11:00 PM	0	0	0	1	1	6	5	1	0	0	0	0	0	14	43.1	38.6
Total	8	9	187	262	416	1019	625	91	11	1	0	0	0	2629	41.0	35.6
Percent	0.30%	0.34%	7.11%	9.97%	15.82%	38.76%	23.77%	3.46%	0.42%	0.04%	0.00%	0.00%	0.00%			
AM Peak	6:00 AM	7:00 AM	9:00 AM	11:00 AM	11:00 AM	11:00 AM	9:00 AM	7:00 AM	10:00 AM	5:00 AM					9:00 AM	
Volume	1	2	21	27	30	81	68	10	2	1	0	0	0	217		
PM Peak	12:00 PM	12:00 PM	12:00 PM	12:00 PM	5:00 PM	12:00 PM	2:00 PM	1:00 PM	8:00 PM						12:00 PM	
Volume	3	2	27	32	41	122	59	8	2	0	0	0	0	279		

15th Percentile:	28.0 MPH	Average Speed:	35.6 MPH	Posted Speed Limit:	35 MPH
50th Percentile:	37.0 MPH	10 MPH Pace:	33 to 42 MPH	Number of Vehicles > 35 MPH:	1563
85th Percentile:	41.0 MPH	Number in Pace:	1721	Percent of Vehicles > 35 MPH:	59.5%
95th Percentile:	44.0 MPH	Percent in Pace:	65.5%		

Grove Street
 south of # 162 Driveway
 City, State: Franklin, MA
 Client: TetraTech/ S. Wood
 Site Code: 143-276845-20002
 Count Date: Thursday, February 6, 2020



PRECISION
 D A T A
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdillc.com

PDI File #: 207444 ATR-A

Speed (60-minute)

SB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 +	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	1	3	10	5	0	0	0	1	0	0	20	42.0	38.7
1:00 AM	0	0	0	1	4	3	1	0	0	0	0	0	0	9	38.6	34.0
2:00 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	2	33.7	30.5
3:00 AM	0	0	2	6	6	3	1	0	0	0	0	0	0	18	35.5	30.5
4:00 AM	0	1	6	8	7	6	0	0	0	0	0	0	0	28	36.0	28.8
5:00 AM	0	1	5	13	11	3	0	0	0	0	0	0	0	33	33.2	28.6
6:00 AM	0	1	6	17	31	24	6	0	0	0	0	0	0	85	37.0	32.3
7:00 AM	0	0	3	20	44	54	20	0	0	0	0	0	0	141	39.0	34.3
8:00 AM	0	1	6	23	46	64	28	2	0	0	0	0	0	170	40.0	34.6
9:00 AM	0	0	6	20	26	50	22	3	1	0	0	0	0	128	40.0	35.1
10:00 AM	1	0	7	16	32	59	25	2	0	0	0	0	0	142	40.0	34.8
11:00 AM	0	0	5	22	28	57	36	4	0	0	0	0	0	152	41.0	35.5
12:00 PM	1	0	2	23	52	69	48	2	1	0	0	0	0	198	41.0	35.6
1:00 PM	0	1	1	13	49	67	35	3	0	0	0	0	0	169	40.0	35.5
2:00 PM	0	0	5	12	55	128	66	17	1	0	0	0	0	284	41.0	36.9
3:00 PM	0	0	1	32	71	158	87	9	1	0	0	0	0	359	41.0	36.5
4:00 PM	0	5	7	31	108	239	79	4	0	1	0	0	0	474	40.0	35.6
5:00 PM	2	5	15	74	126	164	32	2	1	0	0	0	0	421	38.0	33.3
6:00 PM	0	4	12	42	71	102	18	3	1	0	0	0	0	253	38.2	33.5
7:00 PM	0	0	4	25	39	77	20	3	0	0	0	0	0	168	39.0	34.5
8:00 PM	0	1	2	15	44	52	22	3	0	0	0	0	0	139	40.3	34.9
9:00 PM	0	0	1	5	20	42	5	1	1	0	0	0	0	75	39.0	35.5
10:00 PM	0	0	0	3	11	20	8	2	1	0	0	0	0	45	41.4	36.8
11:00 PM	0	0	0	0	5	4	5	1	0	0	0	0	0	15	41.9	37.8
Total	4	20	96	423	889	1456	569	61	8	1	1	0	0	3528	40.0	34.9
Percent	0.11%	0.57%	2.72%	11.99%	25.20%	41.27%	16.13%	1.73%	0.23%	0.03%	0.03%	0.00%	0.00%			
AM Peak	10:00 AM	4:00 AM	10:00 AM	8:00 AM	8:00 AM	8:00 AM	11:00 AM	11:00 AM	9:00 AM		12:00 AM					8:00 AM
Volume	1	1	7	23	46	64	36	4	1	0	1	0	0			170
PM Peak	5:00 PM	4:00 PM	5:00 PM	5:00 PM	5:00 PM	4:00 PM	3:00 PM	2:00 PM	12:00 PM	4:00 PM						4:00 PM
Volume	2	5	15	74	126	239	87	17	1	1	0	0	0			474

15th Percentile:	29.0 MPH	Average Speed:	34.9 MPH	Posted Speed Limit:	35 MPH
50th Percentile:	36.0 MPH	10 MPH Pace:	31 to 40 MPH	Number of Vehicles > 35 MPH:	1824
85th Percentile:	40.0 MPH	Number in Pace:	2437	Percent of Vehicles > 35 MPH:	51.7%
95th Percentile:	42.0 MPH	Percent in Pace:	69.1%		



PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdilic.com

Grove Street
 south of # 162 Driveway
 City, State: Franklin, MA
 Client: TetraTech/ S. Wood
 Site Code: 143-276845-20002
 Count Date: Friday, February 7, 2020



PRECISION
 D A T A
 INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdilic.com

PDI File #: 207444 ATR-A

Speed (60-minute)

SB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 +	Total	85th %ile	Ave Speed
12:00 AM	2	2	0	2	5	4	5	0	1	0	0	0	0	21	40.0	32.1
1:00 AM	2	0	0	2	0	4	1	1	0	0	0	0	0	10	41.0	32.3
2:00 AM	0	0	0	0	3	4	0	0	0	0	0	0	0	7	37.0	34.7
3:00 AM	0	0	0	2	1	3	2	1	0	0	0	0	0	9	41.8	36.1
4:00 AM	0	0	2	10	12	2	2	1	0	0	0	0	0	29	35.6	31.3
5:00 AM	0	0	6	11	11	18	5	2	0	0	0	0	0	53	39.0	33.1
6:00 AM	0	0	5	16	18	31	8	4	0	0	0	0	0	82	39.0	34.1
7:00 AM	1	2	8	31	32	46	32	1	0	0	0	0	0	153	40.2	33.8
8:00 AM	0	1	4	32	48	58	30	4	0	0	0	0	0	177	40.0	34.7
9:00 AM	0	0	2	12	31	70	26	2	0	0	0	0	0	143	40.0	35.9
10:00 AM	1	1	3	21	37	86	29	2	1	0	0	0	0	181	40.0	35.3
11:00 AM	0	0	3	27	69	104	52	10	1	0	0	0	0	266	41.0	36.0
12:00 PM	1	1	4	23	50	82	42	11	0	0	0	0	0	214	41.0	35.8
1:00 PM	0	0	2	24	55	66	62	6	0	0	0	0	0	215	41.0	35.9
2:00 PM	1	1	4	28	51	110	66	15	0	0	0	0	0	276	41.0	36.3
3:00 PM	0	2	4	20	91	167	98	12	1	0	0	0	0	395	41.0	36.6
4:00 PM	0	2	3	15	97	142	112	12	0	1	0	0	0	384	41.0	36.9
5:00 PM	0	8	16	42	91	179	53	2	0	0	0	0	0	391	39.0	34.5
6:00 PM	0	0	8	28	62	117	30	0	0	0	0	0	0	245	39.0	34.7
7:00 PM	0	0	1	21	39	81	19	2	0	0	0	0	0	163	39.0	35.3
8:00 PM	0	1	0	7	28	55	24	1	0	0	0	0	0	116	41.0	36.2
9:00 PM	0	0	2	2	17	33	24	3	0	0	0	0	0	81	41.0	36.7
10:00 PM	0	0	0	1	6	23	23	3	0	0	0	0	0	56	42.0	38.8
11:00 PM	0	0	0	0	5	7	11	2	1	0	0	0	0	26	42.3	39.3
Total	8	21	77	377	859	1492	756	97	5	1	0	0	0	3693	41.0	35.6
Percent	0.22%	0.57%	2.09%	10.21%	23.26%	40.40%	20.47%	2.63%	0.14%	0.03%	0.00%	0.00%	0.00%			
AM Peak	12:00 AM	12:00 AM	7:00 AM	8:00 AM	11:00 AM	11:00 AM	11:00 AM	11:00 AM	12:00 AM						11:00 AM	
Volume	2	2	8	32	69	104	52	10	1	0	0	0	0		266	
PM Peak	12:00 PM	5:00 PM	5:00 PM	5:00 PM	4:00 PM	5:00 PM	4:00 PM	2:00 PM	3:00 PM	4:00 PM					3:00 PM	
Volume	1	8	16	42	97	179	112	15	1	1	0	0	0		395	

15th Percentile:	30.0 MPH	Average Speed:	35.6 MPH	Posted Speed Limit:	35 MPH
50th Percentile:	36.0 MPH	10 MPH Pace:	32 to 41 MPH	Number of Vehicles > 35 MPH:	2106
85th Percentile:	41.0 MPH	Number in Pace:	2546	Percent of Vehicles > 35 MPH:	57.0%
95th Percentile:	43.0 MPH	Percent in Pace:	68.9%		

Grove Street
 south of # 162 Driveway
 City, State: Franklin, MA
 Client: TetraTech/ S. Wood
 Site Code: 143-276845-20002
 Count Date: Saturday, February 8, 2020



PRECISION
 D A T A
 INDUSTRIES, LLC
 46 Morton Street, Framingham, MA 01702
 Office: 508-875-0100 Fax: 508-875-0118
 Email: datarequests@pdilic.com

PDI File #: 207444 ATR-A

Speed (60-minute)

SB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 +	Total	85th %ile	Ave Speed
12:00 AM	0	0	0	1	2	8	4	1	0	0	0	0	0	16	43.5	37.4
1:00 AM	0	0	0	0	2	3	2	1	0	0	0	0	0	8	41.0	37.9
2:00 AM	0	0	0	1	1	1	0	0	0	0	0	0	0	3	36.3	32.7
3:00 AM	0	0	0	4	1	3	0	0	0	0	0	0	0	8	37.0	31.5
4:00 AM	0	0	0	1	4	4	2	1	0	0	0	0	0	12	41.1	36.4
5:00 AM	0	0	1	1	4	4	5	0	1	0	0	0	0	16	43.0	36.9
6:00 AM	0	1	2	4	9	6	4	2	0	0	0	0	0	28	40.0	33.7
7:00 AM	0	2	1	8	19	21	21	3	0	0	0	0	0	75	41.0	35.7
8:00 AM	0	0	5	14	30	33	16	6	1	0	0	0	0	105	41.0	34.7
9:00 AM	0	0	2	10	42	45	60	9	1	0	0	0	0	169	43.0	37.4
10:00 AM	0	1	1	10	43	79	54	9	2	0	0	0	0	199	42.0	37.1
11:00 AM	1	1	5	15	45	76	73	16	1	0	0	0	0	233	42.0	37.0
12:00 PM	0	1	5	24	53	107	91	11	1	0	0	0	0	293	42.0	37.0
1:00 PM	0	2	1	17	40	94	58	13	0	0	0	0	0	225	42.0	36.8
2:00 PM	0	2	4	18	47	94	64	10	0	0	0	0	0	239	42.0	36.6
3:00 PM	0	1	4	10	41	108	79	6	2	0	0	0	0	251	41.0	37.3
4:00 PM	0	1	1	6	29	94	70	12	1	0	0	0	0	214	42.1	38.1
5:00 PM	0	1	4	16	38	65	44	6	0	0	0	0	0	174	41.0	36.1
6:00 PM	0	1	3	11	24	76	20	1	0	0	0	0	0	136	39.8	35.5
7:00 PM	0	1	2	3	23	49	14	1	1	0	0	0	0	94	40.0	36.1
8:00 PM	0	0	0	2	14	53	14	3	1	0	0	0	0	87	41.0	37.0
9:00 PM	0	0	0	1	15	29	20	2	0	0	0	0	0	67	41.0	37.2
10:00 PM	0	0	0	1	15	18	11	5	1	0	0	0	0	51	44.0	37.6
11:00 PM	0	0	0	1	5	18	11	4	1	0	0	0	0	40	43.2	38.7
Total	1	15	41	179	546	1088	737	122	14	0	0	0	0	2743	42.0	36.8
Percent	0.04%	0.55%	1.49%	6.53%	19.91%	39.66%	26.87%	4.45%	0.51%	0.00%	0.00%	0.00%	0.00%			
AM Peak	11:00 AM	7:00 AM	8:00 AM	11:00 AM	11:00 AM	10:00 AM	11:00 AM	11:00 AM	10:00 AM						11:00 AM	
Volume	1	2	5	15	45	79	73	16	2	0	0	0	0	233		
PM Peak		1:00 PM	12:00 PM	12:00 PM	12:00 PM	3:00 PM	12:00 PM	1:00 PM	3:00 PM						12:00 PM	
Volume	0	2	5	24	53	108	91	13	2	0	0	0	0	293		

15th Percentile:	31.0 MPH	Average Speed:	36.8 MPH	Posted Speed Limit:	35 MPH
50th Percentile:	37.0 MPH	10 MPH Pace:	33 to 42 MPH	Number of Vehicles > 35 MPH:	1779
85th Percentile:	42.0 MPH	Number in Pace:	1900	Percent of Vehicles > 35 MPH:	64.9%
95th Percentile:	44.0 MPH	Percent in Pace:	69.3%		

PDI File #: **207444 C**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars and Heavy Vehicles (Combined)

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	1	24	0	0	25	0	0	0	0	0	0	150	7	0	157	0	0	0	0	0	182
7:15 AM	7	31	0	0	38	0	0	0	0	0	0	157	1	0	158	0	0	0	0	0	196
7:30 AM	7	50	0	0	57	0	0	0	0	0	0	128	0	0	128	1	0	2	0	3	188
7:45 AM	2	37	0	0	39	0	0	0	0	0	0	124	2	0	126	0	0	3	0	3	168
Total	17	142	0	0	159	0	0	0	0	0	0	559	10	0	569	1	0	5	0	6	734
8:00 AM	4	42	0	0	46	0	0	0	0	0	0	90	3	0	93	0	0	3	0	3	142
8:15 AM	1	46	0	0	47	0	0	0	0	0	0	93	2	0	95	1	0	4	0	5	147
8:30 AM	0	40	0	0	40	0	0	0	0	0	0	74	2	0	76	1	0	2	0	3	119
8:45 AM	2	39	0	0	41	0	0	0	0	0	0	91	2	0	93	0	0	4	0	4	138
Total	7	167	0	0	174	0	0	0	0	0	0	348	9	0	357	2	0	13	0	15	546
Grand Total	24	309	0	0	333	0	0	0	0	0	0	907	19	0	926	3	0	18	0	21	1280
Approach %	7.2	92.8	0.0	0.0		0.0	0.0	0.0	0.0		0.0	97.9	2.1	0.0		14.3	0.0	85.7	0.0		
Total %	1.9	24.1	0.0	0.0	26.0	0.0	0.0	0.0	0.0	0.0	0.0	70.9	1.5	0.0	72.3	0.2	0.0	1.4	0.0	1.6	
Exiting Leg Total	925					0					312					43					1280
Cars	22	286	0	0	308	0	0	0	0	0	0	868	18	0	886	3	0	16	0	19	1213
% Cars	91.7	92.6	0.0	0.0	92.5	0.0	0.0	0.0	0.0	0.0	0.0	95.7	94.7	0.0	95.7	100.0	0.0	88.9	0.0	90.5	94.8
Exiting Leg Total	884					0					289					40					1213
Heavy Vehicles	2	23	0	0	25	0	0	0	0	0	0	39	1	0	40	0	0	2	0	2	67
% Heavy Vehicles	8.3	7.4	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	4.3	5.3	0.0	4.3	0.0	0.0	11.1	0.0	9.5	5.2
Exiting Leg Total	41					0					23					3					67

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	1	24	0	0	25	0	0	0	0	0	0	150	7	0	157	0	0	0	0	0	182
7:15 AM	7	31	0	0	38	0	0	0	0	0	0	157	1	0	158	0	0	0	0	0	196
7:30 AM	7	50	0	0	57	0	0	0	0	0	0	128	0	0	128	1	0	2	0	3	188
7:45 AM	2	37	0	0	39	0	0	0	0	0	0	124	2	0	126	0	0	3	0	3	168
Total Volume	17	142	0	0	159	0	0	0	0	0	0	559	10	0	569	1	0	5	0	6	734
% Approach Total	10.7	89.3	0.0	0.0		0.0	0.0	0.0	0.0		0.0	98.2	1.8	0.0		16.7	0.0	83.3	0.0		
PHF	0.607	0.710	0.000	0.000	0.697	0.000	0.000	0.000	0.000	0.000	0.000	0.890	0.357	0.000	0.900	0.250	0.000	0.417	0.000	0.500	0.936
Cars	16	134	0	0	150	0	0	0	0	0	0	540	9	0	549	1	0	3	0	4	703
Cars %	94.1	94.4	0.0	0.0	94.3	0.0	0.0	0.0	0.0	0.0	0.0	96.6	90.0	0.0	96.5	100.0	0.0	60.0	0.0	66.7	95.8
Heavy Vehicles	1	8	0	0	9	0	0	0	0	0	0	19	1	0	20	0	0	2	0	2	31
Heavy Vehicles %	5.9	5.6	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	3.4	10.0	0.0	3.5	0.0	0.0	40.0	0.0	33.3	4.2
Cars Enter Leg	16	134	0	0	150	0	0	0	0	0	0	540	9	0	549	1	0	3	0	4	703
Heavy Enter Leg	1	8	0	0	9	0	0	0	0	0	0	19	1	0	20	0	0	2	0	2	31
Total Entering Leg	17	142	0	0	159	0	0	0	0	0	0	559	10	0	569	1	0	5	0	6	734
Cars Exiting Leg	543					0					135					25					703
Heavy Exiting Leg	21					0					8					2					31
Total Exiting Leg	564					0					143					27					734

PDI File #: **207444 C**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	1	24	0	0	25	0	0	0	0	0	0	146	7	0	153	0	0	0	0	0	178
7:15 AM	7	28	0	0	35	0	0	0	0	0	0	150	0	0	150	0	0	0	0	0	185
7:30 AM	6	48	0	0	54	0	0	0	0	0	0	122	0	0	122	1	0	2	0	3	179
7:45 AM	2	34	0	0	36	0	0	0	0	0	0	122	2	0	124	0	0	1	0	1	161
Total	16	134	0	0	150	0	0	0	0	0	0	540	9	0	549	1	0	3	0	4	703
8:00 AM	4	39	0	0	43	0	0	0	0	0	0	80	3	0	83	0	0	3	0	3	129
8:15 AM	1	43	0	0	44	0	0	0	0	0	0	89	2	0	91	1	0	4	0	5	140
8:30 AM	0	35	0	0	35	0	0	0	0	0	0	72	2	0	74	1	0	2	0	3	112
8:45 AM	1	35	0	0	36	0	0	0	0	0	0	87	2	0	89	0	0	4	0	4	129
Total	6	152	0	0	158	0	0	0	0	0	0	328	9	0	337	2	0	13	0	15	510
Grand Total	22	286	0	0	308	0	0	0	0	0	0	868	18	0	886	3	0	16	0	19	1213
Approach %	7.1	92.9	0.0	0.0		0.0	0.0	0.0	0.0		0.0	98.0	2.0	0.0		15.8	0.0	84.2	0.0		
Total %	1.8	23.6	0.0	0.0	25.4	0.0	0.0	0.0	0.0	0.0	0.0	71.6	1.5	0.0	73.0	0.2	0.0	1.3	0.0	1.6	
Exiting Leg Total	884					0					289					40					1213

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	1	24	0	0	25	0	0	0	0	0	0	146	7	0	153	0	0	0	0	0	178
7:15 AM	7	28	0	0	35	0	0	0	0	0	0	150	0	0	150	0	0	0	0	0	185
7:30 AM	6	48	0	0	54	0	0	0	0	0	0	122	0	0	122	1	0	2	0	3	179
7:45 AM	2	34	0	0	36	0	0	0	0	0	0	122	2	0	124	0	0	1	0	1	161
Total Volume	16	134	0	0	150	0	0	0	0	0	0	540	9	0	549	1	0	3	0	4	703
% Approach Total	10.7	89.3	0.0	0.0		0.0	0.0	0.0	0.0		0.0	98.4	1.6	0.0		25.0	0.0	75.0	0.0		
PHF	0.571	0.698	0.000	0.000	0.694	0.000	0.000	0.000	0.000	0.000	0.000	0.900	0.321	0.000	0.897	0.250	0.000	0.375	0.000	0.333	0.950
Entering Leg	16	134	0	0	150	0	0	0	0	0	0	540	9	0	549	1	0	3	0	4	703
Exiting Leg	543					0					135					25					703
Total	693					0					684					29					1406

PDI File #: **207444 C**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	8
7:30 AM	1	2	0	0	3	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	6
7:45 AM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	2	0	2	4
Total	1	8	0	0	9	0	0	0	0	0	0	19	1	0	20	0	0	2	0	2	31
8:00 AM	0	3	0	0	3	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	10
8:15 AM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
8:30 AM	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
8:45 AM	1	4	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
Total	1	15	0	0	16	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	36
Grand Total	2	23	0	0	25	0	0	0	0	0	0	39	1	0	40	0	0	2	0	2	42
Approach %	8.0	92.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	97.5	2.5	0.0		0.0	0.0	100.0	0.0		
Total %	3.0	34.3	0.0	0.0	37.3	0.0	0.0	0.0	0.0	0.0	0.0	58.2	1.5	0.0	59.7	0.0	0.0	3.0	0.0	3.0	67.0
Exiting Leg Total	41					0					23					3					67
Buses	0	8	0	0	8	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	9
% Buses	0.0	34.8	0.0	0.0	32.0	0.0	0.0	0.0	0.0	0.0	0.0	23.1	0.0	0.0	22.5	0.0	0.0	0.0	0.0	0.0	21.4
Exiting Leg Total	9					0					8					0					17
Single-Unit Trucks	2	12	0	0	14	0	0	0	0	0	0	25	1	0	26	0	0	2	0	2	28
% Single-Unit	100.0	52.2	0.0	0.0	56.0	0.0	0.0	0.0	0.0	0.0	0.0	64.1	100.0	0.0	65.0	0.0	0.0	100.0	0.0	100.0	62.7
Exiting Leg Total	27					0					12					3					42
Articulated Trucks	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	5
% Articulated	0.0	13.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	11.9
Exiting Leg Total	5					0					3					0					8

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	8
7:30 AM	1	2	0	0	3	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	6
7:45 AM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	2	0	2	4
8:00 AM	0	3	0	0	3	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	10
Total Volume	1	11	0	0	12	0	0	0	0	0	0	25	1	0	26	0	0	2	0	2	40
% Approach Total	8.3	91.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	96.2	3.8	0.0		0.0	0.0	100.0	0.0		
PHF	0.250	0.917	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.250	0.000	0.650	0.000	0.000	0.250	0.000	0.250	0.769
Buses	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
Buses %	0.0	27.3	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	11.5	0.0	0.0	0.0	0.0	0.0	15.0
Single-Unit Trucks	1	7	0	0	8	0	0	0	0	0	0	18	1	0	19	0	0	2	0	2	21
Single-Unit %	100.0	63.6	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	72.0	100.0	0.0	73.1	0.0	0.0	100.0	0.0	100.0	72.5
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
Articulated %	0.0	9.1	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	16.0	0.0	0.0	15.4	0.0	0.0	0.0	0.0	0.0	12.5
Buses	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
Single-Unit Trucks	1	7	0	0	8	0	0	0	0	0	0	18	1	0	19	0	0	2	0	2	21
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
Total Entering Leg	1	11	0	0	12	0	0	0	0	0	0	25	1	0	26	0	0	2	0	2	40
Buses	3					0					3					0					6
Single-Unit Trucks	20					0					7					2					29
Articulated Trucks	4					0					1					0					5
Total Exiting Leg	27					0					11					2					40

PDI File #: **207444 C**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Buses

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
7:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	
7:45 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Total	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	5	
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
8:30 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
8:45 AM	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	6	
Total	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	12	
Grand Total	0	8	0	0	8	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	17	
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0			
Total %	0.0	47.1	0.0	0.0	47.1	0.0	0.0	0.0	0.0	0.0	0.0	52.9	0.0	0.0	52.9	0.0	0.0	0.0	0.0	0.0		
Exiting Leg Total						9					0					8					0	17

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
8:30 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
8:45 AM	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	6	
Total Volume	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	12	
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0			
PHF	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.500	
Entering Leg	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	12	
Exiting Leg						6					0					6					0	12
Total						12					0					12					0	24

PDI File #: **207444 C**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Single-Unit Trucks

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	7
7:30 AM	1	1	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
7:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	2	0	2	2
Total	1	6	0	0	7	0	0	0	0	0	0	13	1	0	14	0	0	2	0	2	23
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	8
8:15 AM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
8:30 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
8:45 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	6	0	0	7	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	19
Grand Total	2	12	0	0	14	0	0	0	0	0	0	25	1	0	26	0	0	2	0	2	2
Approach %	14.3	85.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	96.2	3.8	0.0		0.0	0.0	100.0	0.0		
Total %	4.8	28.6	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	59.5	2.4	0.0	61.9	0.0	0.0	4.8	0.0	4.8	4.8
Exiting Leg Total						0					12					3					42

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	7
7:30 AM	1	1	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
7:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	2	0	2	5
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	8
Total Volume	1	7	0	0	8	0	0	0	0	0	0	18	1	0	19	0	0	2	0	2	29
% Approach Total	12.5	87.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	94.7	5.3	0.0		0.0	0.0	100.0	0.0		
PHF	0.250	0.583	0.000	0.000	0.667	0.000	0.000	0.000	0.000	0.000	0.000	0.563	0.250	0.000	0.594	0.000	0.000	0.250	0.000	0.250	0.725
Entering Leg	1	7	0	0	8	0	0	0	0	0	0	18	1	0	19	0	0	2	0	2	29
Exiting Leg						0					7					2					29
Total						0					26					4					58

PDI File #: **207444 C**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Articulated Trucks

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
8:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
Grand Total	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	8
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	37.5	0.0	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	62.5	0.0	0.0	62.5	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total						5					0					3					0

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total Volume	0	1	0	0	1	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	6
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.750
Entering Leg	0	1	0	0	1	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	6
Exiting Leg						5					0					1					6
Total						6					0					6					12

PDI File #: **207444 C**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Bicycles (on Roadway and Crosswalks)

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

PDI File #: 207444 C
 Location: N: Grove Street S: Grove Street
 Location: E: Driveway W: Grove Street Business Center
 City, State: Franklin, MA
 Client: TetraTech/ S. Wood
 Site Code: 143-276845-20002
 Count Date: Thursday, February 6, 2020
 Start Time: 7:00 AM
 End Time: 9:00 AM
 Class:



Pedestrians

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars and Heavy Vehicles (Combined)

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	2	133	0	0	135	0	0	0	0	0	0	62	0	0	62	5	0	1	0	6	203
4:15 PM	1	99	0	0	100	0	0	0	0	0	0	59	3	0	62	1	0	3	0	4	166
4:30 PM	2	127	0	0	129	0	0	0	0	0	0	81	0	0	81	0	0	2	0	2	212
4:45 PM	1	115	0	0	116	0	0	0	0	0	0	75	0	0	75	3	0	4	0	7	198
Total	6	474	0	0	480	0	0	0	0	0	0	277	3	0	280	9	0	10	0	19	779
5:00 PM	0	143	0	0	143	0	0	0	0	0	0	64	0	0	64	2	0	3	0	5	212
5:15 PM	0	120	0	0	120	0	0	0	0	0	0	57	2	0	59	3	0	0	0	3	182
5:30 PM	1	84	0	0	85	0	0	0	0	0	0	51	1	0	52	2	0	3	0	5	142
5:45 PM	1	90	0	0	91	0	0	0	0	0	0	51	1	0	52	1	0	1	0	2	145
Total	2	437	0	0	439	0	0	0	0	0	0	223	4	0	227	8	0	7	0	15	681
Grand Total	8	911	0	0	919	0	0	0	0	0	0	500	7	0	507	17	0	17	0	34	1460
Approach %	0.9	99.1	0.0	0.0		0.0	0.0	0.0	0.0		0.0	98.6	1.4	0.0		50.0	0.0	50.0	0.0		
Total %	0.5	62.4	0.0	0.0	62.9	0.0	0.0	0.0	0.0	0.0	0.0	34.2	0.5	0.0	34.7	1.2	0.0	1.2	0.0	2.3	
Exiting Leg Total	517					0					928					15					1460
Cars	5	895	0	0	900	0	0	0	0	0	0	487	5	0	492	16	0	17	0	33	1425
% Cars	62.5	98.2	0.0	0.0	97.9	0.0	0.0	0.0	0.0	0.0	0.0	97.4	71.4	0.0	97.0	94.1	0.0	100.0	0.0	97.1	97.6
Exiting Leg Total	504					0					911					10					1425
Heavy Vehicles	3	16	0	0	19	0	0	0	0	0	0	13	2	0	15	1	0	0	0	1	35
% Heavy Vehicles	37.5	1.8	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	2.6	28.6	0.0	3.0	5.9	0.0	0.0	0.0	2.9	2.4
Exiting Leg Total	13					0					17					5					35

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	2	127	0	0	129	0	0	0	0	0	0	81	0	0	81	0	0	2	0	2	212
4:45 PM	1	115	0	0	116	0	0	0	0	0	0	75	0	0	75	3	0	4	0	7	198
5:00 PM	0	143	0	0	143	0	0	0	0	0	0	64	0	0	64	2	0	3	0	5	212
5:15 PM	0	120	0	0	120	0	0	0	0	0	0	57	2	0	59	3	0	0	0	3	182
Total Volume	3	505	0	0	508	0	0	0	0	0	0	277	2	0	279	8	0	9	0	17	804
% Approach Total	0.6	99.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	99.3	0.7	0.0		47.1	0.0	52.9	0.0		
PHF	0.375	0.883	0.000	0.000	0.888	0.000	0.000	0.000	0.000	0.000	0.000	0.855	0.250	0.000	0.861	0.667	0.000	0.563	0.000	0.607	0.948
Cars	2	495	0	0	497	0	0	0	0	0	0	273	1	0	274	8	0	9	0	17	788
Cars %	66.7	98.0	0.0	0.0	97.8	0.0	0.0	0.0	0.0	0.0	0.0	98.6	50.0	0.0	98.2	100.0	0.0	100.0	0.0	100.0	98.0
Heavy Vehicles	1	10	0	0	11	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	16
Heavy Vehicles %	33.3	2.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.4	50.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	2.0
Cars Enter Leg	2	495	0	0	497	0	0	0	0	0	0	273	1	0	274	8	0	9	0	17	788
Heavy Enter Leg	1	10	0	0	11	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	16
Total Entering Leg	3	505	0	0	508	0	0	0	0	0	0	277	2	0	279	8	0	9	0	17	804
Cars Exiting Leg	282					0					503					3					788
Heavy Exiting Leg	4					0					10					2					16
Total Exiting Leg	286					0					513					5					804

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	2	130	0	0	132	0	0	0	0	0	0	59	0	0	59	4	0	1	0	5	196
4:15 PM	0	97	0	0	97	0	0	0	0	0	0	59	2	0	61	1	0	3	0	4	162
4:30 PM	1	123	0	0	124	0	0	0	0	0	0	81	0	0	81	0	0	2	0	2	207
4:45 PM	1	112	0	0	113	0	0	0	0	0	0	75	0	0	75	3	0	4	0	7	195
Total	4	462	0	0	466	0	0	0	0	0	0	274	2	0	276	8	0	10	0	18	760
5:00 PM	0	143	0	0	143	0	0	0	0	0	0	61	0	0	61	2	0	3	0	5	209
5:15 PM	0	117	0	0	117	0	0	0	0	0	0	56	1	0	57	3	0	0	0	3	177
5:30 PM	0	83	0	0	83	0	0	0	0	0	0	46	1	0	47	2	0	3	0	5	135
5:45 PM	1	90	0	0	91	0	0	0	0	0	0	50	1	0	51	1	0	1	0	2	144
Total	1	433	0	0	434	0	0	0	0	0	0	213	3	0	216	8	0	7	0	15	665
Grand Total	5	895	0	0	900	0	0	0	0	0	0	487	5	0	492	16	0	17	0	33	1425
Approach %	0.6	99.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	99.0	1.0	0.0		48.5	0.0	51.5	0.0		
Total %	0.4	62.8	0.0	0.0	63.2	0.0	0.0	0.0	0.0	0.0	0.0	34.2	0.4	0.0	34.5	1.1	0.0	1.2	0.0	2.3	
Exiting Leg Total					504					0					911					10	1425

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	1	123	0	0	124	0	0	0	0	0	0	81	0	0	81	0	0	2	0	2	207
4:45 PM	1	112	0	0	113	0	0	0	0	0	0	75	0	0	75	3	0	4	0	7	195
5:00 PM	0	143	0	0	143	0	0	0	0	0	0	61	0	0	61	2	0	3	0	5	209
5:15 PM	0	117	0	0	117	0	0	0	0	0	0	56	1	0	57	3	0	0	0	3	177
Total Volume	2	495	0	0	497	0	0	0	0	0	0	273	1	0	274	8	0	9	0	17	788
% Approach Total	0.4	99.6	0.0	0.0		0.0	0.0	0.0	0.0		0.0	99.6	0.4	0.0		47.1	0.0	52.9	0.0		
PHF	0.500	0.865	0.000	0.000	0.869	0.000	0.000	0.000	0.000	0.000	0.000	0.843	0.250	0.000	0.846	0.667	0.000	0.563	0.000	0.607	0.943
Entering Leg	2	495	0	0	497	0	0	0	0	0	0	273	1	0	274	8	0	9	0	17	788
Exiting Leg					282					0					503					3	788
Total					779					0					777					20	1576

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:00 PM	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	7	
4:15 PM	1	2	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4	
4:30 PM	1	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
4:45 PM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
Total	2	12	0	0	14	0	0	0	0	0	0	3	1	0	4	1	0	0	0	1	19	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3	
5:15 PM	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	5	
5:30 PM	1	1	0	0	2	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	7	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
Total	1	4	0	0	5	0	0	0	0	0	0	10	1	0	11	0	0	0	0	0	16	
Grand Total	3	16	0	0	19	0	0	0	0	0	0	13	2	0	15	1	0	0	0	1	35	
Approach %	15.8	84.2	0.0	0.0		0.0	0.0	0.0	0.0		0.0	86.7	13.3	0.0		100.0	0.0	0.0	0.0			
Total %	8.6	45.7	0.0	0.0	54.3	0.0	0.0	0.0	0.0	0.0	0.0	37.1	5.7	0.0	42.9	2.9	0.0	0.0	0.0	2.9		
Exiting Leg Total						13					0					17					5	35
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	0					0					0					0					0	
Single-Unit Trucks	3	14	0	0	17	0	0	0	0	0	0	6	2	0	8	1	0	0	0	1	26	
% Single-Unit	100.0	87.5	0.0	0.0	89.5	0.0	0.0	0.0	0.0	0.0	0.0	46.2	100.0	0.0	53.3	100.0	0.0	0.0	0.0	100.0	74.3	
Exiting Leg Total	6					0					15					5					26	
Articulated Trucks	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	9	
% Articulated	0.0	12.5	0.0	0.0	10.5	0.0	0.0	0.0	0.0	0.0	0.0	53.8	0.0	0.0	46.7	0.0	0.0	0.0	0.0	0.0	25.7	
Exiting Leg Total	7					0					2					0					9	

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	7
4:15 PM	1	2	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4
4:30 PM	1	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
4:45 PM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total Volume	2	12	0	0	14	0	0	0	0	0	0	3	1	0	4	1	0	0	0	1	19
% Approach Total	14.3	85.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	75.0	25.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.500	0.750	0.000	0.000	0.700	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.333	0.250	0.000	0.000	0.000	0.250	0.679
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single-Unit Trucks	2	10	0	0	12	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	16
Single-Unit %	100.0	83.3	0.0	0.0	85.7	0.0	0.0	0.0	0.0	0.0	0.0	66.7	100.0	0.0	75.0	100.0	0.0	0.0	0.0	100.0	84.2
Articulated Trucks	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Articulated %	0.0	16.7	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	15.8
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	2	10	0	0	12	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	16
Articulated Trucks	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total Entering Leg	2	12	0	0	14	0	0	0	0	0	0	3	1	0	4	1	0	0	0	1	19
Buses	0					0					0					0					0
Single-Unit Trucks	2					0					11					3					16
Articulated Trucks	1					0					2					0					3
Total Exiting Leg	3					0					13					3					19

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Buses

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total	0					0					0					0					0

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg	0					0					0					0					0
Total	0					0					0					0					0

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:00 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	6	
4:15 PM	1	2	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4	
4:30 PM	1	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
4:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
Total	2	10	0	0	12	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	16	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	5	
5:30 PM	1	1	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
Total	1	4	0	0	5	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	10	
Grand Total	3	14	0	0	17	0	0	0	0	0	0	6	2	0	8	1	0	0	0	1	26	
Approach %	17.6	82.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	75.0	25.0	0.0		100.0	0.0	0.0	0.0			
Total %	11.5	53.8	0.0	0.0	65.4	0.0	0.0	0.0	0.0	0.0	0.0	23.1	7.7	0.0	30.8	3.8	0.0	0.0	0.0	3.8		
Exiting Leg Total						6					0					15					5	26

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:00 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	6	
4:15 PM	1	2	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4	
4:30 PM	1	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
4:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
Total Volume	2	10	0	0	12	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	16	
% Approach Total	16.7	83.3	0.0	0.0		0.0	0.0	0.0	0.0		0.0	66.7	33.3	0.0		100.0	0.0	0.0	0.0			
PHF	0.500	0.833	0.000	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.375	0.250	0.000	0.000	0.000	0.250	0.667	
Entering Leg	2	10	0	0	12	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	16	
Exiting Leg						2					0					11					3	16
Total						14					0					14					4	32

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Articulated Trucks

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	6
Grand Total	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	9
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	22.2	0.0	0.0	22.2	0.0	0.0	0.0	0.0	0.0	0.0	77.8	0.0	0.0	77.8	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	7					0					2					0					9

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
Total Volume	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.583
Entering Leg	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
Exiting Leg	6					0					1					0					7
Total	7					0					7					0					14

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Bicycles (on Roadway and Crosswalks)

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

PDI File #: **207444 CC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Thursday, February 6, 2020**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Pedestrians

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

PDI File #: **207444 CCC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Saturday, February 8, 2020**
 Start Time: **3:00 PM**
 End Time: **6:00 PM**
 Class:



Cars and Heavy Vehicles (Combined)

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
3:00 PM	0	77	0	0	77	0	0	0	0	0	0	39	0	0	39	0	0	0	0	0	116
3:15 PM	1	59	0	0	60	0	0	0	0	0	0	51	1	0	52	0	0	0	0	0	112
3:30 PM	1	53	0	0	54	0	0	0	0	0	0	31	0	0	31	0	0	0	0	0	85
3:45 PM	1	59	0	0	60	0	0	0	0	0	0	46	1	0	47	0	0	0	0	0	107
Total	3	248	0	0	251	0	0	0	0	0	0	167	2	0	169	0	0	0	0	0	420
4:00 PM	0	47	0	1	48	0	0	0	0	0	0	31	0	0	31	1	0	0	0	1	80
4:15 PM	1	60	0	0	61	0	0	0	0	0	0	44	0	0	44	0	0	0	0	0	105
4:30 PM	2	53	0	0	55	0	0	0	0	0	0	40	1	1	42	0	0	0	0	0	97
4:45 PM	1	50	0	0	51	0	0	0	0	0	0	51	1	0	52	0	0	1	0	1	104
Total	4	210	0	1	215	0	0	0	0	0	0	166	2	1	169	1	0	1	0	2	386
5:00 PM	0	46	0	0	46	0	0	0	0	0	0	40	1	0	41	3	0	0	0	3	90
5:15 PM	1	40	0	0	41	0	0	0	0	0	0	40	1	0	41	1	0	1	0	2	84
5:30 PM	0	47	0	0	47	0	0	0	0	0	0	35	0	0	35	2	0	1	0	3	85
5:45 PM	0	30	0	0	30	0	0	0	0	0	0	39	0	0	39	1	0	0	0	1	70
Total	1	163	0	0	164	0	0	0	0	0	0	154	2	0	156	7	0	2	0	9	329
Grand Total	8	621	0	1	630	0	0	0	0	0	0	487	6	1	494	8	0	3	0	11	1135
Approach %	1.3	98.6	0.0	0.2		0.0	0.0	0.0	0.0		0.0	98.6	1.2	0.2		72.7	0.0	27.3	0.0		
Total %	0.7	54.7	0.0	0.1	55.5	0.0	0.0	0.0	0.0	0.0	0.0	42.9	0.5	0.1	43.5	0.7	0.0	0.3	0.0	1.0	
Exiting Leg Total	491					0					630					14					1135
Cars	2	617	0	1	620	0	0	0	0	0	0	484	3	1	488	8	0	3	0	11	1119
% Cars	25.0	99.4	0.0	100.0	98.4	0.0	0.0	0.0	0.0	0.0	0.0	99.4	50.0	100.0	98.8	100.0	0.0	100.0	0.0	100.0	98.6
Exiting Leg Total	488					0					626					5					1119
Heavy Vehicles	6	4	0	0	10	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	16
% Heavy Vehicles	75.0	0.6	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.6	50.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	1.4
Exiting Leg Total	3					0					4					9					16

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
3:00 PM	0	77	0	0	77	0	0	0	0	0	0	39	0	0	39	0	0	0	0	0	116
3:15 PM	1	59	0	0	60	0	0	0	0	0	0	51	1	0	52	0	0	0	0	0	112
3:30 PM	1	53	0	0	54	0	0	0	0	0	0	31	0	0	31	0	0	0	0	0	85
3:45 PM	1	59	0	0	60	0	0	0	0	0	0	46	1	0	47	0	0	0	0	0	107
Total Volume	3	248	0	0	251	0	0	0	0	0	0	167	2	0	169	0	0	0	0	0	420
% Approach Total	1.2	98.8	0.0	0.0		0.0	0.0	0.0	0.0		0.0	98.8	1.2	0.0		0.0	0.0	0.0	0.0		
PHF	0.750	0.805	0.000	0.000	0.815	0.000	0.000	0.000	0.000	0.000	0.000	0.819	0.500	0.000	0.813	0.000	0.000	0.000	0.000	0.000	0.905
Cars	1	247	0	0	248	0	0	0	0	0	0	165	1	0	166	0	0	0	0	0	414
Cars %	33.3	99.6	0.0	0.0	98.8	0.0	0.0	0.0	0.0	0.0	0.0	98.8	50.0	0.0	98.2	0.0	0.0	0.0	0.0	0.0	98.6
Heavy Vehicles	2	1	0	0	3	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	6
Heavy Vehicles %	66.7	0.4	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	1.2	50.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	1.4
Cars Enter Leg	1	247	0	0	248	0	0	0	0	0	0	165	1	0	166	0	0	0	0	0	414
Heavy Enter Leg	2	1	0	0	3	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	6
Total Entering Leg	3	248	0	0	251	0	0	0	0	0	0	167	2	0	169	0	0	0	0	0	420
Cars Exiting Leg	165					0					247					2					414
Heavy Exiting Leg	2					0					1					3					6
Total Exiting Leg	167					0					248					5					420

PDI File #: **207444 CCC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Saturday, February 8, 2020**
 Start Time: **3:00 PM**
 End Time: **6:00 PM**
 Class:



Cars

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
3:00 PM	0	77	0	0	77	0	0	0	0	0	0	39	0	0	39	0	0	0	0	0	116
3:15 PM	1	58	0	0	59	0	0	0	0	0	0	49	0	0	49	0	0	0	0	0	108
3:30 PM	0	53	0	0	53	0	0	0	0	0	0	31	0	0	31	0	0	0	0	0	84
3:45 PM	0	59	0	0	59	0	0	0	0	0	0	46	1	0	47	0	0	0	0	0	106
Total	1	247	0	0	248	0	0	0	0	0	0	165	1	0	166	0	0	0	0	0	414
4:00 PM	0	47	0	1	48	0	0	0	0	0	0	31	0	0	31	1	0	0	0	1	80
4:15 PM	0	60	0	0	60	0	0	0	0	0	0	44	0	0	44	0	0	0	0	0	104
4:30 PM	0	52	0	0	52	0	0	0	0	0	0	40	0	1	41	0	0	0	0	0	93
4:45 PM	1	49	0	0	50	0	0	0	0	0	0	51	1	0	52	0	0	1	0	1	103
Total	1	208	0	1	210	0	0	0	0	0	0	166	1	1	168	1	0	1	0	2	380
5:00 PM	0	45	0	0	45	0	0	0	0	0	0	39	0	0	39	3	0	0	0	3	87
5:15 PM	0	40	0	0	40	0	0	0	0	0	0	40	1	0	41	1	0	1	0	2	83
5:30 PM	0	47	0	0	47	0	0	0	0	0	0	35	0	0	35	2	0	1	0	3	85
5:45 PM	0	30	0	0	30	0	0	0	0	0	0	39	0	0	39	1	0	0	0	1	70
Total	0	162	0	0	162	0	0	0	0	0	0	153	1	0	154	7	0	2	0	9	325
Grand Total	2	617	0	1	620	0	0	0	0	0	0	484	3	1	488	8	0	3	0	11	1119
Approach %	0.3	99.5	0.0	0.2		0.0	0.0	0.0	0.0		0.0	99.2	0.6	0.2		72.7	0.0	27.3	0.0		
Total %	0.2	55.1	0.0	0.1	55.4	0.0	0.0	0.0	0.0	0.0	0.0	43.3	0.3	0.1	43.6	0.7	0.0	0.3	0.0	1.0	
Exiting Leg Total					488					0					626					5	1119

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
3:00 PM	0	77	0	0	77	0	0	0	0	0	0	39	0	0	39	0	0	0	0	0	116
3:15 PM	1	58	0	0	59	0	0	0	0	0	0	49	0	0	49	0	0	0	0	0	108
3:30 PM	0	53	0	0	53	0	0	0	0	0	0	31	0	0	31	0	0	0	0	0	84
3:45 PM	0	59	0	0	59	0	0	0	0	0	0	46	1	0	47	0	0	0	0	0	106
Total Volume	1	247	0	0	248	0	0	0	0	0	0	165	1	0	166	0	0	0	0	0	414
% Approach Total	0.4	99.6	0.0	0.0		0.0	0.0	0.0	0.0		0.0	99.4	0.6	0.0		0.0	0.0	0.0	0.0		
PHF	0.250	0.802	0.000	0.000	0.805	0.000	0.000	0.000	0.000	0.000	0.000	0.842	0.250	0.000	0.847	0.000	0.000	0.000	0.000	0.000	0.892
Entering Leg	1	247	0	0	248	0	0	0	0	0	0	165	1	0	166	0	0	0	0	0	414
Exiting Leg					165					0					247					2	414
Total					413					0					413					2	828

PDI File #: 207444 CCC
 Location: N: Grove Street S: Grove Street
 Location: E: Driveway W: Grove Street Business Center
 City, State: Franklin, MA
 Client: TetraTech/ S. Wood
 Site Code: 143-276845-20002
 Count Date: Saturday, February 8, 2020
 Start Time: 3:00 PM
 End Time: 6:00 PM
 Class:



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0
3:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	0	3	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	6
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	2	1	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	2	0	0	5	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	6
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0
5:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	0	0	2	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	4
Grand Total	6	4	0	0	10	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	16
Approach %	60.0	40.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	50.0	50.0	0.0		0.0	0.0	0.0	0.0		
Total %	37.5	25.0	0.0	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	18.8	18.8	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total	3					0					4					9					16
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total	0					0					0					0					0
Single-Unit Trucks	6	4	0	0	10	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	0
% Single-Unit	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
Exiting Leg Total	3					0					4					9					16
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total	0					0					0					0					0

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	2	1	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0
Total Volume	3	3	0	0	6	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	9
% Approach Total	50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	33.3	66.7	0.0		0.0	0.0	0.0	0.0		
PHF	0.375	0.750	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.500	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.563
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single-Unit Trucks	3	3	0	0	6	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	0
Single-Unit %	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	3	3	0	0	6	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Entering Leg	3	3	0	0	6	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	9
Buses	0					0					0					0					0
Single-Unit Trucks	1					0					3					5					9
Articulated Trucks	0					0					0					0					0
Total Exiting Leg	1					0					3					5					9

PDI File #: **207444 CCC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Saturday, February 8, 2020**
 Start Time: **3:00 PM**
 End Time: **6:00 PM**
 Class:



Buses

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0			
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total	0					0					0					0					0	

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0			
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg	0					0					0					0					0	
Total	0					0					0					0					0	

PDI File #: **207444 CCC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Saturday, February 8, 2020**
 Start Time: **3:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0
3:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	0	3	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	6
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	2	1	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	2	0	0	5	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	6
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0
5:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	0	0	2	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	4
Grand Total	6	4	0	0	10	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	16
Approach %	60.0	40.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	50.0	50.0	0.0		0.0	0.0	0.0	0.0		
Total %	37.5	25.0	0.0	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	18.8	18.8	0.0	37.5	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	3					0					4					9					16

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	2	1	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0
Total Volume	3	3	0	0	6	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	9
% Approach Total	50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	33.3	66.7	0.0		0.0	0.0	0.0	0.0		
PHF	0.375	0.750	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.500	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.563
Entering Leg	3	3	0	0	6	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	9
Exiting Leg	1					0					3					5					9
Total	7					0					6					5					18

PDI File #: **207444 CCC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Saturday, February 8, 2020**
 Start Time: **3:00 PM**
 End Time: **6:00 PM**
 Class:



Articulated Trucks

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0			
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total	0					0					0					0					0	

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street					Driveway					Grove Street					Grove Street Business Center					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0			
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg	0					0					0					0					0	
Total	0					0					0					0					0	

PDI File #: 207444 CCC
 Location: N: Grove Street S: Grove Street
 Location: E: Driveway W: Grove Street Business Center
 City, State: Franklin, MA
 Client: TetraTech/ S. Wood
 Site Code: 143-276845-20002
 Count Date: Saturday, February 8, 2020
 Start Time: 3:00 PM
 End Time: 6:00 PM
 Class:



Bicycles (on Roadway and Crosswalks)

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Approach %	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

PDI File #: **207444 CCC**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: Driveway W: Grove Street Business Center**
 City, State: **Franklin, MA**
 Client: **TetraTech/ S. Wood**
 Site Code: **143-276845-20002**
 Count Date: **Saturday, February 8, 2020**
 Start Time: **3:00 PM**
 End Time: **6:00 PM**
 Class:



Pedestrians

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Approach %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total	0							0							0							0							0

Peak Hour Analysis from 03:00 PM to 06:00 PM begins at:

	Grove Street							Driveway							Grove Street							Grove Street Business Center							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg	0							0							0							0							0
Total	0							0							0							0							0

Appendix B
Seasonal Adjustment Factors

Massachusetts Highway Department
Statewide Traffic Data Collection
2019 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.22	1.14	1.12	1.06	1.00	0.96	0.87	0.85	0.96	0.99	1.04	1.12	0.85
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.97
R4-R7	1.09	1.09	1.11	1.02	0.96	0.92	0.89	0.89	0.99	0.98	1.09	1.13	0.98
U1-Boston	1.03	1.01	0.98	0.94	0.94	0.92	0.95	0.93	0.94	0.94	0.97	1.04	0.96
U1-Essex	1.09	1.06	1.03	0.99	0.94	0.90	0.88	0.86	0.93	0.94	0.99	1.06	0.93
U1-Southeast	1.06	1.05	1.01	0.97	0.95	0.93	0.93	0.90	0.94	0.94	0.98	1.04	0.98
U1-West	1.19	1.14	1.09	0.95	0.92	0.89	0.89	0.86	0.91	0.95	0.97	1.07	0.84
U1-Worcester	1.02	1.04	0.97	0.94	0.93	0.91	0.95	0.91	0.93	0.92	0.95	1.10	0.88
U2	1.01	1.00	0.94	0.93	0.91	0.89	0.93	0.90	0.90	0.91	0.94	1.02	0.99
U3	1.06	1.03	0.98	0.94	0.93	0.91	0.95	0.91	0.92	0.93	0.97	1.00	0.98
U4-U7	1.01	1.00	0.95	0.92	0.88	0.86	0.92	0.91	0.92	0.94	0.99	1.04	0.99
Rec - East	1.04	1.16	1.12	0.98	0.92	0.88	0.77	0.81	0.94	1.02	1.08	1.12	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.98

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

Appendix C
Trip Generation Calculations

ITE Trip Generation Proposed Marijuana Dispensary Franklin, Massachusetts

Land Use Code 882 - Marijuana Dispensary					Size:	3.856	KSF
Time Period	R ² Value	Use Equation or Rate?	Rate	Percent Enter	In	Out	Total
Weekday Daily		Rate	252.7	50%	487	487	974
AM Street Peak Hour		Rate	10.44	56%	22	18	40
PM Street Peak Hour		Rate	21.83	50%	42	42	84
Saturday Daily		Rate	259.31	50%	500	500	1000
Saturday Peak Hour		Rate	36.43	50%	70	70	140

Source: *Trip Generation, Tenth Edition with Supplement*, (Institute of Transportation Engineers, 2020).

Land Use Code 150- Warehousing					Size:	7.584	KSF GFA
Time Period	R ² Value	Use Equation or Rate?	Rate	Percent Enter	In	Out	Total
Weekday Daily	0.93	Equation	1.74	50%	7	6	13
AM Street Peak Hour	0.69	Rate	0.17	77%	1	0	1
PM Street Peak Hour	0.65	Rate	0.19	27%	0	1	1
Saturday Daily		Rate	0.15	50%	1	0	1
Saturday Peak Hour		Rate	0.05	64%	0	0	0

Source: *Trip Generation, Tenth Edition with Supplement*, (Institute of Transportation Engineers, 2020).

Land Use Code 710 - General Office Building					Size:	4.647	KSF. GFA
Time Period	R ² Value	Use Equation or Rate?	Rate	Percent Enter	In	Out	Total
Weekday Daily		Rate	9.74	50%	22	23	45
AM Street Peak Hour		Rate	1.16	86%	4	1	5
PM Street Peak Hour		Rate	1.15	16%	1	4	5
Saturday Daily		Rate	2.21	50%	5	5	10
Saturday Peak Hour of Generator		Rate	0.53	54%	1	1	2

Source: *Trip Generation, Tenth Edition with Supplement*, (Institute of Transportation Engineers, 2020).

162 Grove Street - Warehouse, Office & Dispensary			
Time Period	In	Out	Total
Weekday Daily	516	516	1032
AM Street Peak Hour	27	19	46
PM Street Peak Hour	43	47	90
Saturday Daily	506	505	1011
Saturday Peak Hour	71	71	142

NETA Transactions
Northampton, Massachusetts

		8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Grand Total
Sunday	10/13/2019	109	75	131	187	172	189	229	202	203	162	143	135	124	104	0	2165
Monday	10/14/2019	77	112	139	148	150	163	206	213	153	175	134	119	101	93	2	1985
Tuesday	10/15/2019	82	79	127	138	159	123	131	144	114	136	132	108	104	74	2	1653
Wednesday	10/16/2019	70	88	121	105	177	169	131	133	120	88	105	83	71	57	1	1519
Thursday	10/17/2019	67	84	92	142	165	148	150	167	143	146	120	138	101	60	1	1724
Friday	10/18/2019	117	115	143	177	195	195	229	212	207	222	205	188	174	126	0	2505
Saturday	10/19/2019	161	129	156	142	166	165	204	214	196	175	144	143	128	100	3	2226
Sunday	10/20/2019	94	153	179	176	172	196	174	228	161	150	148	122	95	83	0	2131
Monday	10/21/2019	63	94	128	149	176	163	146	135	138	123	120	107	117	85	4	1748
Tuesday	10/22/2019	76	89	88	116	155	108	103	128	108	120	115	105	90	83	1	1485
Wednesday	10/23/2019	70	96	107	152	161	148	150	144	161	158	137	140	115	76	2	1817
Thursday	10/24/2019	72	110	124	141	157	178	161	164	171	147	166	147	122	92	1	1953
Friday	10/25/2019	120	94	159	176	176	229	195	238	178	189	228	161	130	127	7	2407
Saturday	10/26/2019	141	160	197	209	240	203	221	193	211	199	144	138	96	129	2	2483
Sunday	10/27/2019	136	100	149	181	189	201	157	156	144	117	122	89	97	67	1	1906
Monday	10/28/2019	71	70	116	140	157	138	148	170	130	139	142	114	100	80	0	1715
Tuesday	10/29/2019	72	86	102	132	123	118	132	118	109	99	117	117	71	76	1	1473
Wednesday	10/30/2019	61	105	155	143	145	141	136	120	142	127	137	120	116	66	2	1716
Thursday	10/31/2019	76	84	133	131	160	146	136	146	133	132	122	100	90	83	1	1673
Friday	11/1/2019	136	130	187	176	188	253	203	253	198	192	192	187	161	149	3	2608
Saturday	11/2/2019	112	107	169	180	155	183	209	239	256	209	155	160	134	116	5	2389
Sunday	11/3/2019	188	167	164	160	185	189	188	201	180	138	146	120	71	63	2	2162
Monday	11/4/2019	63	78	124	122	160	131	144	127	130	105	108	95	88	59	0	1534
Tuesday	11/5/2019	45	79	87	129	126	146	131	135	120	120	100	95	96	56	5	1470
Wednesday	11/6/2019	77	88	120	152	138	122	125	140	110	146	132	109	61	68	1	1589
Thursday	11/7/2019	45	81	99	122	136	116	124	127	138	97	104	119	73	73	3	1457
Friday	11/8/2019	109	130	152	155	171	206	201	231	194	201	227	168	124	135	4	2408
Saturday	11/9/2019	191	163	155	229	234	259	267	307	239	198	186	140	129	91	6	2794
Sunday	11/10/2019	121	127	174	184	255	212	186	180	178	147	139	92	95	76	1	2167
Monday	11/11/2019	64	112	114	0	0	0	0	0	0	0	0	0	0	0	0	290
57152																	
Monday Average		69	89	127	140	161	149	161	161	138	136	126	109	102	79	2	1746
Tuesday Average		69	83	101	129	141	124	124	131	113	119	116	106	90	72	2	1520
Wednesday Average		70	94	126	138	155	145	136	134	133	130	128	113	91	67	2	1660
Thursday Average		65	90	112	134	155	147	143	151	146	131	128	126	97	77	2	1702
Friday Average		121	117	160	171	183	221	207	234	194	201	213	176	147	134	4	2482
Saturday Average		151	140	169	190	199	203	225	238	226	195	157	145	122	109	4	2473
Sunday Average		130	124	159	178	195	197	187	193	173	143	140	112	96	79	1	2106
Weekday Average		78	95	125	142	159	157	154	162	145	143	142	126	105	86	2	1822
Typ. Wkdy Average		68	89	113	134	150	139	134	139	131	126	124	115	93	72	2	1627

Northampton - Peak Transactions																	
Weekday Peak	136	130	187	176	188	253	203	253	198	192	192	187	161	149	3	2608	
Saturday Peak	191	163	155	229	234	259	267	307	239	198	186	140	129	91	6	2794	

Franklin - Projected Transactions																	
Weekday Peak	103	99	142	134	143	192	154	192	150	146	146	142	122	113	2	1982	
Saturday Peak	145	124	118	174	178	197	203	233	182	150	141	106	98	69	5	2123	

Registers

Northampton	25
Franklin (Proposed)	19

**Trip Generation based on NETA Data
Proposed Marijuana Dispensary
Franklin, Massachusetts**

Peak Hour	Transactions	Customer Trips			Customer Vehicle Trips ¹			Employee Vehicle Trips			Total Vehicle Trips		
		Entering	Exiting	Total	Entering	Exiting	Total	Entering	Exiting	Total	Entering	Exiting	Total
AM	103	103	103	206	86	86	172	15	0	15	101	86	187
PM	192	192	192	384	160	160	320	0	15	15	160	175	335
Saturday	233	233	233	466	194	194	388	0	15	15	194	209	403

¹ Assumes customer trips/Vehicle Occupancy Rate

1.20 Vehicle Occupancy Rate

Appendix D

Mode Share

Workers Age 16+ by Mode of Transportation to Work
by Massachusetts Town of Employment in 2000

Source: 2000 Census Transportation Planning Package (CTPP)

CTPS
Central Transportation Planning Staff
Boston Metropolitan Planning Organization
10 Park Plaza, Suite 2150
Boston, MA 02116

Town#	Town	Total	Drove Alone	Carpooled	Public Transportation	Walked	Other Mode	Worked at Home	Percent Public Transportation
101	Franklin	16,752	14,180	1,429	148	265	85	645	0.9%
	State Total	3,178,368	2,352,744	288,244	274,485	135,045	30,355	97,495	8.6%

Appendix E
Traffic Projection Model

**Traffic Projection Model
Proposed Marijuana Dispensary
Franklin, Massachusetts**

AM Peak Hour

INTID	NAME	MOVEMENT	VOLUME	2020 Raw	Seasonal	2020 Existing	Entering	Exiting	Project In	Project Out	Entering	Exiting	Total Project Trips	2020 Build
	16 Grove Street & Business Park				1.00				101	86				
		NBL	12	10		10					0	0	0	10
		NBT	607	539		539		65%			0	56	56	595
		NBR	0	0		0					0	0	0	0
		SBL	0	0		0					0	0	0	0
		SBT	160	142		142	65%				66	0	66	208
		SBR	19	17		17					0	0	0	17
		EBL	5	5		5					0	0	0	5
		EBT	0	0		0					0	0	0	0
		EBR	1	1		1					0	0	0	1
		WBL	0	0		0					0	0	0	0
		WBT	0	0		0					0	0	0	0
		WBR	0	0		0					0	0	0	0
	21 Grove Street & Site Drive													0
		NBT	618	549		549					0	0	0	549
		NBR	0	0		0	35%				35	0	35	35
		SBL	0	0		0	65%				66	0	66	66
		SBT	161	143		143					0	0	0	143
		WBL	0	0		0		35%			0	30	30	30
		WBR	0	0		0		65%			0	56	56	56

**Traffic Projection Model
Proposed Marijuana Dispensary
Franklin, Massachusetts**

PM Peak Hour

INTID	NAME	MOVEMENT	VOLUME	2020 Raw	Seasonal	2020 Existing	Entering	Exiting	Project In	Project Out	Entering	Exiting	Total Project Trips	2020 Build
	16 Grove Street & Business Park				1.00				160	175				
		NBL	2	2		2					0	0	0	2
		NBT	291	277		277		65%			0	114	114	391
		NBR	0	0		0					0	0	0	0
		SBL	0	0		0					0	0	0	0
		SBT	530	505		505	65%				104	0	104	609
		SBR	3	3		3					0	0	0	3
		EBL	9	9		9					0	0	0	9
		EBT	0	0		0					0	0	0	0
		EBR	8	8		8					0	0	0	8
		WBL	0	0		0					0	0	0	0
		WBT	0	0		0					0	0	0	0
		WBR	0	0		0					0	0	0	0
	21 Grove Street & Site Drive													
		NBT	293	279		279					0	0	0	279
		NBR	0	0		0	35%				56	0	56	56
		SBL	0	0		0	65%				104	0	104	104
		SBT	539	513		513					0	0	0	513
		WBL	0	0		0		35%			0	61	61	61
		WBR	0	0		0		65%			0	114	114	114

**Traffic Projection Model
Proposed Marijuana Dispensary
Franklin, Massachusetts**

Saturday Peak Hour

INTID	NAME	MOVEMENT	VOLUME	2020 Raw	Seasonal	2020 Existing	Entering	Exiting	Project In	Project Out	Entering	Exiting	Total Project Trips	2020 Build
	16 Grove Street & Business Park				1.00				194	209				
		NBL	2	2		2					0	0	0	2
		NBT	167	167		167		65%			0	136	136	303
		NBR	0	0		0					0	0	0	0
		SBL	0	0		0					0	0	0	0
		SBT	248	248		248	65%				126	0	126	374
		SBR	3	3		3					0	0	0	3
		EBL	0	0		0					0	0	0	0
		EBT	0	0		0					0	0	0	0
		EBR	0	0		0					0	0	0	0
		WBL	0	0		0					0	0	0	0
		WBT	0	0		0					0	0	0	0
		WBR	0	0		0					0	0	0	0
	21 Grove Street & Site Drive													
		NBT	169	169		169					0	0	0	169
		NBR	0	0		0	35%				68	0	68	68
		SBL	0	0		0	65%				126	0	126	126
		SBT	248	248		248					0	0	0	248
		WBL	0	0		0		35%			0	73	73	73
		WBR	0	0		0		65%			0	136	136	136

Appendix F
Capacity Analysis Worksheets

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	5	0	1	0	0	0	10	539	0	0	142	17
Future Vol, veh/h	5	0	1	0	0	0	10	539	0	0	142	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-4	-	-	4	-	-	2	-	-	-3	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	40	0	0	0	0	0	10	3	0	0	6	0
Mvmt Flow	5	0	1	0	0	0	11	573	0	0	151	18

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	755	755	160	756	764	573	169	0	0	573	0	0
Stage 1	160	160	-	595	595	-	-	-	-	-	-	-
Stage 2	595	595	-	161	169	-	-	-	-	-	-	-
Critical Hdwy	6.7	5.7	5.8	7.9	7.3	6.6	4.2	-	-	4.1	-	-
Critical Hdwy Stg 1	5.7	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.7	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.86	4	3.3	3.5	4	3.3	2.29	-	-	2.2	-	-
Pot Cap-1 Maneuver	334	402	906	276	284	490	1361	-	-	1010	-	-
Stage 1	788	797	-	433	434	-	-	-	-	-	-	-
Stage 2	492	566	-	816	734	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	332	399	906	274	282	490	1361	-	-	1010	-	-
Mov Cap-2 Maneuver	332	399	-	274	282	-	-	-	-	-	-	-
Stage 1	782	797	-	430	430	-	-	-	-	-	-	-
Stage 2	488	561	-	815	734	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB			
HCM Control Delay, s	14.9		0		0.1		0			
HCM LOS	B		A							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1361	-	-	371	-	1010	-	-
HCM Lane V/C Ratio	0.008	-	-	0.017	-	-	-	-
HCM Control Delay (s)	7.7	-	-	14.9	0	0	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	0	-	-

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		TT			TT
Traffic Vol, veh/h	0	0	549	0	0	143
Future Vol, veh/h	0	0	549	0	0	143
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	0	-	-	-4
Peak Hour Factor	92	92	94	92	92	94
Heavy Vehicles, %	2	2	3	2	2	6
Mvmt Flow	0	0	584	0	0	152

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	736	584	0	0	584	0
Stage 1	584	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	7.62	6.82	-	-	4.12	-
Critical Hdwy Stg 1	6.62	-	-	-	-	-
Critical Hdwy Stg 2	6.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	302	464	-	-	991	-
Stage 1	459	-	-	-	-	-
Stage 2	833	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	302	464	-	-	991	-
Mov Cap-2 Maneuver	302	-	-	-	-	-
Stage 1	459	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	991
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	9	0	8	0	0	0	2	277	0	0	505	3
Future Vol, veh/h	9	0	8	0	0	0	2	277	0	0	505	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-4	-	-	4	-	-	2	-	-	-3	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	50	1	0	0	2	33
Mvmt Flow	9	0	8	0	0	0	2	292	0	0	532	3

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	829	829	533	833	831	292	535	0	0	292	0	0
Stage 1	533	533	-	296	296	-	-	-	-	-	-	-
Stage 2	296	296	-	537	535	-	-	-	-	-	-	-
Critical Hdwy	6.3	5.7	5.8	7.9	7.3	6.6	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	351	371	584	241	256	728	830	-	-	1281	-	-
Stage 1	601	595	-	671	629	-	-	-	-	-	-	-
Stage 2	766	718	-	472	468	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	350	370	584	237	255	728	830	-	-	1281	-	-
Mov Cap-2 Maneuver	350	370	-	237	255	-	-	-	-	-	-	-
Stage 1	600	595	-	669	627	-	-	-	-	-	-	-
Stage 2	764	716	-	465	468	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.7	0	0.1	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	830	-	-	431	-	1281	-	-
HCM Lane V/C Ratio	0.003	-	-	0.042	-	-	-	-
HCM Control Delay (s)	9.3	-	-	13.7	0	0	-	-
HCM Lane LOS	A	-	-	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	0	-	-

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		TT			TT
Traffic Vol, veh/h	0	0	279	0	0	513
Future Vol, veh/h	0	0	279	0	0	513
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	0	-	-	-4
Peak Hour Factor	92	92	95	92	92	95
Heavy Vehicles, %	2	2	1	2	2	2
Mvmt Flow	0	0	294	0	0	540

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	834	294	0	0	294
Stage 1	294	-	-	-	-
Stage 2	540	-	-	-	-
Critical Hdwy	7.62	6.82	-	-	4.12
Critical Hdwy Stg 1	6.62	-	-	-	-
Critical Hdwy Stg 2	6.62	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	256	710	-	-	1268
Stage 1	686	-	-	-	-
Stage 2	488	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	256	710	-	-	1268
Mov Cap-2 Maneuver	256	-	-	-	-
Stage 1	686	-	-	-	-
Stage 2	488	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	1268	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0	0

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	0	2	167	0	0	248	3
Future Vol, veh/h	0	0	0	0	0	0	2	167	0	0	248	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-4	-	-	4	-	-	2	-	-	-3	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0	50	1	0	0	0	67
Mvmt Flow	0	0	0	0	0	0	2	184	0	0	273	3

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	462	462	274	462	464	184	276	0	0	184	0	0
Stage 1	274	274	-	188	188	-	-	-	-	-	-	-
Stage 2	188	188	-	274	276	-	-	-	-	-	-	-
Critical Hdwy	6.3	5.7	5.8	7.9	7.3	6.6	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	569	554	793	463	450	846	1055	-	-	1403	-	-
Stage 1	783	730	-	785	718	-	-	-	-	-	-	-
Stage 2	853	780	-	693	645	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	568	553	793	462	449	846	1055	-	-	1403	-	-
Mov Cap-2 Maneuver	568	553	-	462	449	-	-	-	-	-	-	-
Stage 1	782	730	-	784	717	-	-	-	-	-	-	-
Stage 2	851	779	-	693	645	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		0		0.1		0	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1055	-	-	-	-	1403	-	-
HCM Lane V/C Ratio	0.002	-	-	-	-	-	-	-
HCM Control Delay (s)	8.4	-	-	0	0	0	-	-
HCM Lane LOS	A	-	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	0	-	-

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		TT			TT
Traffic Vol, veh/h	0	0	169	0	0	248
Future Vol, veh/h	0	0	169	0	0	248
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	0	-	-	-4
Peak Hour Factor	92	92	91	92	92	91
Heavy Vehicles, %	2	2	1	2	2	0
Mvmt Flow	0	0	186	0	0	273

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	459	186	0	0	186
Stage 1	186	-	-	-	-
Stage 2	273	-	-	-	-
Critical Hdwy	7.62	6.82	-	-	4.12
Critical Hdwy Stg 1	6.62	-	-	-	-
Critical Hdwy Stg 2	6.62	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	481	830	-	-	1388
Stage 1	795	-	-	-	-
Stage 2	706	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	481	830	-	-	1388
Mov Cap-2 Maneuver	481	-	-	-	-
Stage 1	795	-	-	-	-
Stage 2	706	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1388
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	0
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	5	0	1	0	0	0	10	595	0	0	208	17
Future Vol, veh/h	5	0	1	0	0	0	10	595	0	0	208	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-4	-	-	4	-	-	2	-	-	-3	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	40	0	0	0	0	0	10	3	0	0	6	0
Mvmt Flow	5	0	1	0	0	0	11	633	0	0	221	18

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	884	884	230	885	893	633	239	0	0	633	0	0
Stage 1	230	230	-	654	654	-	-	-	-	-	-	-
Stage 2	654	654	-	231	239	-	-	-	-	-	-	-
Critical Hdwy	6.7	5.7	5.8	7.9	7.3	6.6	4.2	-	-	4.1	-	-
Critical Hdwy Stg 1	5.7	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.7	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.86	4	3.3	3.5	4	3.3	2.29	-	-	2.2	-	-
Pot Cap-1 Maneuver	279	349	835	220	232	451	1282	-	-	960	-	-
Stage 1	731	755	-	397	403	-	-	-	-	-	-	-
Stage 2	461	539	-	738	675	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	277	346	835	218	230	451	1282	-	-	960	-	-
Mov Cap-2 Maneuver	277	346	-	218	230	-	-	-	-	-	-	-
Stage 1	725	755	-	394	400	-	-	-	-	-	-	-
Stage 2	457	534	-	737	675	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.8	0	0.1	0
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1282	-	-	312	-	960	-
HCM Lane V/C Ratio	0.008	-	-	0.02	-	-	-
HCM Control Delay (s)	7.8	-	-	16.8	0	0	-
HCM Lane LOS	A	-	-	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	0	-

Intersection						
Int Delay, s/veh	2.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		TT			TT
Traffic Vol, veh/h	30	56	549	35	66	143
Future Vol, veh/h	30	56	549	35	66	143
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	0	-	-	-4
Peak Hour Factor	92	92	94	92	92	94
Heavy Vehicles, %	2	2	3	2	2	6
Mvmt Flow	33	61	584	38	72	152

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	899	603	0	0	622
Stage 1	603	-	-	-	-
Stage 2	296	-	-	-	-
Critical Hdwy	7.62	6.82	-	-	4.12
Critical Hdwy Stg 1	6.62	-	-	-	-
Critical Hdwy Stg 2	6.62	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	229	451	-	-	959
Stage 1	447	-	-	-	-
Stage 2	684	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	210	451	-	-	959
Mov Cap-2 Maneuver	210	-	-	-	-
Stage 1	447	-	-	-	-
Stage 2	628	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.7	0	2.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	322	959
HCM Lane V/C Ratio	-	-	0.29	0.075
HCM Control Delay (s)	-	-	20.7	9.1
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.2	0.2

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	9	0	8	0	0	0	2	391	0	0	609	3
Future Vol, veh/h	9	0	8	0	0	0	2	391	0	0	609	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-4	-	-	4	-	-	2	-	-	-3	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	50	1	0	0	2	33
Mvmt Flow	9	0	8	0	0	0	2	412	0	0	641	3

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1059	1059	643	1063	1060	412	644	0	0	412	0	0
Stage 1	643	643	-	416	416	-	-	-	-	-	-	-
Stage 2	416	416	-	647	644	-	-	-	-	-	-	-
Critical Hdwy	6.3	5.7	5.8	7.9	7.3	6.6	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	258	286	512	160	179	615	749	-	-	1158	-	-
Stage 1	537	544	-	563	543	-	-	-	-	-	-	-
Stage 2	678	653	-	401	408	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	257	285	512	157	179	615	749	-	-	1158	-	-
Mov Cap-2 Maneuver	257	285	-	157	179	-	-	-	-	-	-	-
Stage 1	536	544	-	561	542	-	-	-	-	-	-	-
Stage 2	676	651	-	394	408	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.3	0	0	0
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	749	-	-	336	-	1158	-	-
HCM Lane V/C Ratio	0.003	-	-	0.053	-	-	-	-
HCM Control Delay (s)	9.8	-	-	16.3	0	0	-	-
HCM Lane LOS	A	-	-	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	-	0	-	-

Intersection						
Int Delay, s/veh	6.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		TT			TT
Traffic Vol, veh/h	61	114	279	56	104	513
Future Vol, veh/h	61	114	279	56	104	513
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	0	-	-	-4
Peak Hour Factor	92	92	95	92	92	95
Heavy Vehicles, %	2	2	1	2	2	2
Mvmt Flow	66	124	294	61	113	540

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1090	324	0	0	355	0
Stage 1	324	-	-	-	-	-
Stage 2	766	-	-	-	-	-
Critical Hdwy	7.62	6.82	-	-	4.12	-
Critical Hdwy Stg 1	6.62	-	-	-	-	-
Critical Hdwy Stg 2	6.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	166	679	-	-	1204	-
Stage 1	658	-	-	-	-	-
Stage 2	355	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	144	679	-	-	1204	-
Mov Cap-2 Maneuver	144	-	-	-	-	-
Stage 1	658	-	-	-	-	-
Stage 2	307	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	36.7	0	1.4
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	296	1204
HCM Lane V/C Ratio	-	-	0.643	0.094
HCM Control Delay (s)	-	-	36.7	8.3
HCM Lane LOS	-	-	E	A
HCM 95th %tile Q(veh)	-	-	4.1	0.3

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	0	2	303	0	0	374	3
Future Vol, veh/h	0	0	0	0	0	0	2	303	0	0	374	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-4	-	-	4	-	-	2	-	-	-3	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0	50	1	0	0	0	67
Mvmt Flow	0	0	0	0	0	0	2	333	0	0	411	3

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	750	750	413	750	751	333	414	0	0	333	0	0
Stage 1	413	413	-	337	337	-	-	-	-	-	-	-
Stage 2	337	337	-	413	414	-	-	-	-	-	-	-
Critical Hdwy	6.3	5.7	5.8	7.9	7.3	6.6	4.6	-	-	4.1	-	-
Critical Hdwy Stg 1	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.3	4.7	-	6.9	6.3	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.65	-	-	2.2	-	-
Pot Cap-1 Maneuver	390	405	674	279	289	687	929	-	-	1238	-	-
Stage 1	680	655	-	632	598	-	-	-	-	-	-	-
Stage 2	734	695	-	566	544	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	389	404	674	279	288	687	929	-	-	1238	-	-
Mov Cap-2 Maneuver	389	404	-	279	288	-	-	-	-	-	-	-
Stage 1	679	655	-	631	597	-	-	-	-	-	-	-
Stage 2	732	694	-	566	544	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		0		0.1		0	
HCM LOS	A		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	929	-	-	-	-	1238	-	-
HCM Lane V/C Ratio	0.002	-	-	-	-	-	-	-
HCM Control Delay (s)	8.9	-	-	0	0	0	-	-
HCM Lane LOS	A	-	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	0	-	-

Intersection						
Int Delay, s/veh	6.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		B			A
Traffic Vol, veh/h	73	136	169	68	126	248
Future Vol, veh/h	73	136	169	68	126	248
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	0	-	-	-4
Peak Hour Factor	92	92	91	92	92	91
Heavy Vehicles, %	2	2	1	2	2	0
Mvmt Flow	79	148	186	74	137	273

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	769	223	0	0	260
Stage 1	223	-	-	-	-
Stage 2	546	-	-	-	-
Critical Hdwy	7.62	6.82	-	-	4.12
Critical Hdwy Stg 1	6.62	-	-	-	-
Critical Hdwy Stg 2	6.62	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	286	787	-	-	1304
Stage 1	756	-	-	-	-
Stage 2	484	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	251	787	-	-	1304
Mov Cap-2 Maneuver	251	-	-	-	-
Stage 1	756	-	-	-	-
Stage 2	424	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.8	0	2.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	451	1304
HCM Lane V/C Ratio	-	-	0.504	0.105
HCM Control Delay (s)	-	-	20.8	8.1
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	2.8	0.4

Appendix G

Parking Calculations

NETA Transactions
Northampton, Massachusetts

		8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Grand Total
Sunday	10/13/2019	109	75	131	187	172	189	229	202	203	162	143	135	124	104	0	2165
Monday	10/14/2019	77	112	139	148	150	163	206	213	153	175	134	119	101	93	2	1985
Tuesday	10/15/2019	82	79	127	138	159	123	131	144	114	136	132	108	104	74	2	1653
Wednesday	10/16/2019	70	88	121	105	177	169	131	133	120	88	105	83	71	57	1	1519
Thursday	10/17/2019	67	84	92	142	165	148	150	167	143	146	120	138	101	60	1	1724
Friday	10/18/2019	117	115	143	177	195	195	229	212	207	222	205	188	174	126	0	2505
Saturday	10/19/2019	161	129	156	142	166	165	204	214	196	175	144	143	128	100	3	2226
Sunday	10/20/2019	94	153	179	176	172	196	174	228	161	150	148	122	95	83	0	2131
Monday	10/21/2019	63	94	128	149	176	163	146	135	138	123	120	107	117	85	4	1748
Tuesday	10/22/2019	76	89	88	116	155	108	103	128	108	120	115	105	90	83	1	1485
Wednesday	10/23/2019	70	96	107	152	161	148	150	144	161	158	137	140	115	76	2	1817
Thursday	10/24/2019	72	110	124	141	157	178	161	164	171	147	166	147	122	92	1	1953
Friday	10/25/2019	120	94	159	176	176	229	195	238	178	189	228	161	130	127	7	2407
Saturday	10/26/2019	141	160	197	209	240	203	221	193	211	199	144	138	96	129	2	2483
Sunday	10/27/2019	136	100	149	181	189	201	157	156	144	117	122	89	97	67	1	1906
Monday	10/28/2019	71	70	116	140	157	138	148	170	130	139	142	114	100	80	0	1715
Tuesday	10/29/2019	72	86	102	132	123	118	132	118	109	99	117	117	71	76	1	1473
Wednesday	10/30/2019	61	105	155	143	145	141	136	120	142	127	137	120	116	66	2	1716
Thursday	10/31/2019	76	84	133	131	160	146	136	146	133	132	122	100	90	83	1	1673
Friday	11/1/2019	136	130	187	176	188	253	203	253	198	192	192	187	161	149	3	2608
Saturday	11/2/2019	112	107	169	180	155	183	209	239	256	209	155	160	134	116	5	2389
Sunday	11/3/2019	188	167	164	160	185	189	188	201	180	138	146	120	71	63	2	2162
Monday	11/4/2019	63	78	124	122	160	131	144	127	130	105	108	95	88	59	0	1534
Tuesday	11/5/2019	45	79	87	129	126	146	131	135	120	120	100	95	96	56	5	1470
Wednesday	11/6/2019	77	88	120	152	138	122	125	140	110	146	132	109	61	68	1	1589
Thursday	11/7/2019	45	81	99	122	136	116	124	127	138	97	104	119	73	73	3	1457
Friday	11/8/2019	109	130	152	155	171	206	201	231	194	201	227	168	124	135	4	2408
Saturday	11/9/2019	191	163	155	229	234	259	267	307	239	198	186	140	129	91	6	2794
Sunday	11/10/2019	121	127	174	184	255	212	186	180	178	147	139	92	95	76	1	2167
Monday	11/11/2019	64	112	114	0	0	0	0	0	0	0	0	0	0	0	0	290
57152																	
Monday Average		69	89	127	140	161	149	161	161	138	136	126	109	102	79	2	1746
Tuesday Average		69	83	101	129	141	124	124	131	113	119	116	106	90	72	2	1520
Wednesday Average		70	94	126	138	155	145	136	134	133	130	128	113	91	67	2	1660
Thursday Average		65	90	112	134	155	147	143	151	146	131	128	126	97	77	2	1702
Friday Average		121	117	160	171	183	221	207	234	194	201	213	176	147	134	4	2482
Saturday Average		151	140	169	190	199	203	225	238	226	195	157	145	122	109	4	2473
Sunday Average		130	124	159	178	195	197	187	193	173	143	140	112	96	79	1	2106
Weekday Average		78	95	125	142	159	157	154	162	145	143	142	126	105	86	2	1822
Typ. Wkdy Average		68	89	113	134	150	139	134	139	131	126	124	115	93	72	2	1627

Northampton - Peak Transactions																	
Weekday Peak	136	130	187	176	188	253	203	253	198	192	192	187	161	149	3	2608	
Saturday Peak	191	163	155	229	234	259	267	307	239	198	186	140	129	91	6	2794	

Franklin - Projected Transactions																	
Weekday Peak	103	99	142	134	143	192	154	192	150	146	146	142	122	113	2	1982	
Saturday Peak	145	124	118	174	178	197	203	233	182	150	141	106	98	69	5	2123	

Registers
Northampton 25
Franklin (Proposed) 19

**NETA Franklin
Customer Projections**

Franklin - Projected Transactions¹

		8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	Daily Total
Weekday	Peak	103	99	142	134	143	192	154	192	150	146	146	142	122	113	2	1982
Saturday	Peak	145	124	118	174	178	197	203	233	182	150	141	106	98	69	5	2123

Franklin - Parking Spaces Needed²

		8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	Daily Max
Weekday	Peak	35	33	48	45	48	64	52	64	50	49	49	48	41	38	1	64
Saturday	Peak	49	42	40	58	60	66	68	78	61	50	47	36	33	23	2	78

	Duration (minutes)		Turnover (per hour)
	Avg (Noho)	Assumed	
Weekday	13:24	20	3
Saturday	14:49	20	3

Notes:

1. Projected transactions based on transactions from Northampton facility, factored down to represent 19 registers.
2. Parking spaces needed assume durations shown above for weekday and Saturday (higher than observed in Northampton due to novelty factor).

NETA Franklin
Projected Weekday Hourly Parking Demand

	Time of Day																
	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM
Warehouse	3	3	3	6	6	6	6	6	6	6	6	3	3	3	0	0	0
Retail	0	15	15	25	40	40	50	50	50	50	50	50	35	35	25	10	10
Total	3	18	18	31	46	46	56	56	56	56	56	53	38	38	25	10	10
Employees-Warehouse	3	3	3	6	6	6	6	6	6	6	6	3	3	3	0	0	0
Employees-Retail	0	15	15	25	40	40	50	50	50	50	50	50	35	35	25	10	10
Customers	0	0	35	33	48	45	48	64	52	64	50	49	49	48	41	38	1
Total Parking Demand	3	18	53	64	94	91	104	120	108	120	106	102	87	86	66	48	11
Existing Parking Supply	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Proposed Parking Supply	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141
Surplus Parking	138	123	88	77	47	50	37	21	33	21	35	39	54	55	75	93	130

NETA Franklin - Projected Weekday Staffing Levels					
	6-4:30	7-5:30	8:30-7:00	10:00-8:30	12:00-10:30
Warehouse	3	0	3	0	0
Retail/Office	0	15	10	15	10
Total	3	15	13	15	10

NETA Franklin
Projected Saturday Hourly Parking Demand

	Time of Day																
	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM
Warehouse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retail	0	15	15	25	40	40	50	50	50	50	50	50	35	35	25	10	10
Total	0	15	15	25	40	40	50	50	50	50	50	50	35	35	25	10	10
Employees-Warehouse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Employees-Retail	0	15	15	25	40	40	50	50	50	50	50	50	35	35	25	10	10
Customers	0	0	49	42	40	58	60	66	68	78	61	50	47	36	33	23	2
Total Parking Demand	0	15	64	67	80	98	110	116	118	128	111	100	82	71	58	33	12
Existing Parking Supply	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Proposed Parking Supply	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141
Surplus Parking	141	126	77	74	61	43	31	25	23	13	30	41	59	70	83	108	129

NETA Franklin - Projected Weekday Staffing Levels					
	6-4:30	7-5:30	8:30-7:00	10:00-8:30	12:00-10:30
Warehouse	0	0	0	0	0
Retail/Office	0	15	10	15	10
Total	0	15	10	15	10



June 25, 2020

Mr. Anthony Padula, Chairman
355 East Central Street
Franklin, MA 02038

Re: 162 Grove Street
Traffic Peer Review

Dear Mr. Padula:

BETA Group, Inc. (BETA) is pleased to provide traffic engineering peer review services for the traffic related items for proposed Site Plan Approval application, "Site Layout Plan – 162 Grove Street, Franklin, Massachusetts." This letter is provided to outline findings, comments, and recommendations.

BASIS OF REVIEW

The following documents were received by BETA and formed the basis of the review:

- Traffic Summary, dated May 22, 2020 and prepared by Tetra Tech of Marlborough, MA.
- Site Plan set (10 Sheets) entitled Site Plan 162 Grove Street dated May 21, 2020 and prepared by United Consultants, Inc. of Wrentham, MA.

INTRODUCTION

The project site consists of 162 Grove Street, a vacant, developed parcel formerly used as a truck terminal (the "Site"). The parcel contains an area of 4.003 Acres and is located along the eastern side of Grove Street. The Site and all surrounding properties are located within the Industrial Zoning District. The parcel is also within the Marijuana Use Overlay District.

The existing Site includes a house and a warehouse. The applicant proposes to retain the existing building for conversion into a Medical Marijuana Treatment Center and Non-Medical Marijuana Retail Establishment. Associated site developments will include expansion of the existing parking area, and a 2,583 sq. ft. new addition to the existing building.

FINDINGS, COMMENTS AND RECOMMENDATIONS

Access to the site will be provided via the existing driveway.

The study area includes the following intersections.

- Grove Street at 162 Grove Street driveway (unsignalized)
- Grove Street at Business Park (unsignalized)

The study area was found to be inadequate due to the number of vehicles trips generated by this project.

- T1. Additional intersections, including the intersections of Grove Street at Washington Street and Grove Street and Route 140, should be added to the study area

Manual turning movement counts (TMCs) were collected on Thursday, February 6th, 2020 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM, and Saturday, February 8th, 2020 from 3:00 PM to 6:00 PM. These time periods were chosen because they are representative of the peak traffic volume period for the development. Traffic volume data were also collected via automatic traffic recorder (ATR) on Grove Street, south of 162 Grove Street, over a 72-hour period between Thursday, February 6th, 2020 and Saturday, February 8th, 2020. These volumes are consistent with data recently collected as part of another project. and the collection occurred prior to the decrease in traffic patterns related to COVID-19. BETA concurs with the traffic data collection time periods.

Historical traffic count data collected by MassDOT were reviewed to determine the need for a seasonal adjustment. Traffic volumes in February were found to be average-month conditions. As a result, no seasonal adjustment was added to the existing volumes. BETA finds this methodology acceptable.

Vehicle speeds were measured via ATR along Grove Street. The posted speed limit on Grove Street is 40 miles per hour (mph). The 85th percentile speeds were measured at 40 mph northbound and 41 mph southbound, which are acceptable for a posted 40 mph roadway.

Project-generated traffic volumes were determined by utilizing trip-generation statistics published by the Institute of Transportation Engineers (ITE) for land use code (LUC) 150 - Warehouse, LUC 882 – Marijuana Dispensary, and LUC 710 General Office Building.

Based on the Institute of Transportation Engineers (ITE) for land use code (LUC) 150 - Warehouse, LUC 882 – Marijuana Dispensary, and LUC 710 General Office Building the project site would generate a total of 1,032 new trips on an average weekday and with 46 (27 entering, 19 exiting) during the weekday morning peak hour and 90 (43 entering, 47 exiting) during the weekday afternoon peak hour. The Saturday daily trips of 1,011 and mid-day peak trips are 142 (71 entering, 71 exiting).

Additionally, empirical trip data collected at a similar NETA facility in Northampton from October 13, 2019 to November 11, 2019 was provided. The Northampton facility consists of 25 registers while the proposed facility would have 19 registers.

The trips from both resources were compared, and it was determined that the empirical data was higher than the ITE data, and therefore, the empirical data was utilized for the marijuana dispensary trip generation and factored down to represent 19 registers. A maximum number of 56 employees between the retail and warehouse will be onsite during the weekday afternoon peak, and 50 during the Saturday peak, which was not included as part of the NETA empirical data. A portion of those employees will be entering and exiting during the peak periods.

The 4,647 square feet of office does not appear to be included in the trip generation calculations.

- T2. Verify that office space is included within the NETA Northampton facility and the associated square footage.

Next, based on customer surveys conducted at the NETA facility in Brookline, it was determined that the vehicle occupancy rate (VOR) for that facility was 1.25 persons per vehicle. To provide a more conservative estimate a VOR of 1.20 persons per vehicle was used for the project site. BETA finds this methodology reasonable.

Based on the described methodology, the project site would generate a total of 3,416 new trips on an average weekday and with 187 (101 entering, 86 exiting) during the weekday morning peak hour and 335 (160 entering, 175 exiting) during the weekday afternoon peak hour. The Saturday daily trips of 3,638 and mid-day peak trips are 403 (194 entering, 209 exiting).

New trips were distributed based on existing traffic patterns with approximately 35 percent of traffic heading to and from Washington Street and the remaining 65 percent heading to and from Route 140.

T3. The travel splits shown in Table 1 significantly differ those used in the study., especially for Saturday. Verify the distribution splits applied to the new trips.

Traffic operations analysis was performed with Synchro software based on the 2010 Highway Capacity Manual methodologies. Most movements during the 2020 Build condition would continue to operate at LOS C or better. The site driveway left-turn movement would operate at LOS E. Based on this study, the project appears to have minimal impacts to Level of Service (LOS) when compared to the Existing conditions, however, the study area only consists of the unsignalized intersections of Grove Street at the site driveway and Grove Street at Business Park intersections and does not include a seven-year horizon analysis.

T4. The Board has expressed concern about the number of developments contributing to existing traffic and safety issues along Grove Street. The following standard traffic study components were not included as part of the submission and should be included to understand the full impacts of this project to the surrounding infrastructure:

- Sight distance analysis. Based on field observations, there is limited sight distance approaching the site from the south.
- Background development-related traffic growth that may increase traffic within the study area was not identified.
- Growth rate was not included because the Build analysis was performed using the year 2020 and not a seven-year horizon. A 1 percent growth has been applied for other recently proposed developments in Franklin.
- No-Build analysis.
- Crash data for the most recent three years.

The parking demand was determined by providing up to 56 employee parking spaces during the weekday and 50 spaces during the Saturday highest peak hours and assuming a turnover rate of three vehicles per hour (every 20 minutes). The highest peak is anticipated on Saturday from 3:00 PM – 4:00 PM. The study indicated that the parking anticipated for the peak is anticipated to be 50 employee spaces and 78 additional spaces, for a total of 128 parking spaces needed during the highest peak hour. Based on BETA's experience, and as would be expected, patrons are processed at a faster rate with the larger number of registers at a facility, and therefore the turnover rate would be higher. However, the anticipated 128 parking space demand during the highest peak periods would be very close to the proposed parking supply of 141 spaces.

T5. If available, empirical data of 15-minute interval parking demands for a similar facility, not near public transit and with an on-site parking lot, should be provided to further support the proposed parking supply.

Mr. Anthony Padula, Chairman

June 25, 2020

Page 4 of 4

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Jaklyn Centracchio

Jaklyn Centracchio, PE, PTOE
Senior Project Engineer

cc: Amy Love, Planner
Job No: 4830-64



Spruhan Engineering, P.C.

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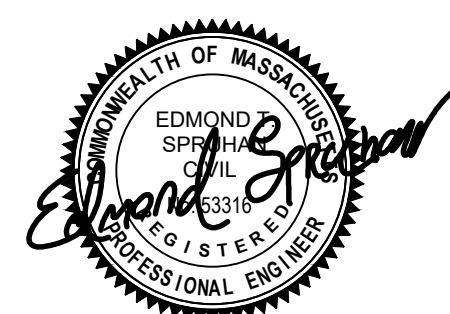
122 CHESTNUT STREET
FRANKLIN
MASSACHUSETTS

CIVIL PLAN

REVISION BLOCK

Table with 2 columns: DESCRIPTION, DATE. Contains revision entries for town comments and beta comments.

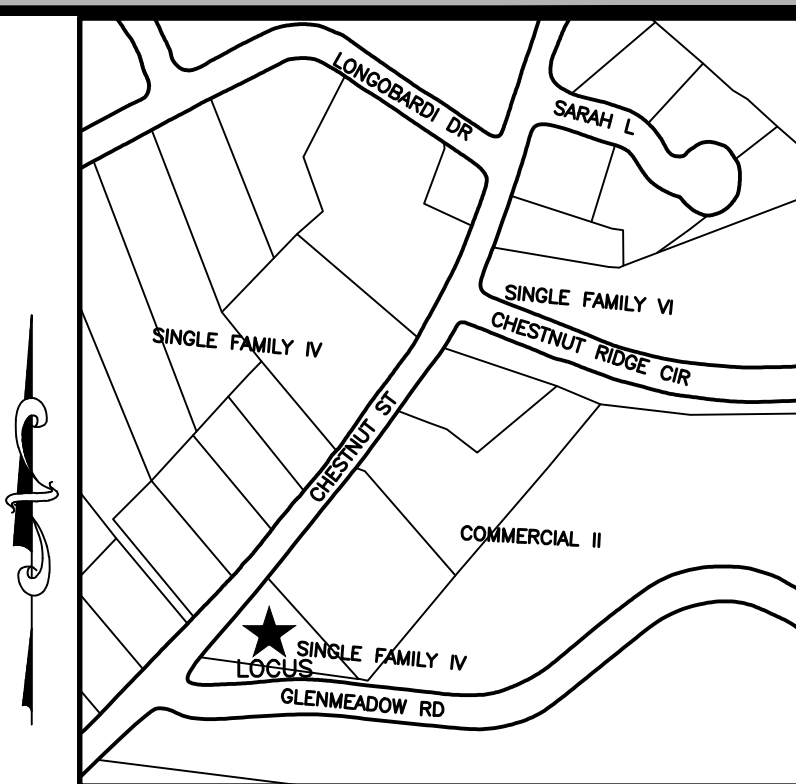
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DATE: 11/08/2019
DRAWN BY: G.P.
CHECKED BY: E.S.
APPROVED BY: E.S.

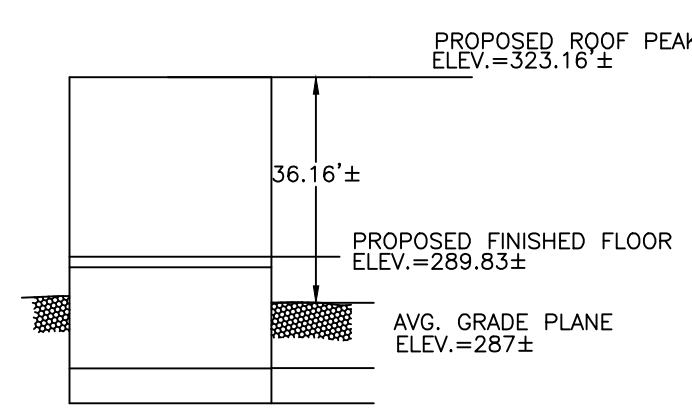
PROPOSED PLOT
PLAN

SHEET 2 OF 12



LOCUS MAP (NOT TO SCALE)

- NOTES: 1. INFORMATION SHOWN ON THIS PLAN IS THE RESULT OF A FIELD SURVEY PERFORMED BY SPRUHAN ENGINEERING, P.C. AS OF 6/26/2019. 2. DEED REFERENCE: BOOK 27480, PAGE 571... 3. THIS PLAN IS NOT INTENDED TO BE RECORDED. 4. I CERTIFY THAT THE DWELLING SHOWN IS NOT LOCATED WITHIN A SPECIAL FLOOD HAZARD ZONE...



PROPOSED PROFILE NOT TO SCALE

SIGHT DISTANCE SITE DRIVEWAY AND CHESTNUT ST. Table with columns: STOP SIGHT DISTANCE, REQUIRED *, SCALED. Rows include Chestnut St. approaching from south-west and north-east, and intersection sight distance.

* Recommended minimum values obtained from Massachusetts Department of Transportation in its 2008 Project Development and Design Guide. ** Recommended minimum value for vehicles turning right exiting a roadway under STOP sign control. *** Recommended minimum value for vehicles turning left exiting a roadway under STOP sign control.

IMPERVIOUS AREA SUMMARY Table with columns: BUILDING ROOF, DRIVEWAY/PARKING, WALKWAY, TOTAL. Shows existing and proposed values and a total impervious increase of 12,941.7 S.F.

* PER TITLE V, SEWER FLOW RESIDENTIAL (G.P.D.) EXISTING = (0 BEDROOMS x 110 G.P.D.) = 0 G.P.D. PROPOSED = (15 BEDROOMS x 110 G.P.D.) = 1,650 G.P.D.

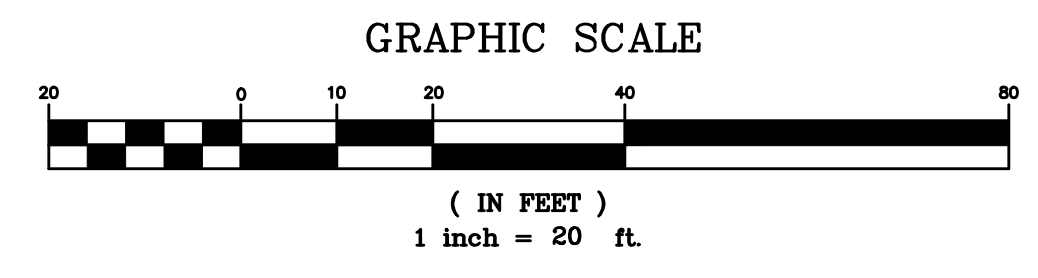
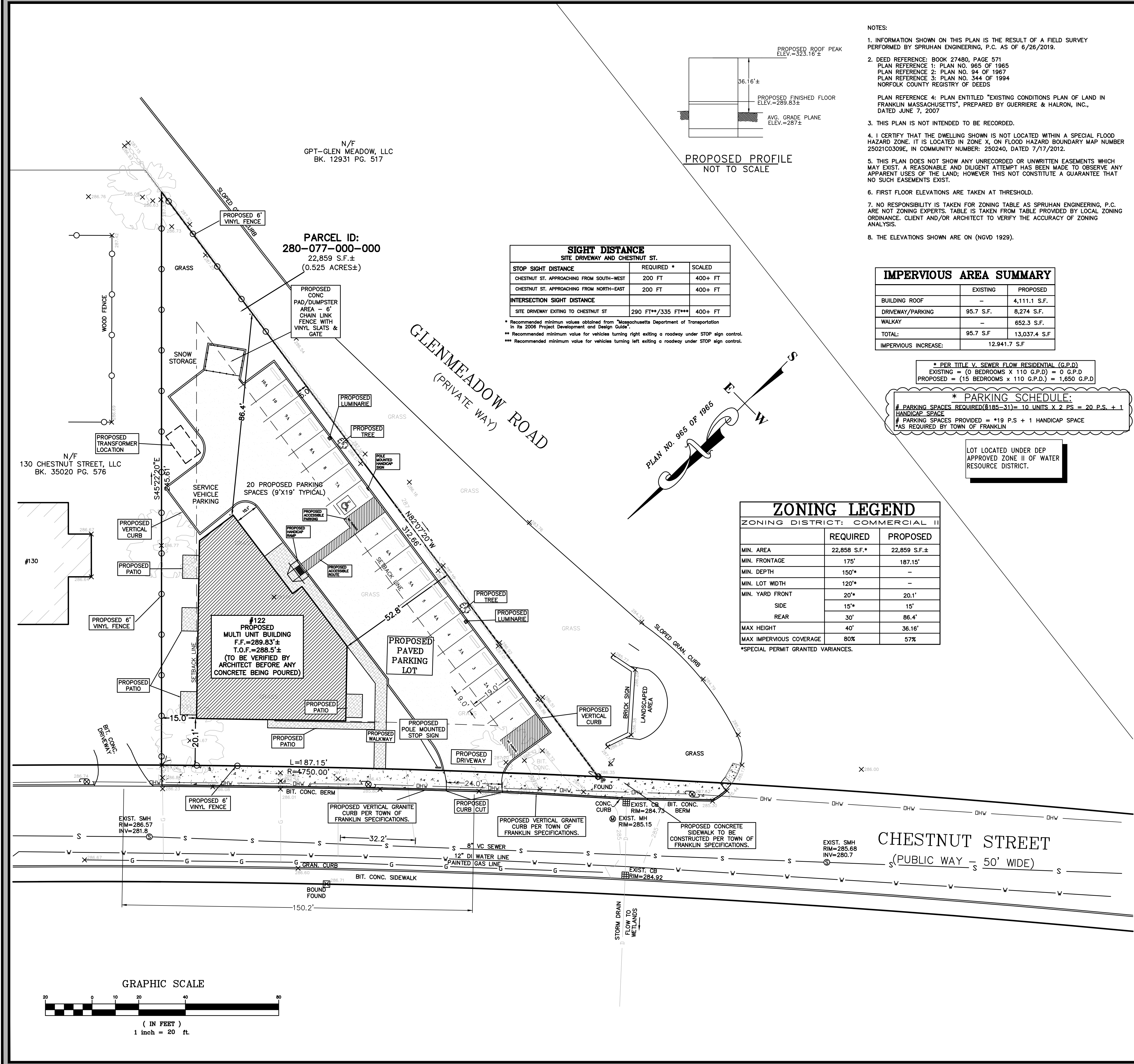
* PARKING SCHEDULE: # PARKING SPACES REQUIRED(8185-31)= 10 UNITS X 2 PS + 1 HANDICAP SPACE # PARKING SPACES PROVIDED = *19 P.S + 1 HANDICAP SPACE *AS REQUIRED BY TOWN OF FRANKLIN

LOT LOCATED UNDER DEP APPROVED ZONE II OF WATER RESOURCE DISTRICT.

ZONING LEGEND ZONING DISTRICT: COMMERCIAL II Table with columns: MIN. AREA, MIN. FRONTAGE, MIN. DEPTH, MIN. LOT WIDTH, MIN. YARD FRONT, SIDE, REAR, MAX HEIGHT, MAX IMPERVIOUS COVERAGE. Shows required vs proposed values.

*SPECIAL PERMIT GRANTED VARIANCES.

LEGEND Table with symbols and descriptions: BOUND, IRON PIN/PIPE, TREE, SEWER MANHOLE, CATCH BASIN, WATER VALVE, GAS VALVE, UTILITY POLE, MANHOLE, SPOT GRADE, EXISTING BUILDING, STONE WALL, FENCE, TREE LINE, SEWER LINE, DRAIN LINE, WATER LINE, GAS LINE, OVERHEAD WIRES, CONTOUR LINE (MJR), CONTOUR LINE (MNR).





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122 CHESTNUT STREET
 FRANKLIN
 MASSACHUSETTS

CIVIL PLAN

REVISION BLOCK

DESCRIPTION	DATE
REVISED AS PER TOWN OF FRANKLIN COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	7/1/2020
REVISED AS PER BETA COMMENTS	7/13/2020

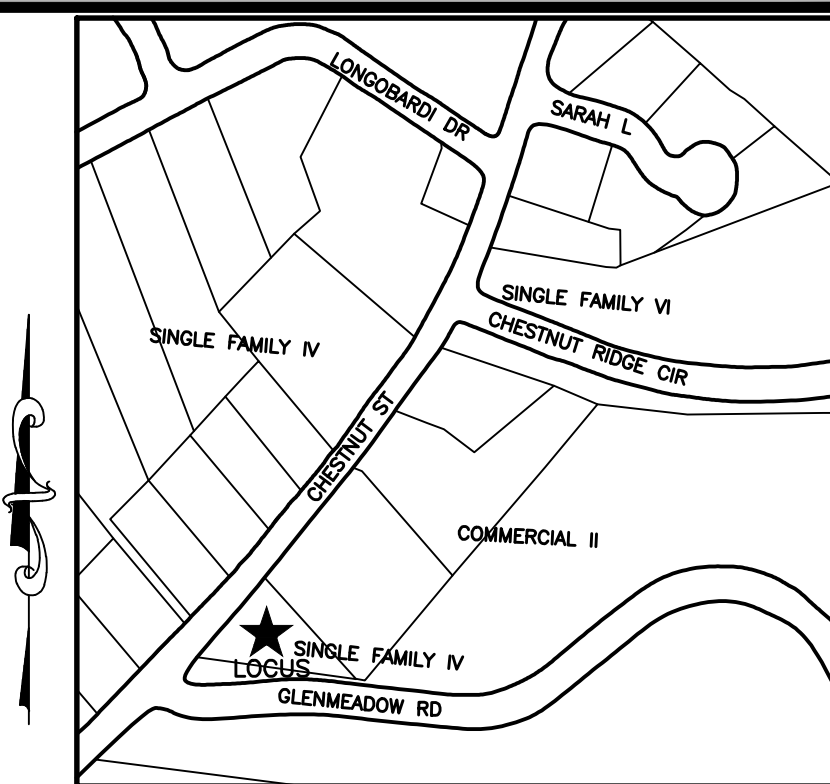
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DATE: 11/08/2019
 DRAWN BY: G.P.
 CHECKED BY: E.S.
 APPROVED BY: E.S.

PROPOSED GRADING
 AND UTILITIES

SHEET 3 OF 12



LOCUS MAP
 (NOT TO SCALE)

- NOTES:
1. INFORMATION SHOWN ON THIS PLAN IS THE RESULT OF A FIELD SURVEY PERFORMED BY SPRUHAN ENGINEERING, P.C. AS OF 6/26/2019.
 2. DEED REFERENCE: BOOK 27480, PAGE 571
 PLAN REFERENCE 1: PLAN NO. 965 OF 1965
 PLAN REFERENCE 2: PLAN NO. 94 OF 1967
 PLAN REFERENCE 3: PLAN NO. 344 OF 1994
 NORFOLK COUNTY REGISTRY OF DEEDS
 3. THIS PLAN IS NOT INTENDED TO BE RECORDED.
 4. I CERTIFY THAT THE DWELLING SHOWN IS NOT LOCATED WITHIN A SPECIAL FLOOD HAZARD ZONE. IT IS LOCATED IN ZONE X, ON FLOOD HAZARD BOUNDARY MAP NUMBER 25021C0309E, IN COMMUNITY NUMBER: 250240, DATED 7/17/2012.
 5. THIS PLAN DOES NOT SHOW ANY UNRECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. A REASONABLE AND DILIGENT ATTEMPT HAS BEEN MADE TO OBSERVE ANY APPARENT USES OF THE LAND; HOWEVER THIS NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.
 6. FIRST FLOOR ELEVATIONS ARE TAKEN AT THRESHOLD.
 7. NO RESPONSIBILITY IS TAKEN FOR ZONING TABLE AS SPRUHAN ENGINEERING, P.C. ARE NOT ZONING EXPERTS. TABLE IS TAKEN FROM TABLE PROVIDED BY LOCAL ZONING ORDINANCE. CLIENT AND/OR ARCHITECT TO VERIFY THE ACCURACY OF ZONING ANALYSIS.
 8. THE ELEVATIONS SHOWN ARE ON (NGVD 1929).

LOT LOCATED UNDER DEP
 APPROVED ZONE II OF WATER
 RESOURCE DISTRICT.

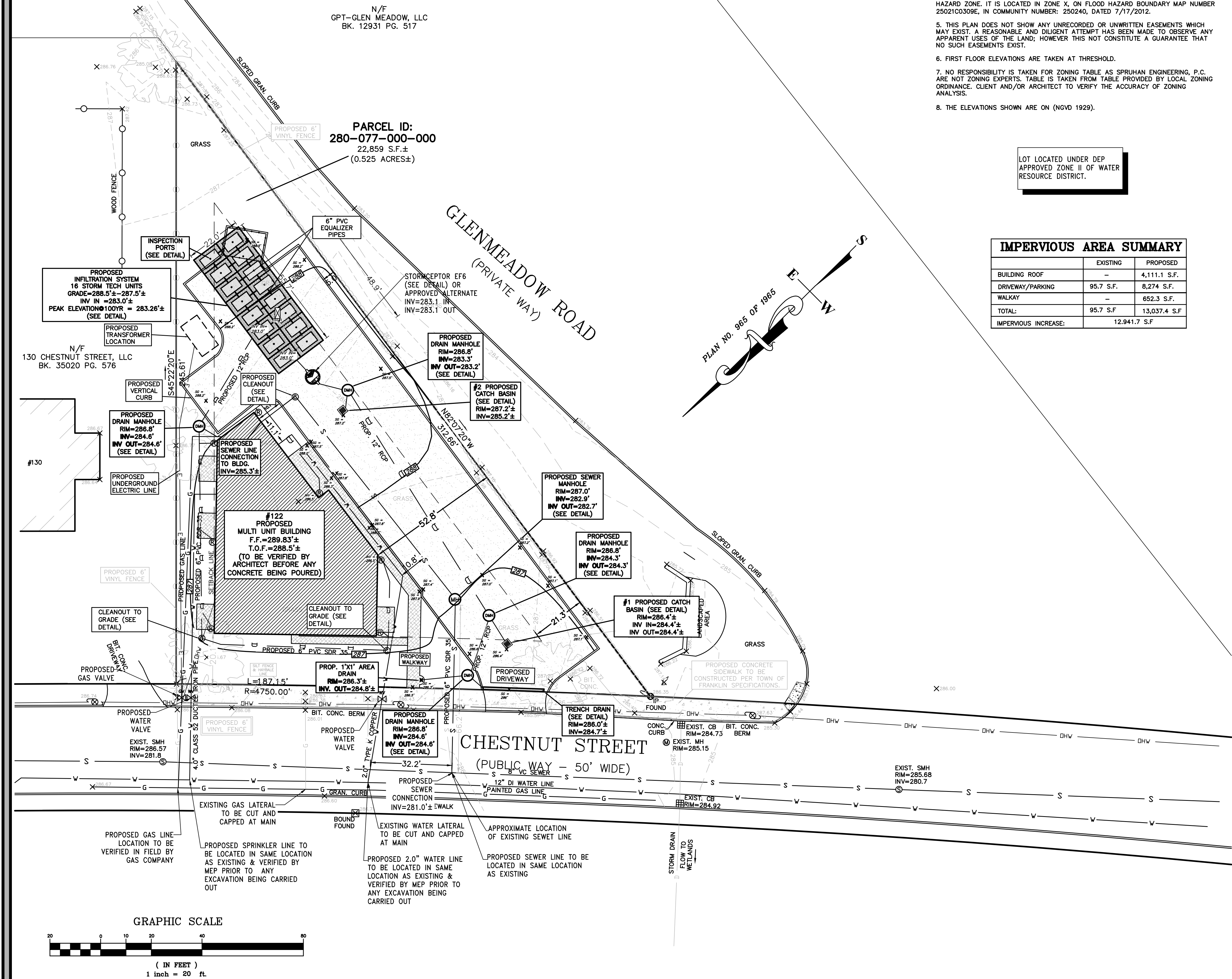
IMPERVIOUS AREA SUMMARY

	EXISTING	PROPOSED
BUILDING ROOF	-	4,111.1 S.F.
DRIVEWAY/PARKING	95.7 S.F.	8,274 S.F.
WALKWAY	-	652.3 S.F.
TOTAL:	95.7 S.F.	13,037.4 S.F.
IMPERVIOUS INCREASE:		12,941.7 S.F.

1. THE CONTRACTOR SHALL REPORT TO THE OWNER AND ENGINEER OF ANY SIGNIFICANT VARIATIONS IN EXISTING SITE CONDITIONS FROM THOSE SHOWN ON THESE PLANS. ANY PROPOSED REVISIONS TO THE WORK, IF REQUIRED BY THESE SITE CONDITIONS, SHALL NOT BE UNDERTAKEN UNTIL REVIEWED AND APPROVED BY THE OWNER AND THE ENGINEER.
2. IN ORDER TO PROTECT THE PUBLIC SAFETY DURING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING AT ALL TIMES ALL NECESSARY SAFETY DEVICES AND PERSONNEL, WARNING LIGHTS, BARRICADES, AND POLICE OFFICERS.
3. ALL WORK SHALL CONFORM TO TOWN OF FRANKLIN GENERAL CONSTRUCTION STANDARDS.
4. THE CONTRACTOR SHALL REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. ALL DEMOLITION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE SITE TO A LEGAL DUMP SITE. ALL TRUCKS LEAVING THE SITE SHALL BE COVERED.
5. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTITUTE EROSION CONTROL MEASURES ON AN AS NECESSARY BASIS, SUCH THAT EXCESSIVE SOIL EROSION DOES NOT OCCUR.
6. THE LOCATION OF UNDERGROUND UTILITIES AS REPRESENTED ON THESE PLANS IS BASED UPON PLANS AND INFORMATION PROVIDED BY THE RESPECTIVE UTILITY COMPANIES OR MUNICIPAL DEPARTMENTS SUPPLEMENTED BY FIELD IDENTIFICATION WHEREVER POSSIBLE. NO WARRANTY IS MADE AS TO THE ACCURACY OF THESE LOCATIONS OR THAT ALL UNDERGROUND UTILITIES ARE SHOWN. THE CONTRACTOR SHALL CONTRACT DIG SAFE AT LEAST 72 HOURS PRIOR TO THE START OF CONSTRUCTION. DIG SAFE TELEPHONE NUMBER IS 1-800-322-4844.
7. THE CONTRACTOR SHALL VERIFY THE LOCATION, SIZE AND DEPTH OF EXISTING UTILITIES PRIOR TO TAPPING INTO, CROSSING OR EXTENDING THEM. IF THE NEW WORK POSES A CONFLICT WITH EXISTING UTILITIES, THE ENGINEER SHALL BE NOTIFIED PRIOR TO THE CONTRACTOR CONTINUING.
8. NO LEDGE, BOULDERS, OR OTHER UNYIELDING MATERIALS ARE TO BE LEFT WITHIN 6" OF THE WATER IN THE TRENCH, NOR ARE THEY TO BE USED FOR BACKFILL FOR THE FIRST 12" ABOVE THE PIPES.
9. PAVEMENT AREA SHALL BE PAVED TO A THICKNESS AS SHOWN ON THE PLANS MEASURED AFTER TAPPING INTO, CROSSING OR EXTENDING THEM. THE COURSE OF CLASS I BITUMINOUS CONCRETE PAVEMENT, TYPE 1-1.
10. BASE MATERIAL SHALL BE CLEAN BANK RUN GRAVEL, CONFORMING TO M.D.P.W. M1.03.1, WITH NO STONES LARGER THAN THREE (3) INCHES IN DIAMETER AND SHALL BE PLACED AND ROLLED WITH AT LEAST A TEN TON ROLLER. THE SURFACES SHALL BE WET DURING ROLLING TO BIND THE MATERIAL. ALL STONES OF 4" DIAMETER OR LARGER SHALL BE REMOVED FROM THE SUB-BASE PRIOR TO PLACING BASE MATERIAL.
11. ALL EXISTING PAVING TO BE DISTURBED SHALL BE CUT ALONG A STRAIGHT LINE THROUGH ITS ENTIRE THICKNESS, BUTT THE NEW PAVING INTO THE EXISTING PAVEMENT TO REMAIN.
12. ANY PAVEMENT REMOVED FOR UTILITY TRENCH EXCAVATION OR OTHERWISE DAMAGED DURING CONSTRUCTION SHALL BE REPLACED WITH A PAVEMENT SECTION CONSISTING OF 1" WEAR COURSE OVERLYING A 1 1/2" BINDER COURSE OVERLYING A 8" COMPACTED GRAVEL BASE COURSE.
13. THE CONTRACTOR SHALL APPLY FOR A STREET OPENING AND UTILITY CONNECTION PERMITS AND SIDEWALK CROSSING PERMIT WITH THE TOWN OF FRANKLIN.
14. CONTRACTOR TO ENSURE THAT ALL SURFACE WATER IS DIVERTED AWAY FROM BUILDING FOUNDATION DURING FINAL GRADING.

LEGEND

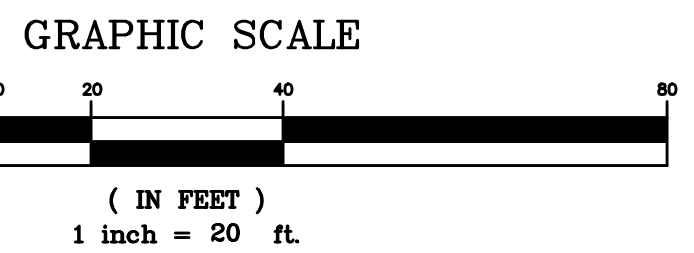
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[Symbol]	TREE
[Symbol]	SEWER MANHOLE
[Symbol]	CATCH BASIN
[Symbol]	WATER VALVE
[Symbol]	GAS VALVE
[Symbol]	UTILITY POLE
[Symbol]	MANHOLE
[Symbol]	SPOT GRADE
[Symbol]	EXISTING BUILDING
[Symbol]	STONE WALL
[Symbol]	FENCE
[Symbol]	TREE LINE
[Symbol]	SEWER LINE
[Symbol]	DRAIN LINE
[Symbol]	WATER LINE
[Symbol]	GAS LINE
[Symbol]	OVERHEAD WIRES
[Symbol]	CONTOUR LINE (MJR)
[Symbol]	CONTOUR LINE (MNR)



N/F
 GPT-GLEN MEADOW, LLC
 BK. 12931 PG. 517

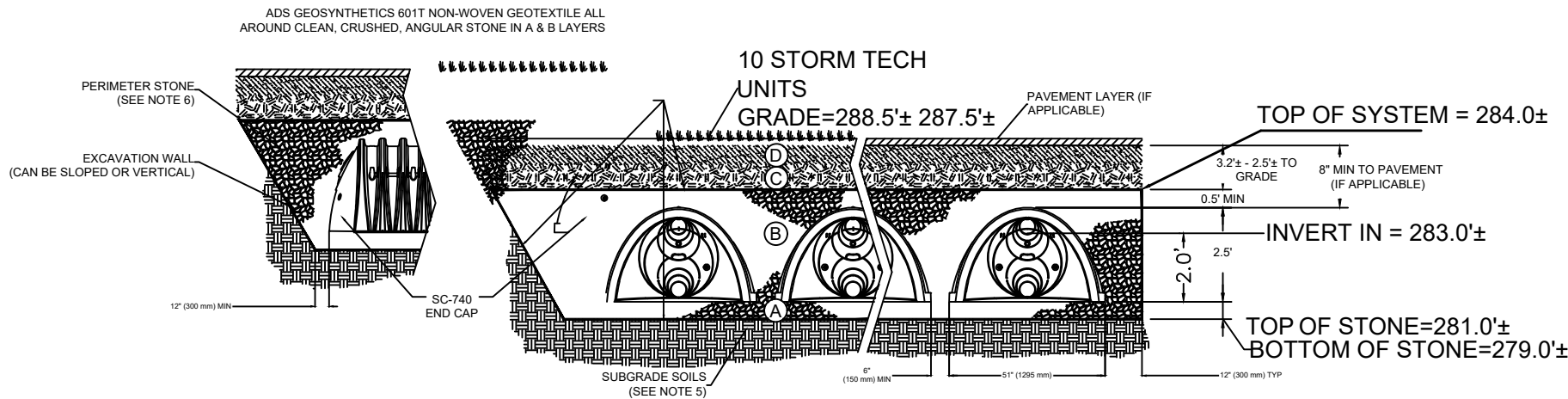
PARCEL ID:
 280-077-000-000
 22,859 S.F.±
 (0.525 ACRES±)

N/F
 130 CHESTNUT STREET, LLC
 BK. 35020 PG. 576



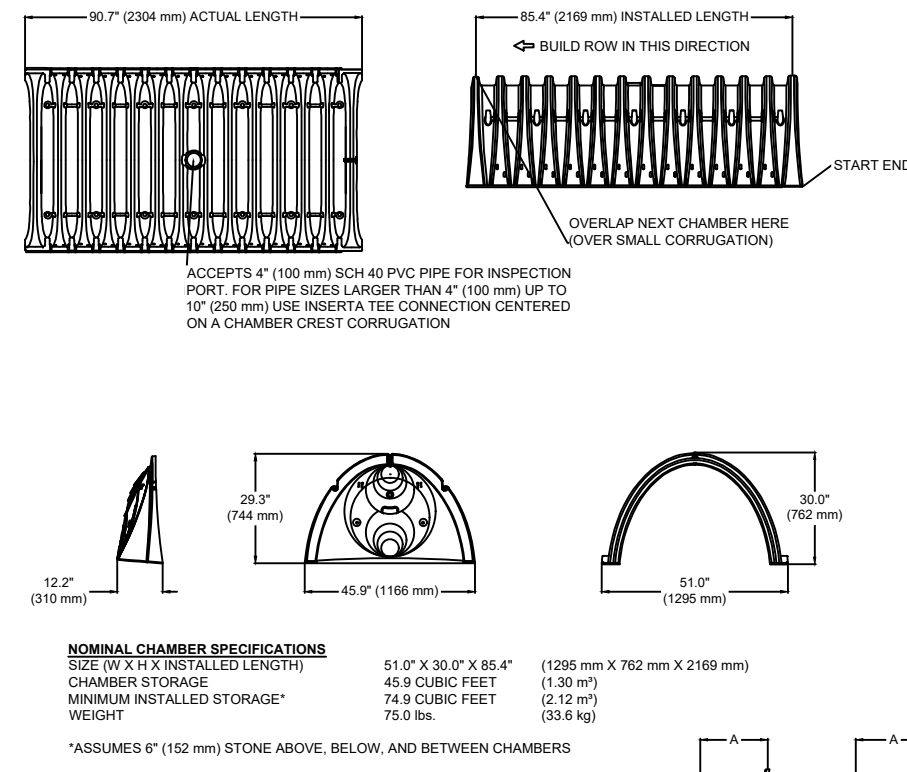
ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR IMPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBGRADE MAY BE PART OF THE 'D' LAYER.	ANY SOLIDROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLAN. CHECK PLAN FOR PAVEMENT MATERIAL AND PREPARATION REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATION MAY HAVE STRONGEST MATERIAL AND PREPARATION REQUIREMENTS.
C INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDEDMENT STONE TO LAYER 'D' (2" ABOVE) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBGRADE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <30% FINES OR PROCESSED AGGREGATE OR MOST PAVEMENT SUBGRADE MATERIALS CAN BE USED IN LAYER 'C' OF THIS LAYER.	AASHTO M45P A-1, A-2.4, A-3 OR AASHTO M457 5, 5P, 4, 4P, 5, 5P, 6, 6P, 6P, 7, 7P, 8, 8P, 8, 8P	BEGIN CONSTRUCTION AFTER 1" (25.4 mm) OF MATERIAL OVER THE CHAMBER IS REACHED. LIFTS TO A MIN. 90% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER CROSS TRUCKS WEIGHT NOT TO EXCEED 12,000 LB (53 kN) DYNAMIC FORCE NOT TO EXCEED 30,000 LB (133 kN).
B EMBEDEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE (X LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/8" (10.0 mm) TO 1 1/2" (38.1 mm).	AASHTO M457 3, 3P, 4, 4P, 5, 5P, 5P	NO COMPACTION REQUIRED.
A FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT/BOTTOM OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/8" (10.0 mm) TO 1 1/2" (38.1 mm).	AASHTO M457 3, 3P, 4, 4P, 5, 5P, 5P	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. **



- NOTES:**
- SC-740 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" OR ASTM F2022 "STANDARD SPECIFICATION FOR POLYPROPYLENE CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
 - SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2797 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
 - "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDEDMENT, AND FILL MATERIALS.
 - THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
 - THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
 - PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
 - ONCE LAYER 'C' IS PLACED, ANY SOLIDROCK MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBGRADE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

SC-740 TECHNICAL SPECIFICATION



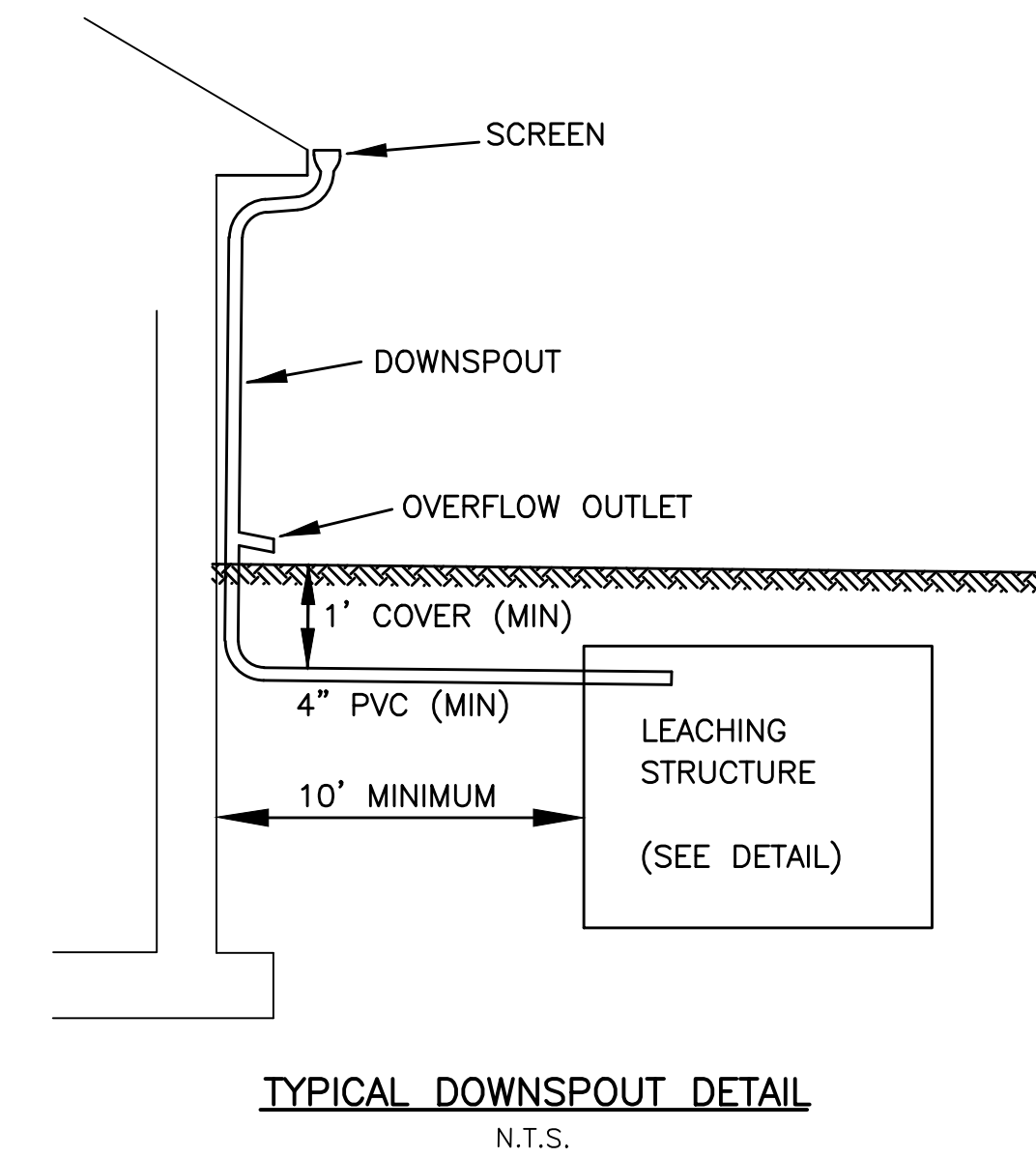
NORMAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	CHAMBER STORAGE	MINIMUM INSTALLED STORAGE*	WEIGHT
30.7" x 30.7" x 30.7" (780 mm x 780 mm x 780 mm)	48.8 CUBIC FEET (1.38 m³)	74.8 CUBIC FEET (2.12 m³)	75.0 LB (33.8 kg)
30.7" x 30.7" x 60.4" (780 mm x 780 mm x 1535 mm)	97.6 CUBIC FEET (2.76 m³)	149.6 CUBIC FEET (4.24 m³)	150.0 LB (68.0 kg)

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B" STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

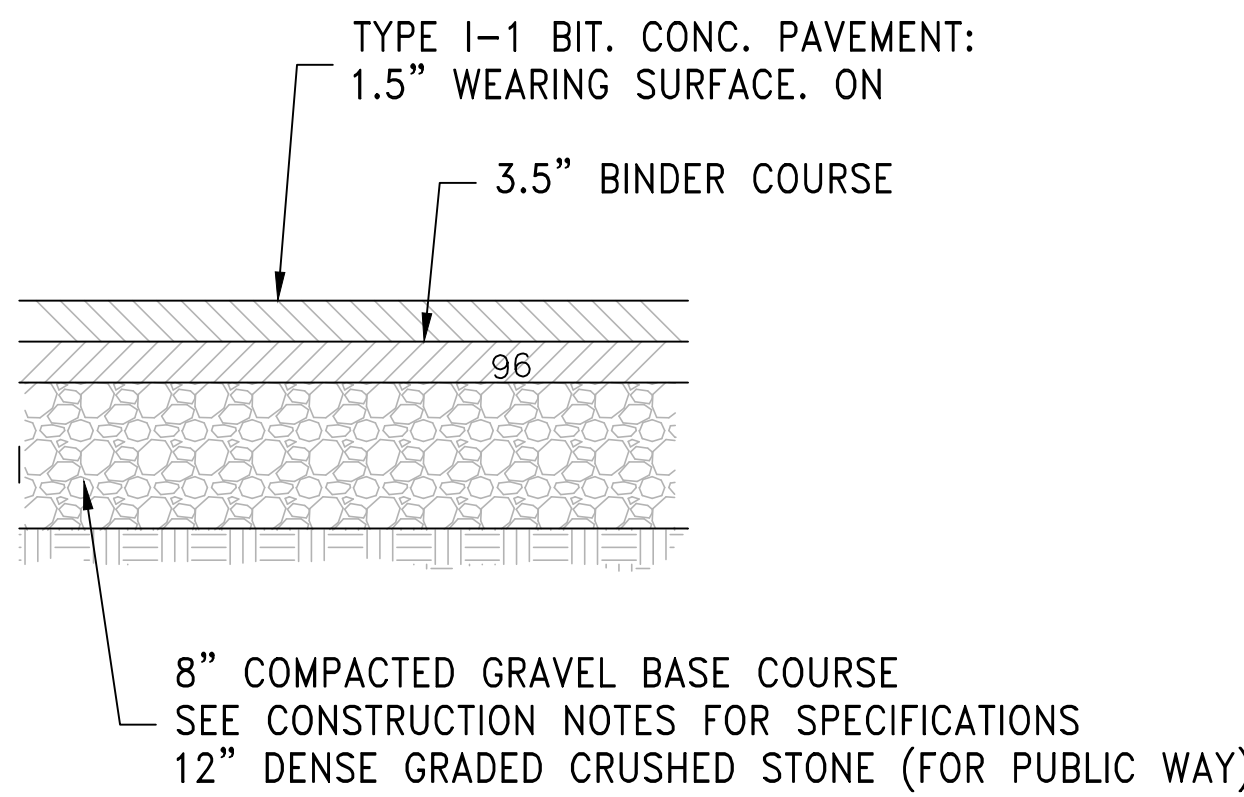
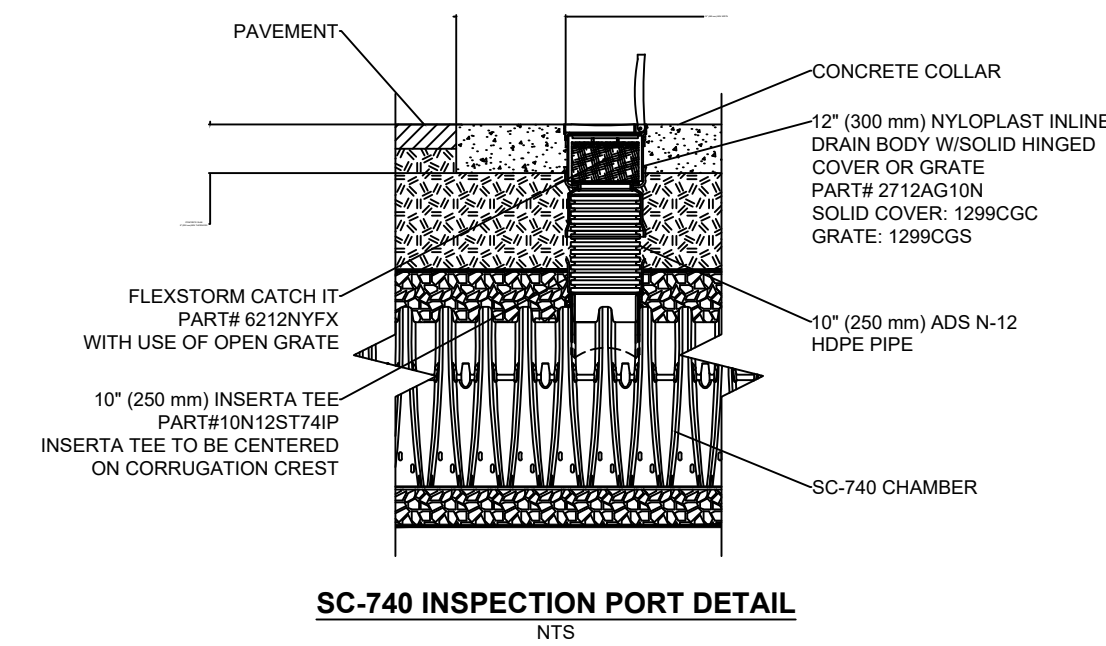
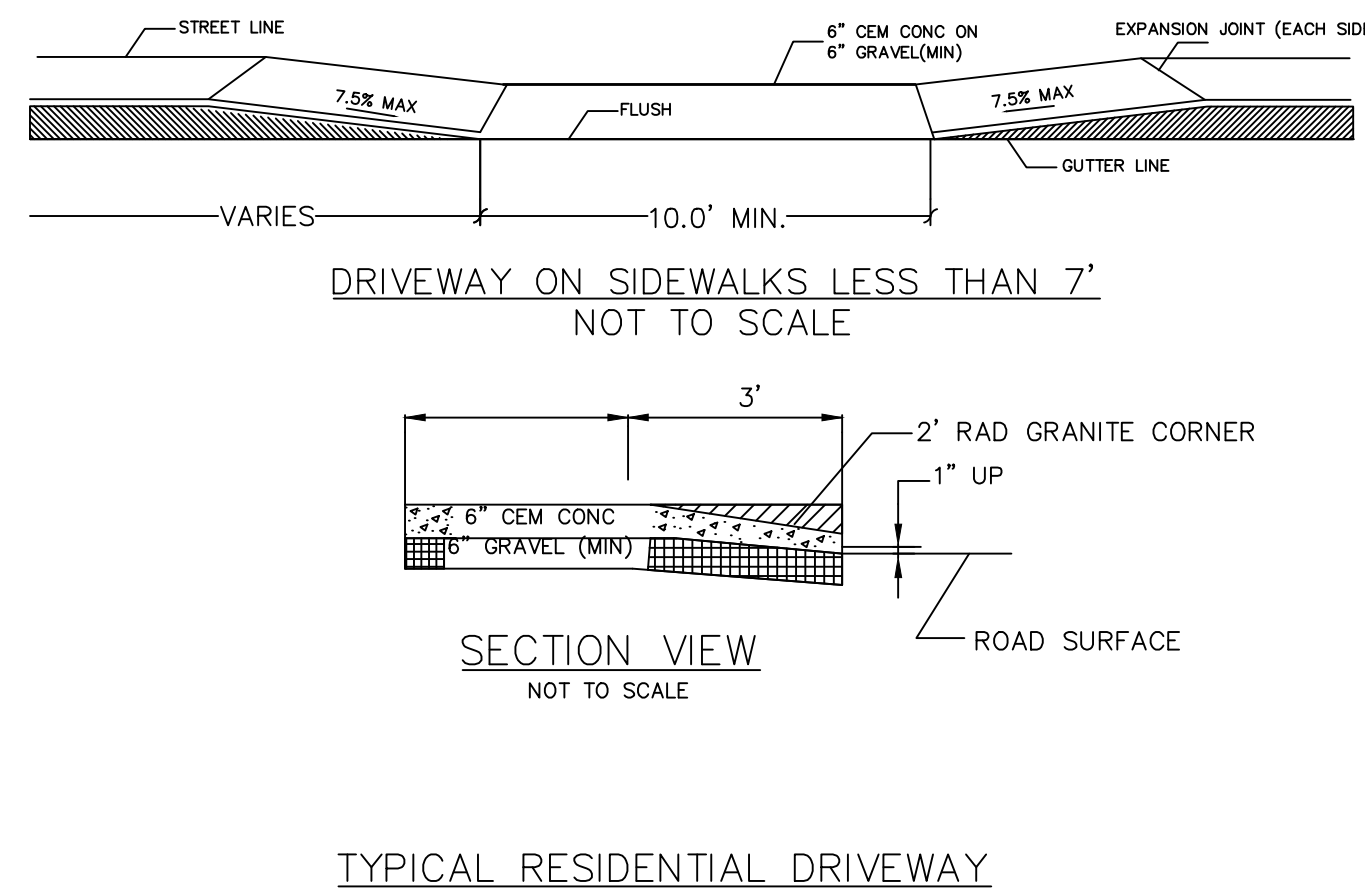
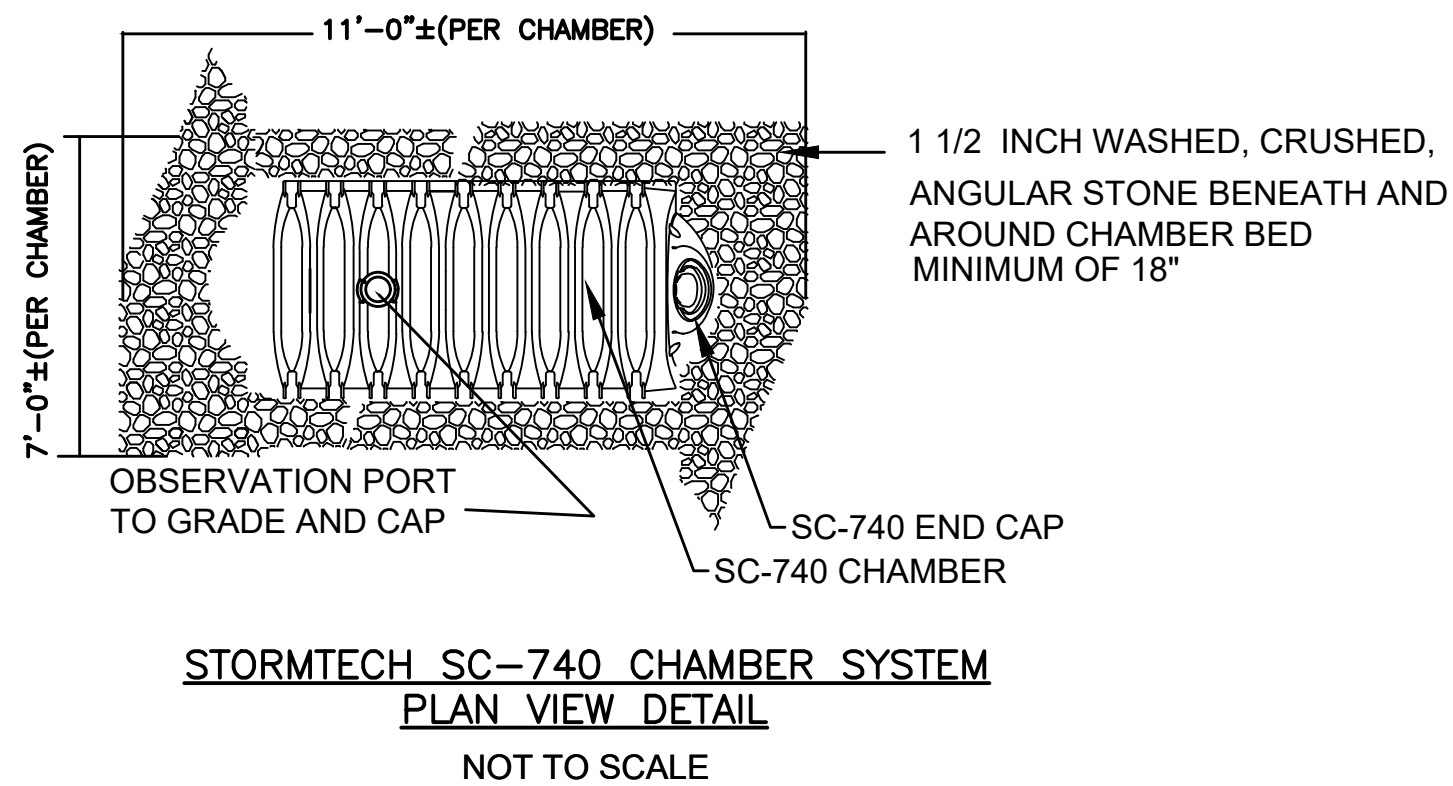
PART #	STUB	A	B	C
SC740PE001T	SC740PE001B	6" (152 mm)	10.9" (277 mm)	18.9" (478 mm)
SC740PE002T	SC740PE002B	6" (152 mm)	12.2" (310 mm)	19.9" (505 mm)
SC740PE003T	SC740PE003B	6" (152 mm)	14.2" (360 mm)	21.9" (556 mm)
SC740PE004T	SC740PE004B	6" (152 mm)	16.2" (410 mm)	23.9" (606 mm)
SC740PE005T	SC740PE005B	6" (152 mm)	18.2" (460 mm)	25.9" (657 mm)
SC740PE006T	SC740PE006B	6" (152 mm)	20.2" (510 mm)	27.9" (707 mm)
SC740PE007T	SC740PE007B	6" (152 mm)	22.2" (560 mm)	29.9" (758 mm)
SC740PE008T	SC740PE008B	6" (152 mm)	24.2" (610 mm)	31.9" (808 mm)
SC740PE009T	SC740PE009B	6" (152 mm)	26.2" (660 mm)	33.9" (859 mm)
SC740PE010T	SC740PE010B	6" (152 mm)	28.2" (710 mm)	35.9" (909 mm)

ALL STUBS, EXCEPT FOR THE SC740PE002B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2884.
FOR THE SC740PE002B THE 2" (50.8 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE 12" (305 mm) STUB SO THAT THE FITTING SITS LEVEL.
NOTE: ALL DIMENSIONS ARE NOMINAL.



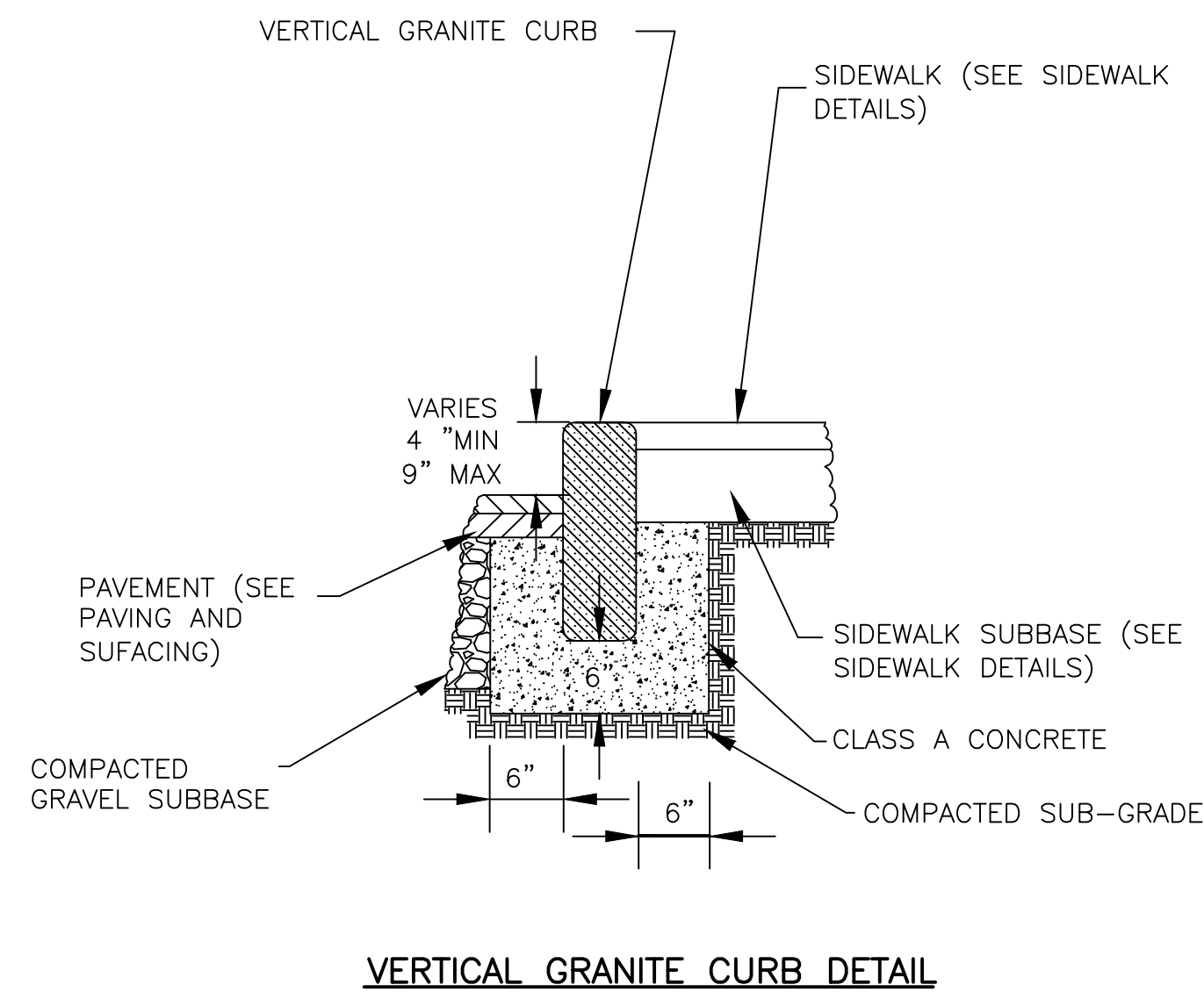
STORMTECH GENERAL NOTES

- STORMTECH LLC ("STORMTECH") REQUIRES INSTALLING CONTRACTORS TO USE AND UNDERSTAND STORMTECH'S LATEST INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING SYSTEM INSTALLATION.
- STORMTECH'S REQUIREMENTS FOR SYSTEMS WITH PAVEMENT DESIGN (ASPHALT, CONCRETE PAVERS, ETC.) MINIMUM COVER IS 18 INCHES NOT INCLUDING PAVEMENT. MAXIMUM COVER IS 98 INCHES INCLUDING PAVEMENT. FOR INSTALLATIONS THAT DO NOT INCLUDE PAVEMENT WHERE RUTTING FROM VEHICLES MAY OCCUR, MINIMUM REQUIRED COVER IS 24 INCHES. MAXIMUM COVER IS 88 INCHES.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE DESIGN ENGINEER.
- AASHTO M288 CLASS 2 NON-WOVEN GEOTEXTILE (FILTER FABRIC) MUST BE USED AS INDICATED IN THE PROJECT PLANS.
- STONE PLACEMENT BETWEEN CHAMBERS ROWS AND AROUND PERIMETER MUST FOLLOW INSTRUCTIONS AS INDICATED IN THE MOST CURRENT VERSION OF STORMTECH'S INSTALLATION INSTRUCTIONS.
- BACKFILLING OVER THE CHAMBERS MUST FOLLOW REQUIREMENTS AS INDICATED IN THE MOST CURRENT VERSION OF STORMTECH'S INSTALLATION INSTRUCTIONS.
- THE CONTRACTOR MUST REFER TO STORMTECH'S INSTALLATION INSTRUCTIONS FOR A TABLE OF ACCEPTABLE VEHICLE LOADS AT VARIOUS DEPTHS OF COVER. THIS INFORMATION IS ALSO AVAILABLE AT STORMTECH'S WEBSITE. CONTRACTOR IS RESPONSIBLE FOR PREVENTING VEHICLES THAT EXCEED STORMTECH'S REQUIREMENTS FROM TRAVELING ACROSS OR PARKING OVER THE STORMWATER SYSTEM. TEMPORARY FENCING, WARNING TAPES AND APPROPRIATELY LOCATED SIGNS ARE COMMONLY USED TO PREVENT UNAUTHORIZED VEHICLES FROM ENTERING SENSITIVE CONSTRUCTION AREAS.
- THE CONTRACTOR MUST APPLY EROSION AND SEDIMENT CONTROL MEASURES TO PROTECT THE STORMWATER SYSTEM DURING ALL PHASES OF SITE CONSTRUCTION PER LOCAL CODES AND DESIGN ENGINEER'S SPECIFICATIONS.



NOTE: PRIVATE PROPERTY ONLY

BITUMINOUS CONCRETE PAVEMENT/ PROPOSED DRIVEWAY
N.T.S.



VERTICAL GRANITE CURB DETAIL

SOIL LOG

DEEP OBSERVATION HOLE LOG
GENERAL SOIL CONDITIONS FOR THE AREA PERFORMED AT 122 CHESTNUT STREET, FRANKLIN BY PETER NOLAN & ASSOCIATES, LLC. AND SPRUHAN ENGINEERING, P.C.
HOLE NUMBER: TP - 1 DATED: 6/24/19
GENERAL SITE CONDITIONS: GRASS AND TREES.

DEPTH	HORIZON	TEXTURE	COLOR	MOTTLING	OTHER
0" - 6"	Ap	LS _{ND}	7.5 YR 4/1	NO	NONE
6" - 18"	Bw	LS _{ND}	7.5 YR 5/1	NO	NONE
18" - 36"	C ₁	COARSE _{SND}	10 YR 6/1	NO	GRAVEL
36" - 60"	C ₂	COARSE _{SND}	10 YR 7/5	NO	GRAVEL
60" - 120"	C ₃	MEDIUM _{SND}	10 YR 7/1	NO	NONE



Spruhan Engineering, P.C.

80 JEWETT ST. (SUITE 1)
NEWTON, MA 02458
Tel: 617-816-0722
Email: espruhan@gmail.com

122 CHESTNUT STREET
FRANKLIN
MASSACHUSETTS

CIVIL PLANS

REVISION BLOCK

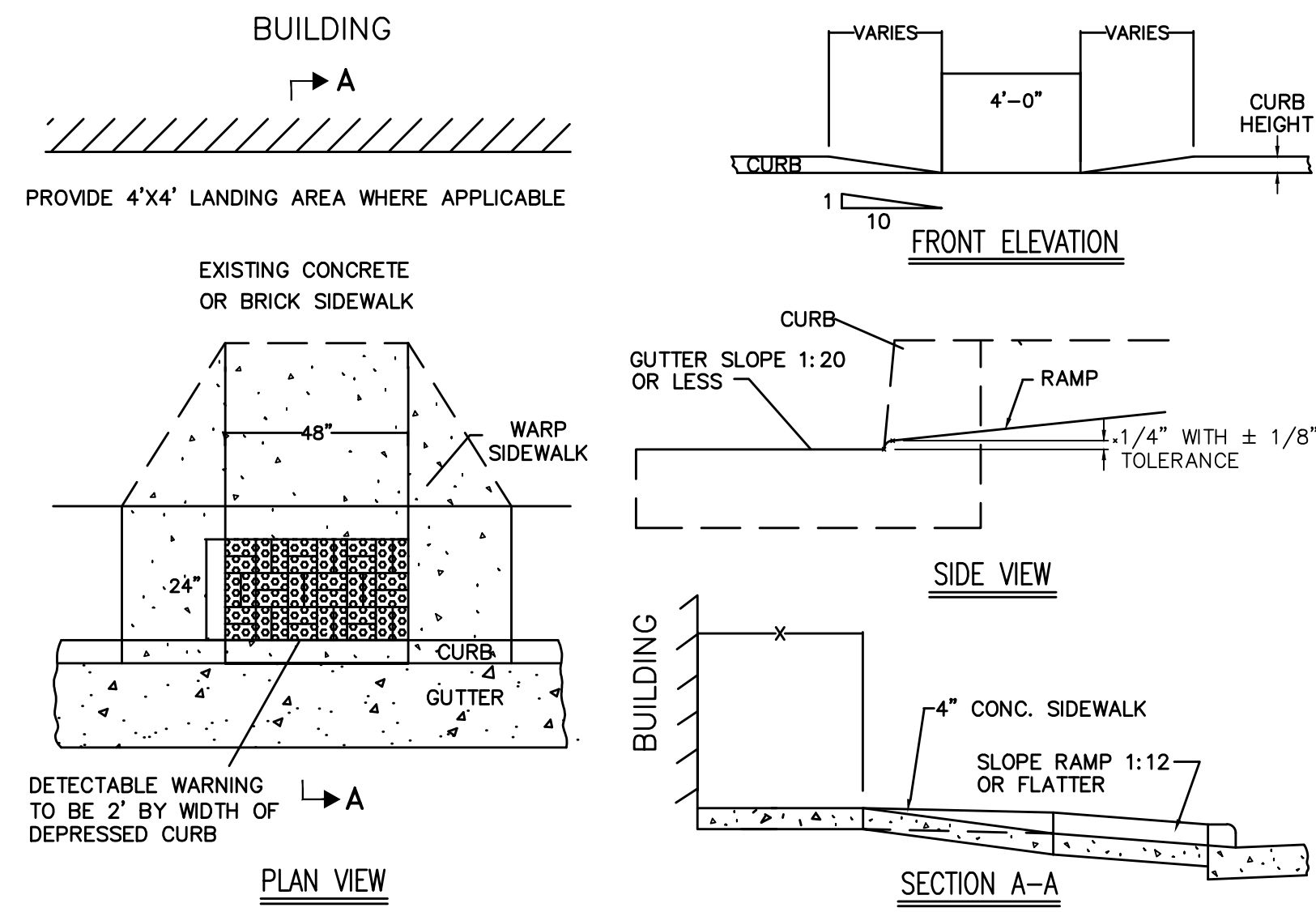
DESCRIPTION	DATE
REVISED AS PER TOWN OF FRANKLIN COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	03/05/2020
REVISED AS PER BETA COMMENTS	7/1/2020
REVISED AS PER BETA COMMENTS	7/13/2020

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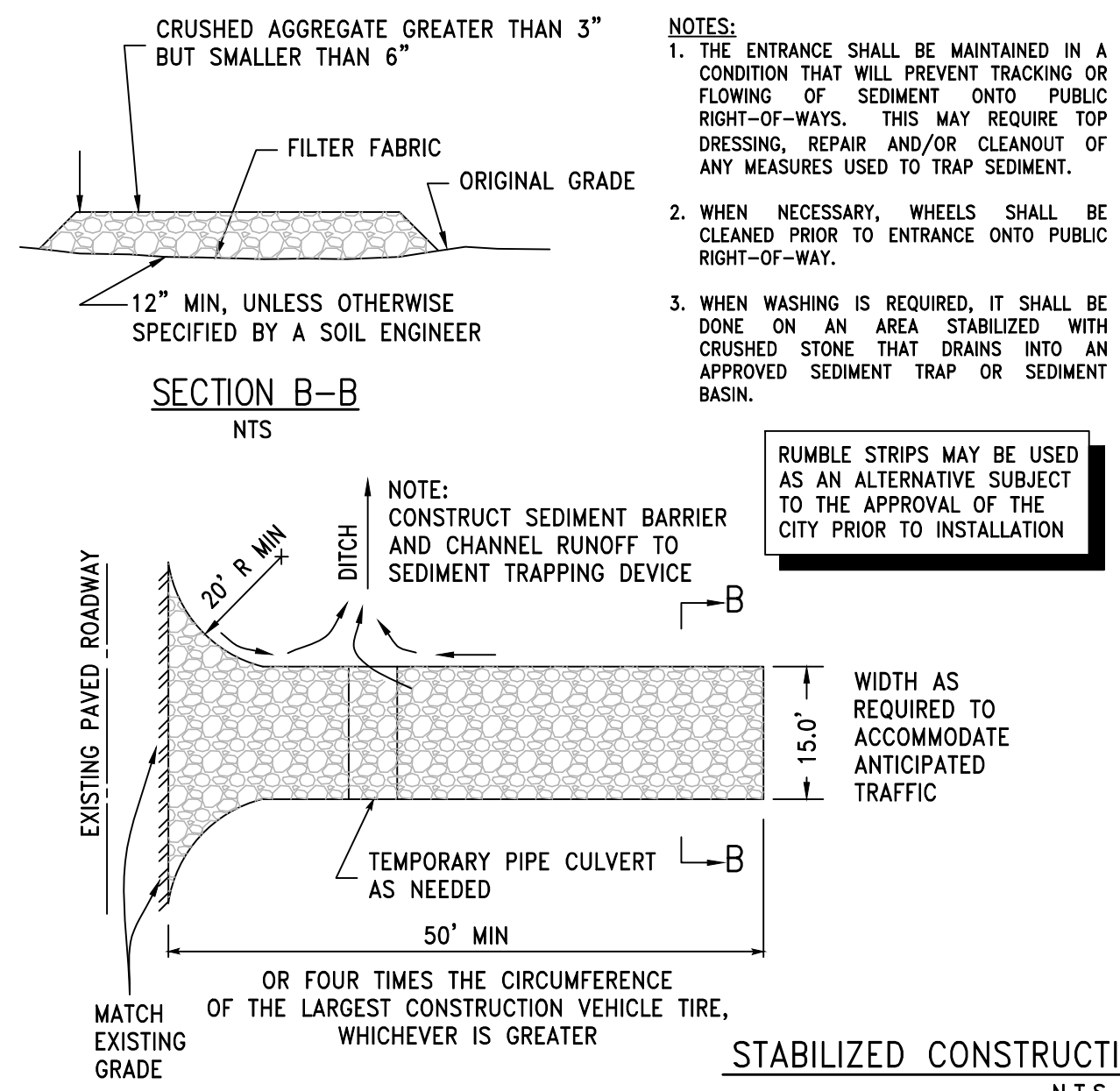


DATE:	11/08/2019
DRAWN BY:	G.P.
CHECKED BY:	E.S.
APPROVED BY:	E.S.

DETAILS



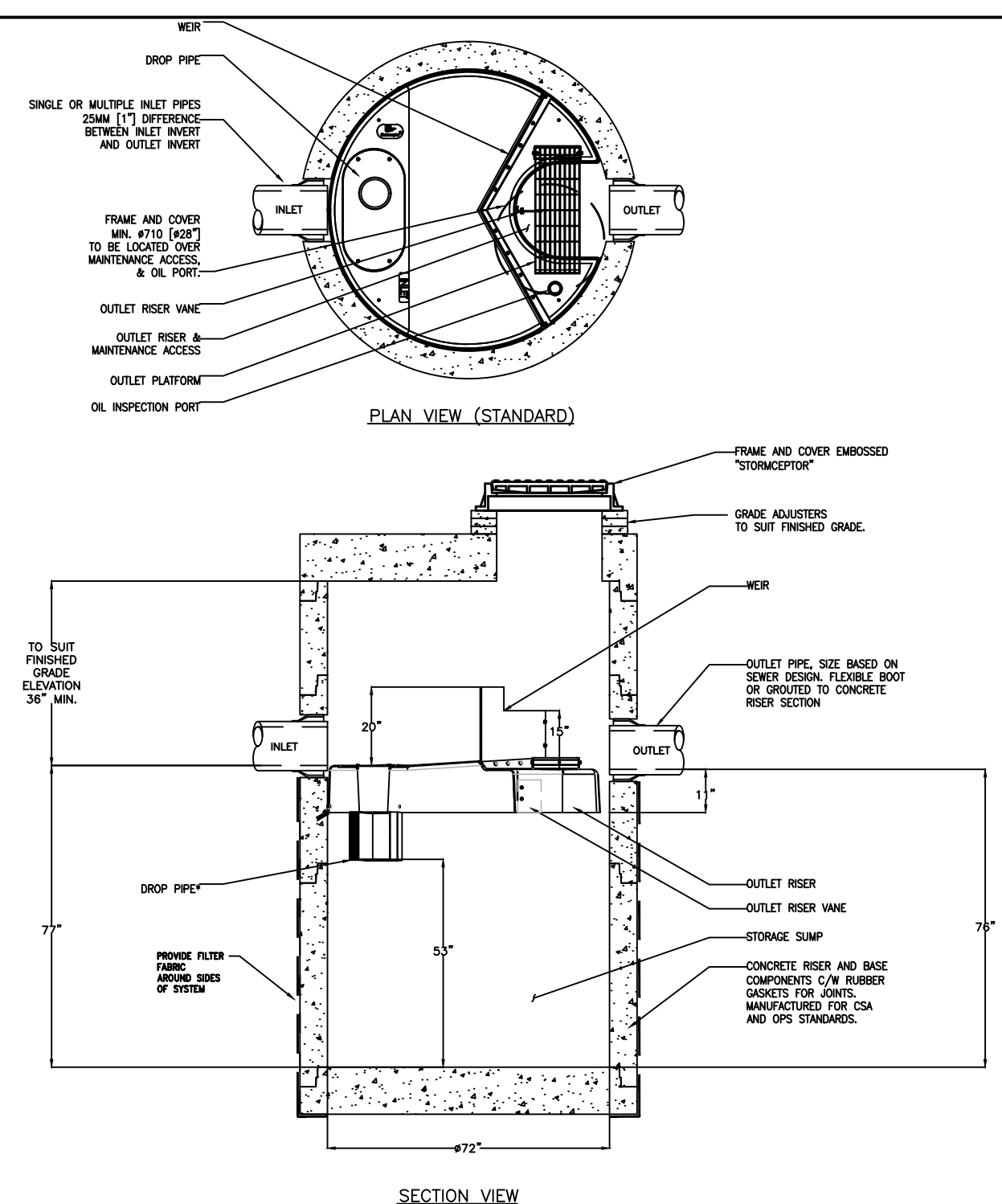
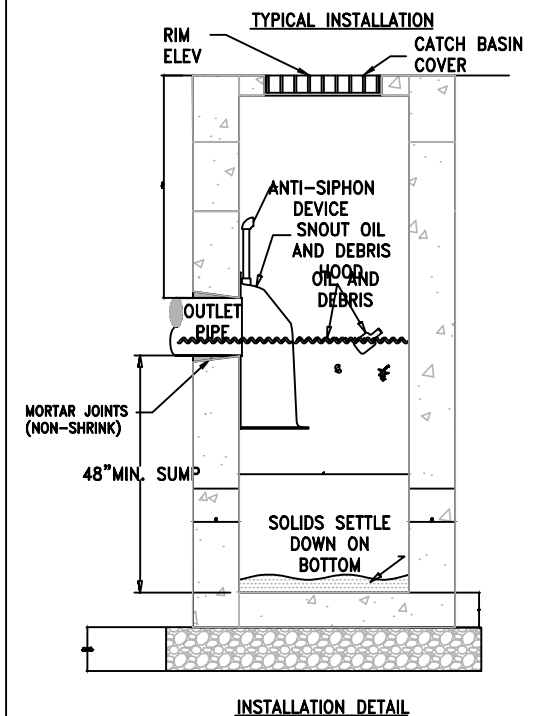
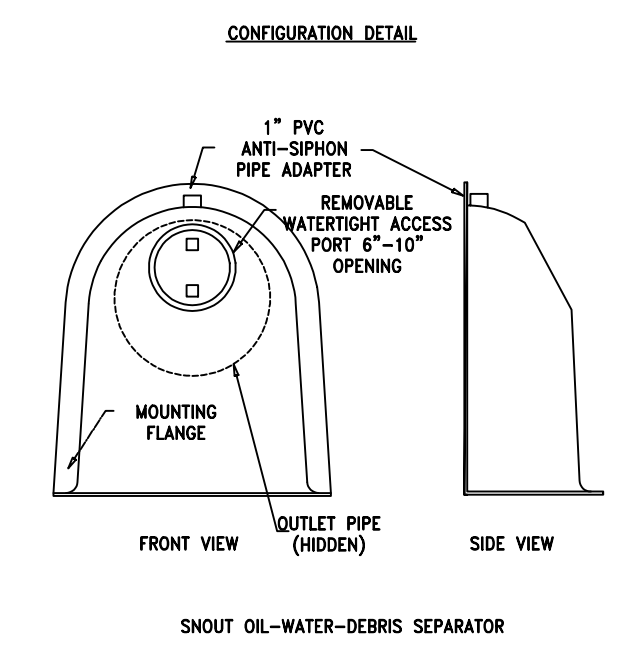
HANDICAP RAMP



STABILIZED CONSTRUCTION ENTRANCE DETAIL
N.T.S.

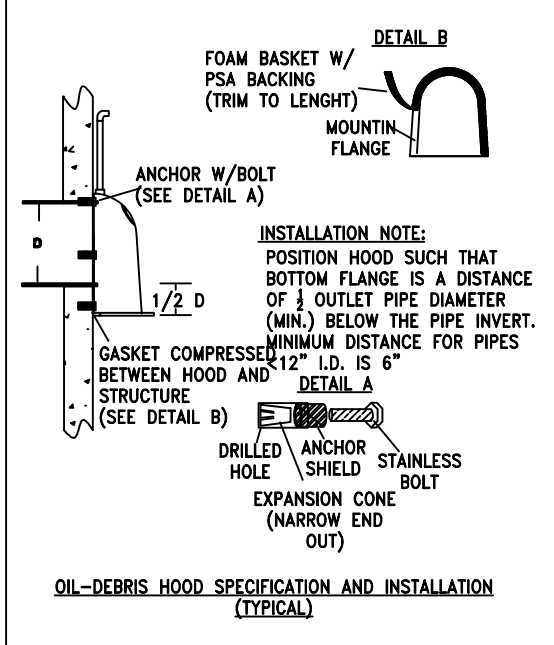
- CONSTRUCTION SPECIFICATIONS:**
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
 2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
 3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
 1. THE AGGREGATE SIZE FOR CONSTRUCTION OF THE PAD SHALL BE 2-3 INCH (50-75 MM) STONE. PLACE THE GRAVEL TO THE SPECIFIC GRADE AND DIMENSIONS SHOWN ON THE PLANS, AND SMOOTH IT.
 2. THE THICKNESS OF THE PAD SHALL NOT BE LESS THAN 6 INCHES (152 MM). USE GEOTEXTILE FABRICS, IF NECESSARY, TO IMPROVE STABILITY OF THE FOUNDATION IN LOCATIONS SUBJECT TO SEEPAGE OR HIGH WATER TABLE.
 3. THE WIDTH OF THE PAD SHALL NOT BE LESS THAN THE FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS AND IN ANY CASE SHALL NOT BE LESS THAN 12 FEET (3.6 M) WIDE.
 4. THE LENGTH OF THE PAD SHALL BE AS REQUIRED, BUT NOT LESS THAN 50 FEET (15.2 M).
 5. LOCATE CONSTRUCTION ENTRANCES AND EXITS TO LIMIT SEDIMENT LEAVING THE SITE AND TO PROVIDE FOR MAXIMUM UTILITY BY ALL CONSTRUCTION VEHICLES. AVOID ENTRANCES WHICH HAVE STEEP GRADES AND ENTRANCES AT CURVES IN PUBLIC ROADS.
 6. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND, AND REPAIR AND/OR MAINTENANCE OF ANY MEASURES USED TO TRAP SEDIMENT.
 7. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY SHALL BE REMOVED IMMEDIATELY.
 8. PROVIDE DRAINAGE TO CARRY WATER TO A SEDIMENT TRAP OR OTHER SUITABLE OUTLET.
 9. WHEN NECESSARY, WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. SEE SEDIMENT BASIN BMP.
 10. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE THROUGH USE OF SAND BAGS, GRAVEL, STRAW BALES, OR OTHER APPROVED METHODS.

- INSPECTION AND MAINTENANCE:**
11. MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE CONSTRUCTION SITE.
 12. REPLACE GRAVEL MATERIAL WHEN SURFACE VOIDS ARE NOT VISIBLE.
 13. AFTER EACH RAINFALL, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY.
 14. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS. REMOVE ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS WITHIN 24 HOURS.



STORMCEPTOR EF6 (OIL/GRIT SEPARATOR) DETAIL

- NOTES:**
1. ALL HOODS AND TRAPS FOR CATCH BASINS AND WATER QUALITY STRUCTURES SHALL BE AS MANUFACTURED BY: BEST MANAGEMENT PRODUCTS INC. 53 MT. ARCHEB RD. LYME, CT 06371 (860) 434-0277, (860)434-3185 FAX (860) 434-0277, (860)434-3185 TOLL FREE: (800) 504-8008 OR (888)354-7585 WEB SITE: www.bmptmp.com OR P/E-APPROVED EQUAL.
 2. ALL HOODS SHALL BE CONSTRUCTED OF A GLASS REINFORCED RESIN COMPOSITE WITH ISO GEL COAT EXTERIOR FINISH WITH A MINIMUM 0.125\"/>



- GENERAL NOTES:**
- * MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m² (27.9 gpm/ft²) FOR STORMCEPTOR EF6 AND 535 L/min/m² (13.1 gpm/ft²) FOR STORMCEPTOR EF06 (OIL CAPTURE CONFIGURATION).
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
 2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
 3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
 4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
 5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.
- INSTALLATION NOTES**
- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
 - B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
 - C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
 - D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
 - E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

DEEP SUMP CATCH BASIN WITH DEBRIS COLLECTOR DETAIL
N.T.S.



Spruhan Engineering, P.C.

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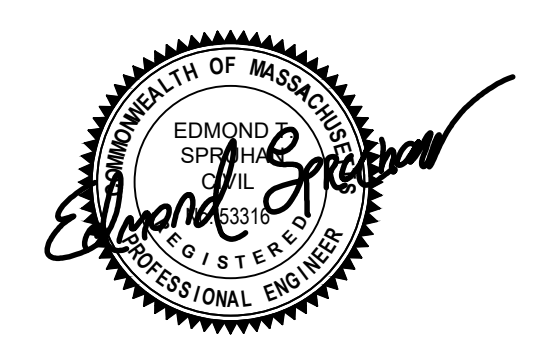
122 CHESTNUT STREET
FRANKLIN
MASSACHUSETTS

CIVIL PLANS

REVISION BLOCK

DESCRIPTION	DATE
REVISED AS PER TOWN OF FRANKLIN COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	6/29/2020
REVISED AS PER BETA COMMENTS	7/13/2020

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DATE:	11/08/2019
DRAWN BY:	G.P.
CHECKED BY:	E.S.
APPROVED BY:	E.S.

DETAILS



**Spruhan
Engineering, P.C.**

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122 CHESTNUT STREET
FRANKLIN
MASSACHUSETTS

CIVIL PLANS

REVISION BLOCK

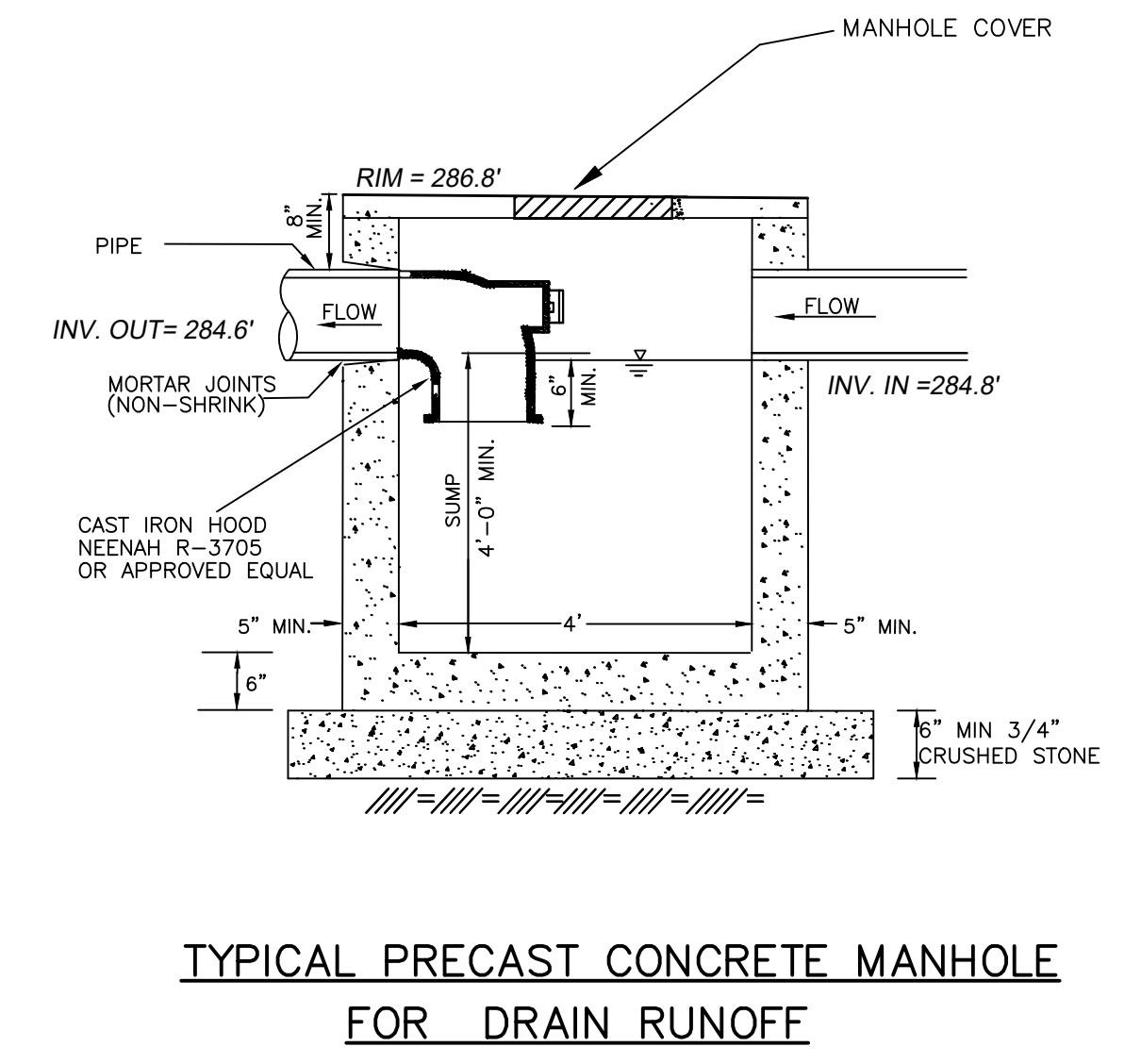
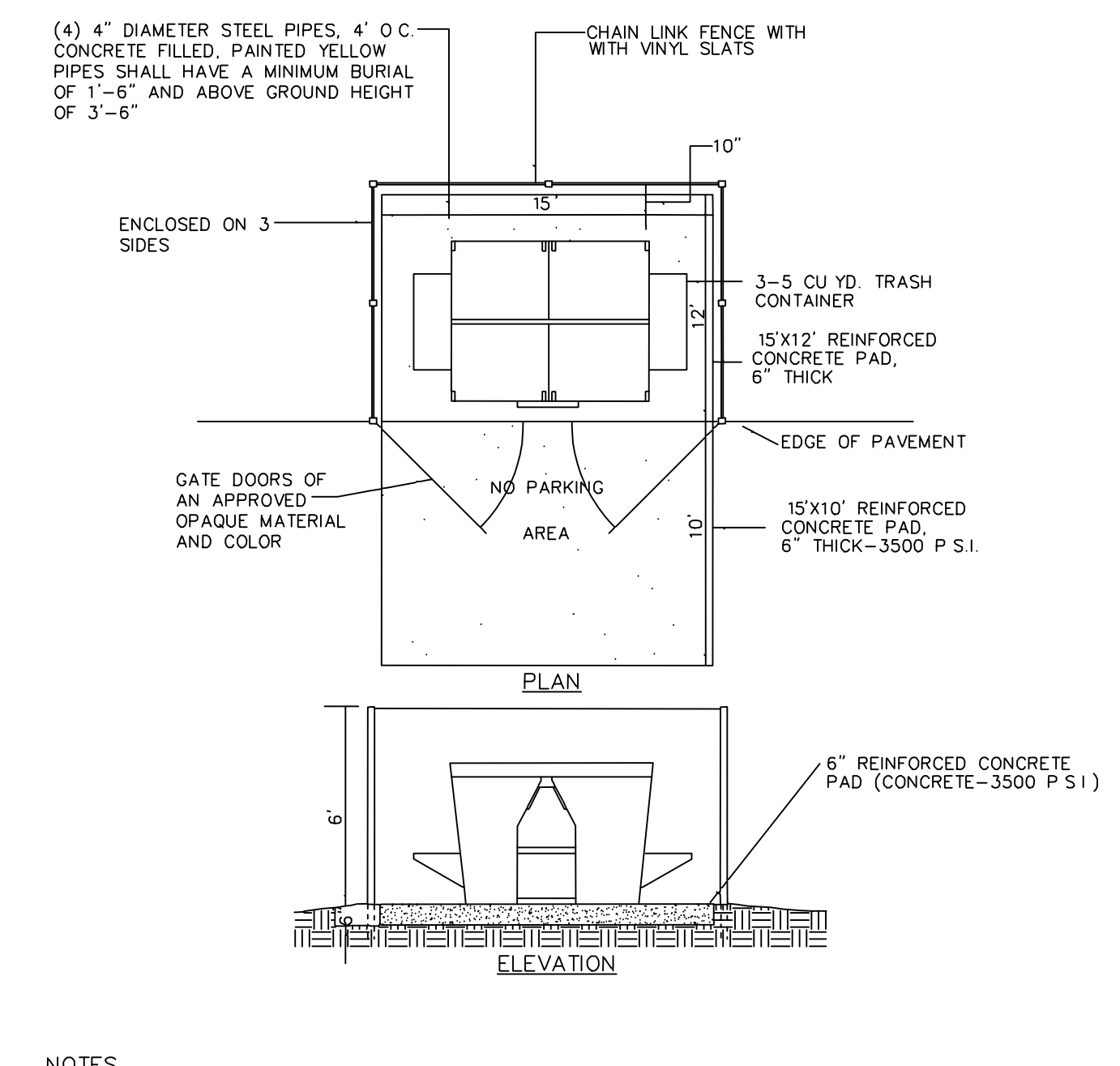
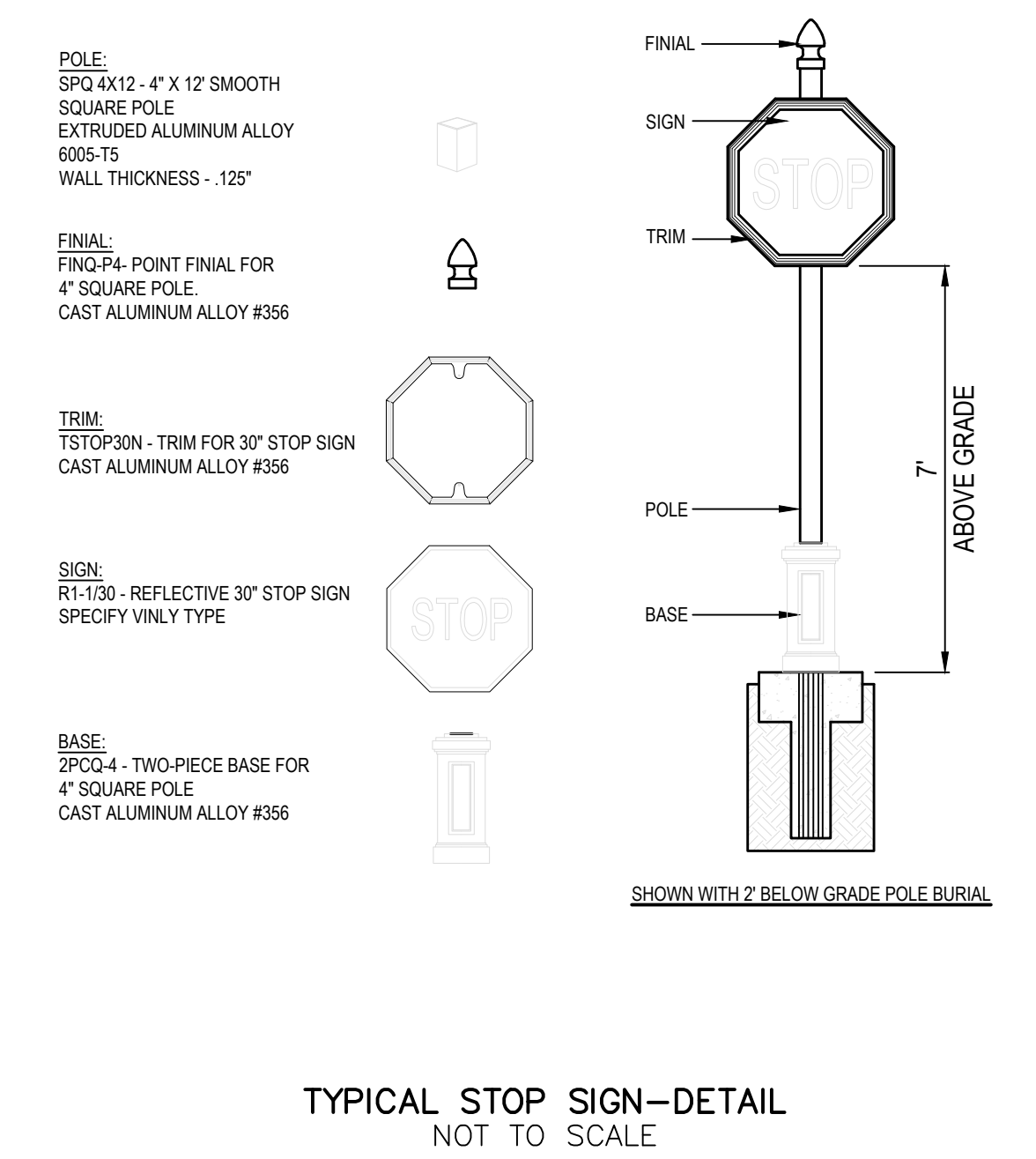
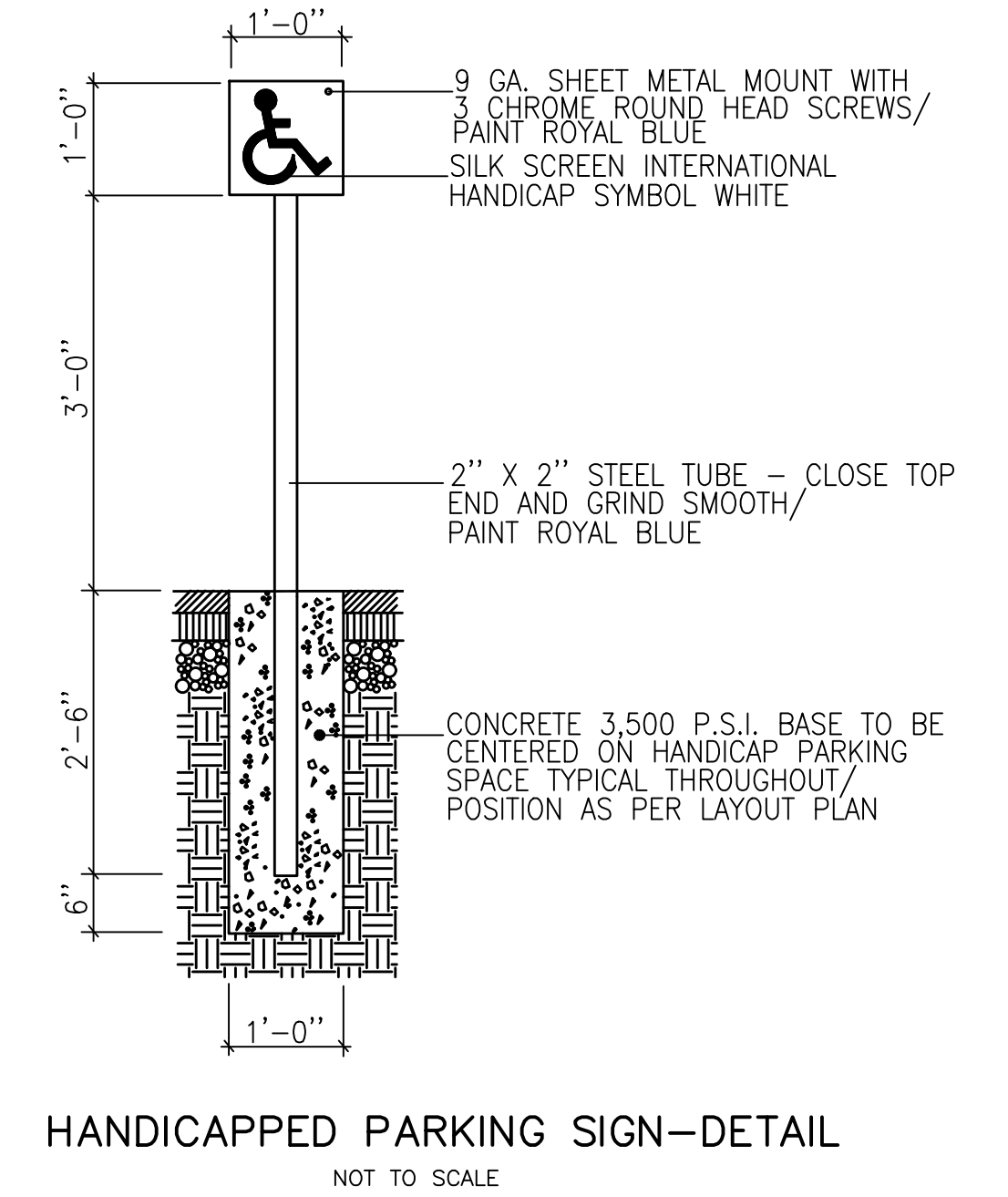
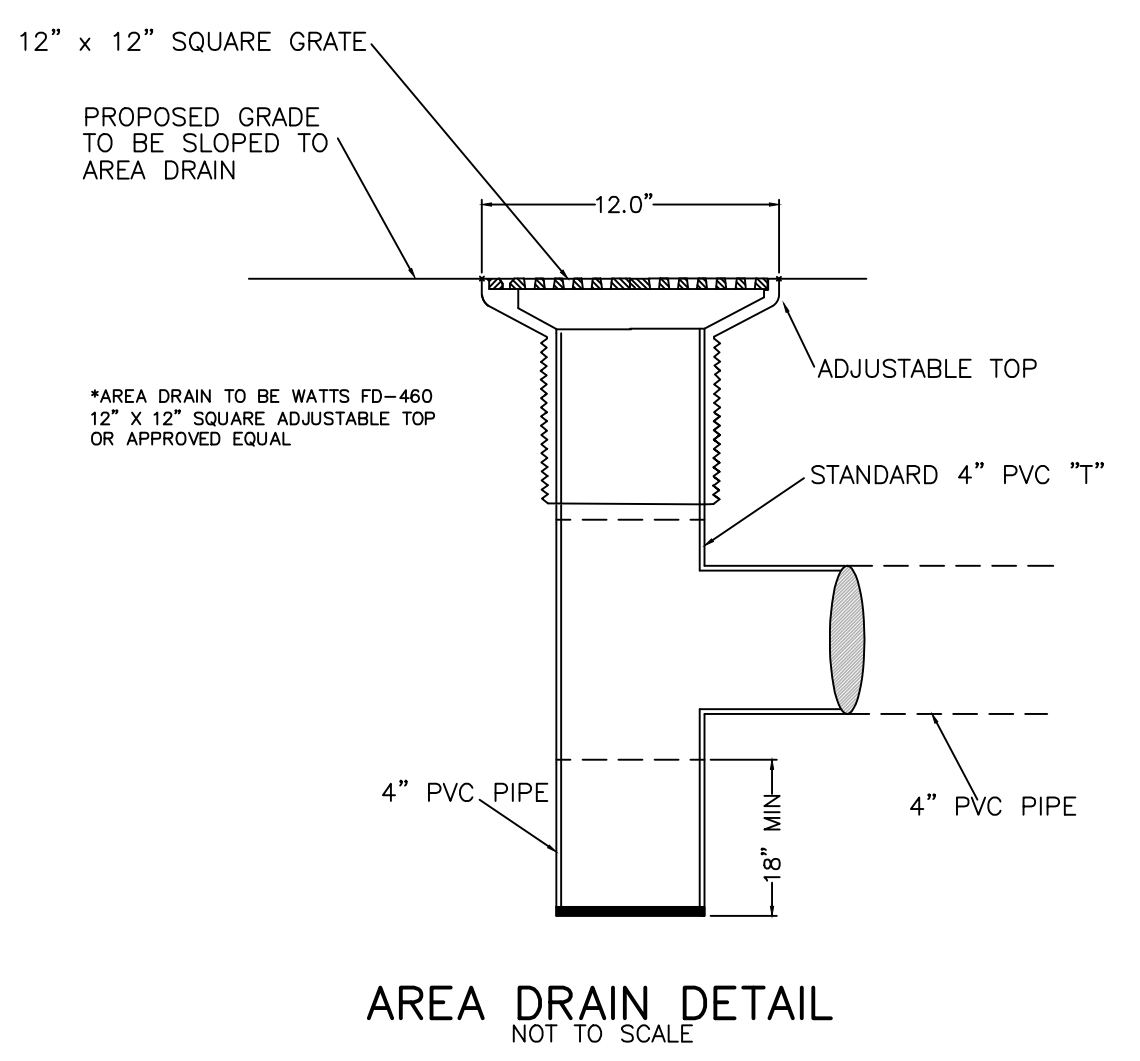
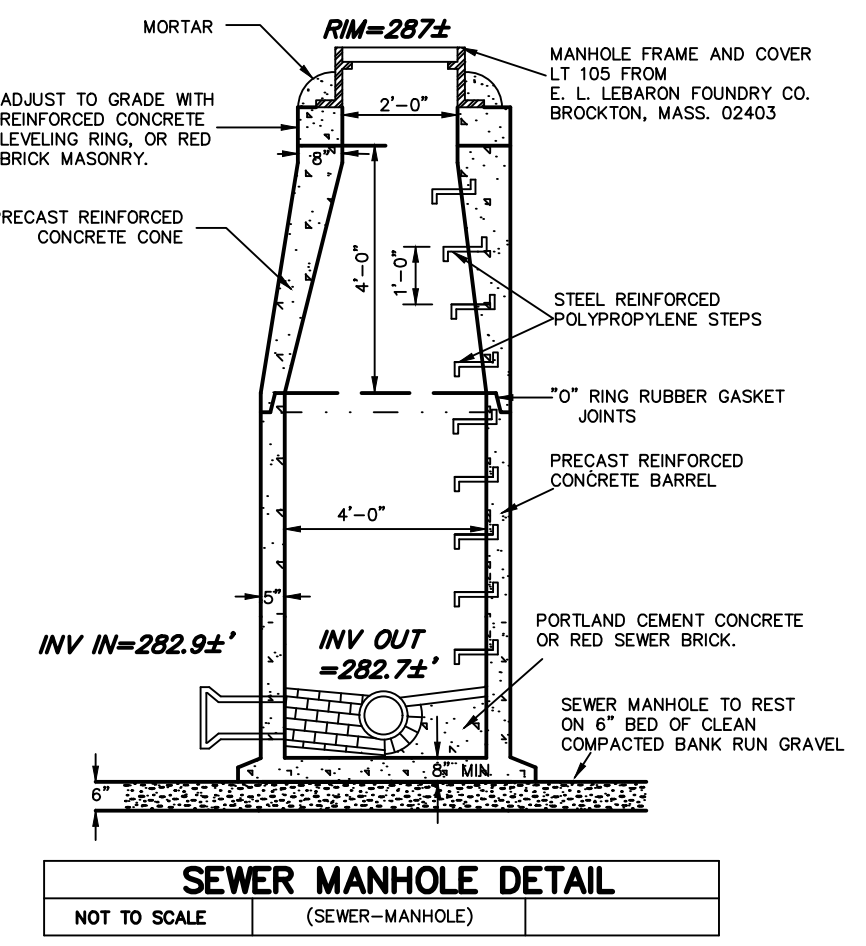
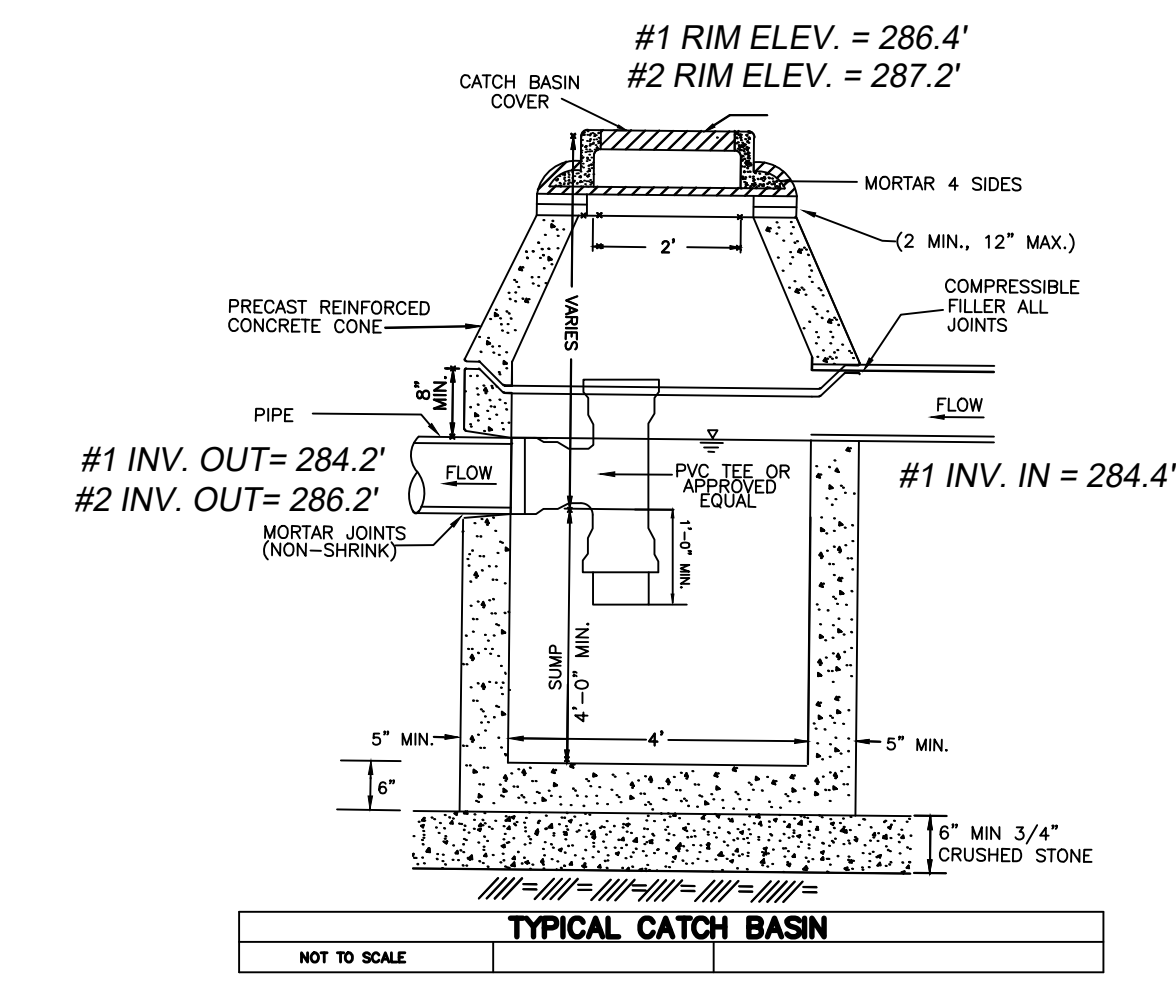
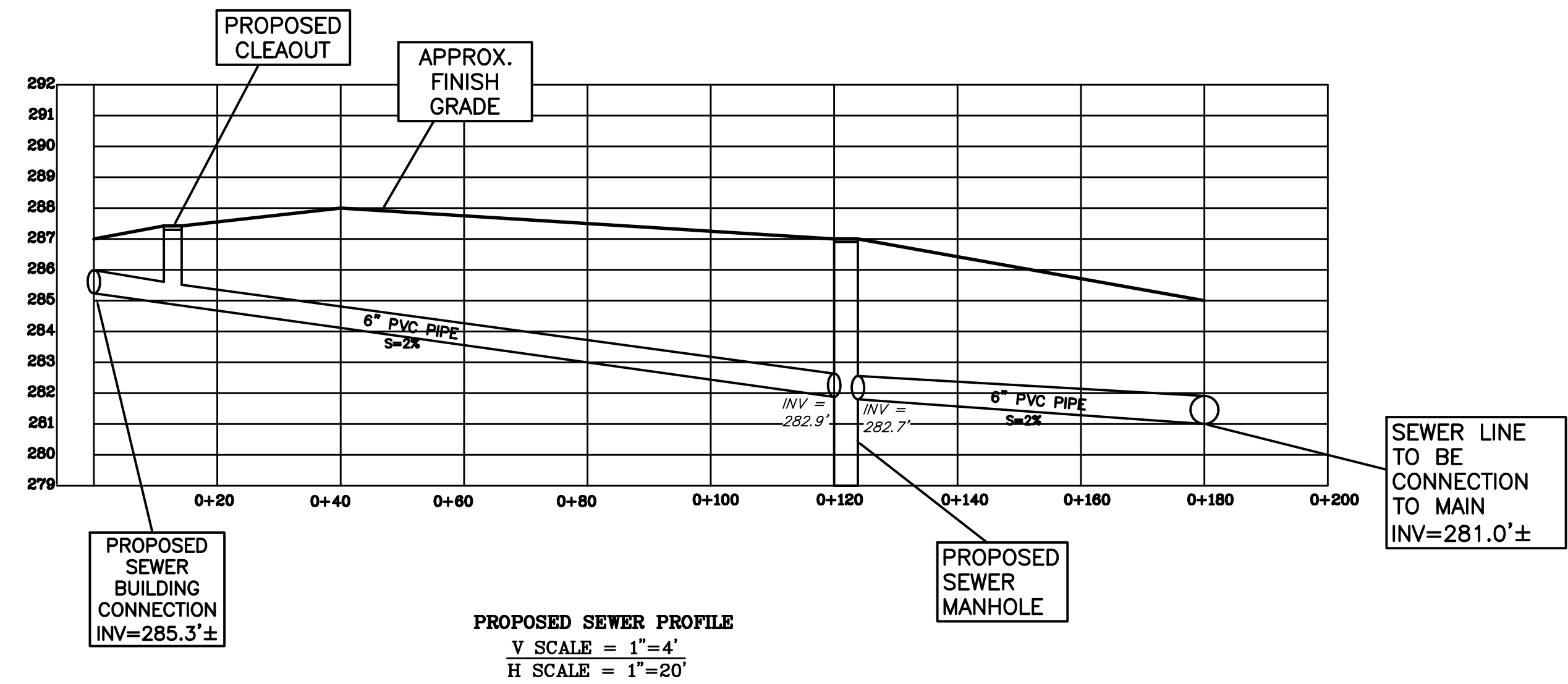
DESCRIPTION	DATE
REVISED AS PER TOWN OF FRANKLIN COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	7/1/2020
REVISED AS PER BETA COMMENTS	7/13/2020

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DETAILS





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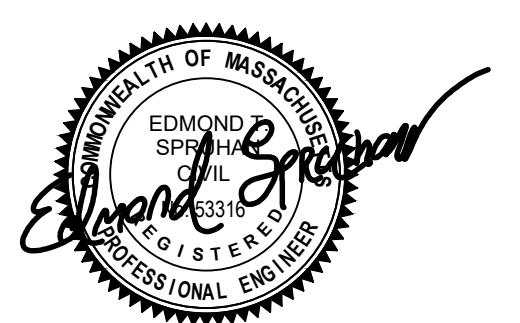
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CIVIL PLAN

REVISION BLOCK

DESCRIPTION	DATE
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REVISED AS PER BETA COMMENTS	7/1/2020

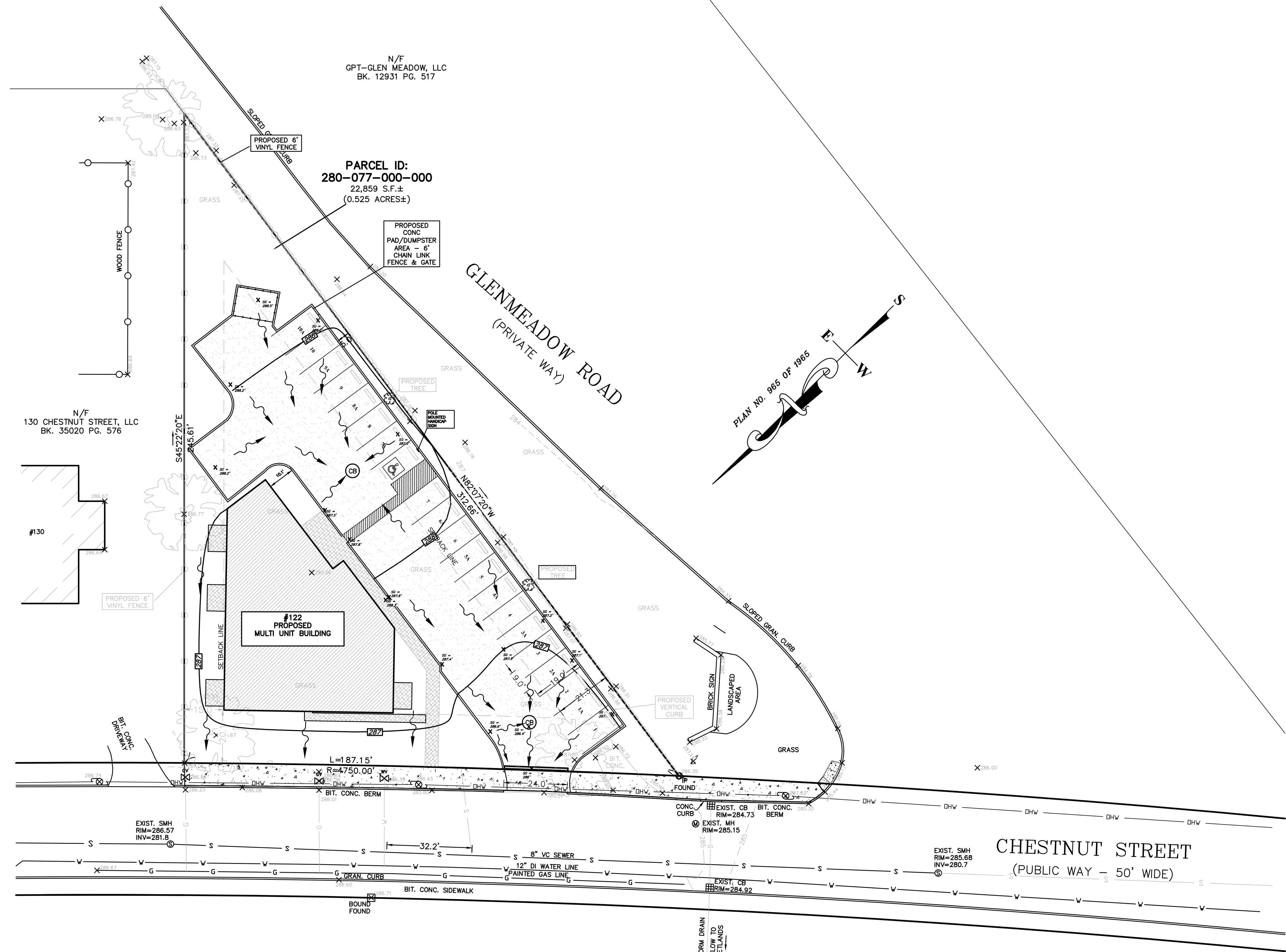
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PROPOSED
WATERSHED

SHEET 9 OF 12



N/F
GPT-GLEN MEADOW, LLC
BK. 12931 PG. 517

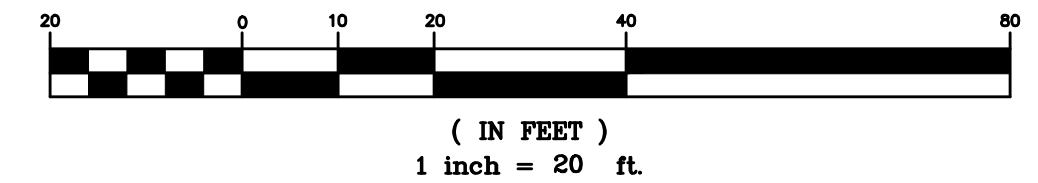
PARCEL ID:
280-077-000-000
22,859 S.F.±
(0.525 ACRES±)

N/F
130 CHESTNUT STREET, LLC
BK. 35020 PG. 576

#122
PROPOSED
MULTI UNIT BUILDING

CHESTNUT STREET
(PUBLIC WAY - 50' WIDE)

GRAPHIC SCALE



(IN FEET)
1 inch = 20 ft.

VEHICLE STORAGE AND MAINTENANCE

- MEASURES SHALL BE TAKEN TO PREVENT OIL, GREASE, OR FUEL TO LEAK IN TO THE GROUND, STORM DRAINS OR SURFACE WATERS.
- ALL EQUIPMENT OR VEHICLES, WHICH ARE TO BE FUELED, MAINTAINED AND STORED ON-SITE SHALL BE IN A DESIGNATED AREA FITTED WITH APPROPRIATE BMPs.
- LEAKS SHALL BE IMMEDIATELY CLEANED AND LEAKED MATERIALS SHALL BE DISPOSED OF PROPERLY.

LANDSCAPE MATERIALS

- CONTAIN STOCKPILED MATERIALS SUCH AS MULCHES AND TOPSOIL WHEN THEY ARE NOT ACTIVELY BEING USED
- CONTAIN FERTILIZERS AND OTHER LANDSCAPE MATERIALS WHEN THEY ARE NOT ACTIVELY BEING USED.
- DISCONTINUE THE APPLICATION OF ANY ERODIBLE LANDSCAPE MATERIAL WITHIN 2 DAYS BEFORE A FORECASTED RAIN EVENT OR DURING PERIODS OF PRECIPITATION.
- APPLY ERODIBLE LANDSCAPE MATERIAL AT QUANTITIES AND APPLICATION RATES ACCORDING TO MANUFACTURE RECOMMENDATIONS OR BASED ON WRITTEN SPECIFICATIONS BY KNOWLEDGEABLE AND EXPERIENCED FIELD PERSONNEL.
- STACK ERODIBLE LANDSCAPE MATERIAL ON PALLETS AND COVERING OR STORING SUCH MATERIALS WHEN NOT BEING USED OR APPLIED.

FIBER ROLL CONSTRUCTION SPECIFICATIONS

- PREPARE SLOPE BEFORE THE WATTLING PROCEDURE IS STARTED. SHALLOW GULLIES SHOULD BE SMOOTHED AS WORK PROGRESSES.
- DIG SMALL TRENCHES ACROSS SLOPE ON CONTOUR, TO PLACE WATTLES IN. THE TRENCH SHOULD BE DEEP ENOUGH TO ACCOMMODATE HALF THE THICKNESS OF THE WATTLE. WHEN THE SOIL IS LOOSE AND UNCOMPACTED, THE TRENCH SHOULD BE DEEP ENOUGH TO BURY THE WATTLE 2/3 OF ITS THICKNESS BECAUSE THE GROUND WILL SETTLE. IT IS CRITICAL THAT WATTLES ARE INSTALLED PERPENDICULAR TO WATER MOVEMENT, PARALLEL TO THE SLOPE CONTOUR.
- START BUILDING TRENCHES AND INSTALL WATTLES FROM THE BOTTOM OF THE SLOPE AND WORK UP.
- CONSTRUCT TRENCHES AT CONTOUR INTERVALS OF THREE TO EIGHT FEET APART DEPENDING ON STEEPNESS OF SLOPE. THE STEEPER THE SLOPE, THE CLOSER TOGETHER THE TRENCHES.
- LAY THE WATTLE ALONG THE TRENCHES FITTING IT SNUGLY AGAINST THE SOIL. MAKE SURE NO GAPS EXIST BETWEEN THE SOIL AND THE STRAW WATTLE. USE A STRAIGHT BAR TO DRIVE HOLES THROUGH THE WATTLE AND INTO THE SOIL FOR THE WOODEN STAKES.
- DRIVE THE STAKE THROUGH THE PREPARED HOLE INTO THE SOIL. LEAVE ONLY ONE OR TWO INCHES OF STAKE EXPOSED ABOVE WATTLE. IF USING WILLOW STAKES REFER TO USDA SOIL CONSERVATION SERVICE TECHNICAL GUIDE, BIOENGINEERING, FOR GUIDELINES TO PREPARING LIVE WILLOW MATERIAL.
- INSTALL STAKES AT LEAST EVERY FOUR FEET APART THROUGH WATTLE. ADDITIONAL STAKES MAY BE DRIVEN ON THE DOWNSLOPE SIDE OF THE TRENCHES ON HIGHLY ERODIBLE OR VERY STEEP SLOPES.

FIBER ROLL INSTALLATION AND MAINTENANCE

- INSPECT THE STRAW WATTLE AND THE SLOPES AFTER SIGNIFICANT STORMS. MAKE SURE THE WATTLES ARE IN CONTACT WITH THE SOIL.
- REPAIR ANY RILLS OR GULLIES PROMPTLY.
- RESEED OR REPLANT VEGETATION IF NECESSARY UNTIL THE SLOPE IS STABILIZED.

EROSION CONTROL NOTES

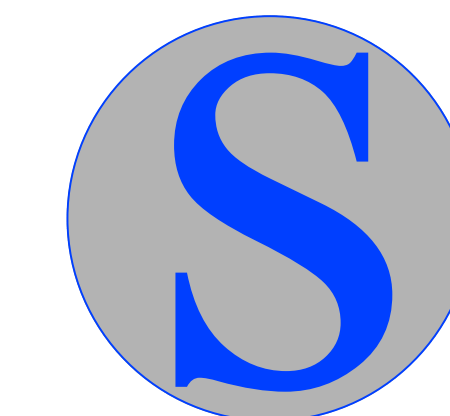
- THE EROSION CONTROL PLANS IN THIS SET SHALL BE REVIEWED AND IMPLEMENTED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL WORK WITH THE PROJECT'S ENGINEER THROUGHOUT CONSTRUCTION TO ENSURE THE SITE IS PROPERLY PROTECTED FROM POSSIBLE POLLUTANTS. THE ENGINEER HAS AUTHORIZATION TO ADD OR REMOVE BMP MEASURES THROUGHOUT CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING SITE EROSION CONTROL AT ALL TIMES.
- IT SHALL BE THE RESPONSIBILITY OF THE OWNER AND THE PERMITEE TO ENSURE THAT EROSION DOES NOT OCCUR FROM ANY ACTIVITY DURING OR AFTER PROJECT CONSTRUCTION. ADDITIONAL MEASURES, BEYOND THOSE SPECIFIED, MAY BE REQUIRED BY THE PLANNING DIRECTOR AS DEEMED NECESSARY TO CONTROL ACCELERATED EROSION.
- AT THE END OF EACH WORKDAY, AT THE END OF EACH WORKWEEK, THE CONTRACTOR SHALL IMPLEMENT ALL TEMPORARY MEASURES NECESSARY TO PREVENT EROSION AND SILTATION, UNTIL THE PROJECT HAS BEEN FINALIZED. THESE MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, DIRECT SEEDING OF THE AFFECTED AREAS, STRAW MULCHING, AND/OR INSTALLATION OF STRAW BALES DAMS/SILT FENCES.
- DURING CONSTRUCTION, NO TURBID WATER SHALL BE PERMITTED TO LEAVE THE SITE. USE OF SILT AND GREASE TRAPS, FILTER BERMS, HAY BALES OR SILT FENCES SHALL BE USED TO PREVENT SUCH DISCHARGE.
- ALL AREAS ON- AND OFF-SITE EXPOSED DURING CONSTRUCTION ACTIVITIES, IF NOT PERMANENTLY LANDSCAPED PER PLAN, SHALL BE PROTECTED BY MULCHING AND/OR SEEDING.
- ALL EXCAVATED MATERIAL SHALL BE REMOVED TO AN APPROVED DISPOSAL SITE OR DISPOSED OF ON-SITE IN A MANNER THAT WILL NOT CAUSE EROSION.
- ANY MATERIAL STOCKPILED, FOR LONGER THAN 14 DAYS, DURING CONSTRUCTION SHALL BE COVERED WITH PLASTIC.
- UPON COMPLETION OF CONSTRUCTION, ALL REMAINING EXPOSED SOILS SHALL BE PERMANENTLY REVEGETATED.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT ADDITIONAL MEASURES NECESSARY TO CONTROL SITE EROSION AND PREVENT SEDIMENT TRANSPORT OFF-SITE ARE IMPLEMENTED.
- ALL SPILLS AND/OR LEAKS SHALL BE IMMEDIATELY CLEANED UP AND MITIGATED.

CONSTRUCTION MATERIALS

- ALL LOOSE STOCKPILED CONSTRUCTION MATERIALS THAT ARE NOT ACTIVELY BEING USED (I.E. SOIL, SPOILS, AGGREGATE, FLY-ASH, STUCCO, HYDRATED LIME, ETC.) SHALL BE COVERED AND BERMED.
- ALL CHEMICALS SHALL BE STORED IN WATERTIGHT CONTAINERS (WITH APPROPRIATE SECONDARY CONTAINMENT TO PREVENT ANY SPILLAGE OR LEAKAGE) OR IN A STORAGE SHED (COMPLETELY ENCLOSED).
- EXPOSURE OF CONSTRUCTION MATERIALS TO PRECIPITATION SHALL BE MINIMIZED. THIS DOES NOT INCLUDE MATERIALS AND EQUIPMENT THAT ARE DESIGNED TO BE OUTDOORS AND EXPOSED TO ENVIRONMENTAL CONDITIONS (I.E. POLES, EQUIPMENT PADS, CABINETS, CONDUCTORS, INSULATORS, BRICKS, ETC.).
- BEST MANAGEMENT PRACTICES TO PREVENT THE OFF-SITE TRACKING OF LOOSE CONSTRUCTION AND LANDSCAPE MATERIALS SHALL BE IMPLEMENTED.

WASTE MANAGEMENT

- DISPOSAL OF ANY RINSE OR WASH WATERS OR MATERIALS ON IMPERVIOUS OR PERVIOUS SURFACES OR INTO THE STORM DRAIN SYSTEM SHALL BE PREVENTED.
- SANITATION FACILITIES SHALL BE CONTAINED (E.G. PORTABLE TOILETS) TO PREVENT DISCHARGES OF POLLUTANTS TO THE STORM WATER DRAINAGE SYSTEM OR RECEIVING WATER, AND SHALL BE LOCATED A MINIMUM 20 FEET AWAY FROM AN INLET, STREET OR DRIVEWAY, STREAM, RIPARIAN AREA OR OTHER DRAINAGE FACILITY.
- SANITATION FACILITIES SHALL BE INSPECTED REGULARLY FOR LEAKS AND SPILLS AND CLEANED OR REPLACED AS NECESSARY.
- COVER WASTE DISPOSAL CONTAINERS AT THE END OF EVERY BUSINESS DAY AND DURING A RAIN EVENT.
- DISCHARGES FROM WASTE DISPOSAL CONTAINERS TO THE STORM WATER DRAINAGE SYSTEM OR RECEIVING WATER SHALL BE PREVENTED.
- STOCKPILED WASTE MATERIAL SHALL BE CONTAINED AND SECURELY PROTECTED FROM WIND AND RAIN AT ALL TIMES UNLESS ACTIVELY BEING USED.
- PROCEDURES THAT EFFECTIVELY ADDRESS HAZARDOUS AND NON-HAZARDOUS SPILLS SHALL BE IMPLEMENTED. EQUIPMENT AND MATERIALS FOR CLEANUP OF SPILLS SHALL BE AVAILABLE ON SITE AND THAT SPILLS AND LEAKS SHALL BE CLEANED UP IMMEDIATELY AND DISPOSED OF PROPERLY; AND
- CONCRETE WASHOUT AREAS AND OTHER WASHOUT AREAS THAT MAY CONTAIN ADDITIONAL POLLUTANTS SHALL BE CONTAINED SO THERE IS NO DISCHARGE INTO THE UNDERLYING SOIL AND ONTO THE SURROUNDING AREAS.



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122 CHESTNUT STREET
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MASSACHUSETTS

CIVIL PLANS

REVISION BLOCK

DESCRIPTION	DATE
REVISED AS PER TOWN OF FRANKLIN COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	28/02/2020
REVISED AS PER BETA COMMENTS	7/1/2020

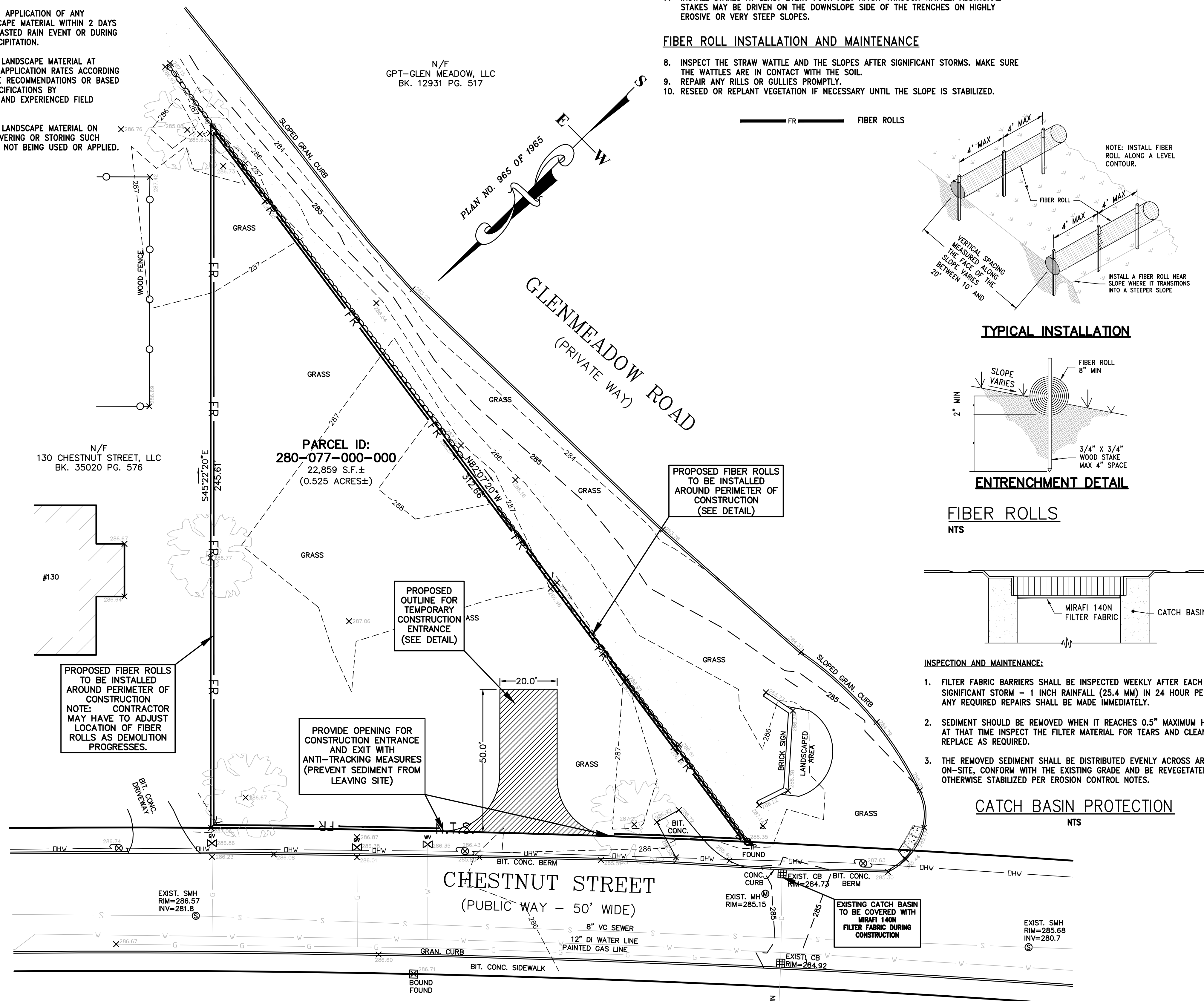
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APPROVED BY: E.S.

DEMOLITION & EROSION CONTROL PLAN

SHEET 10 OF 12



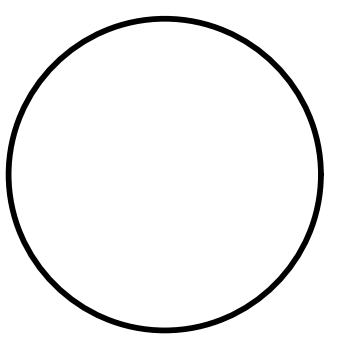
**New
Multi-Family
Dwelling**

**122
Chestnut Street
Franklin, MA**

OWNER

mckay architects

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www.mckayarchitects.net



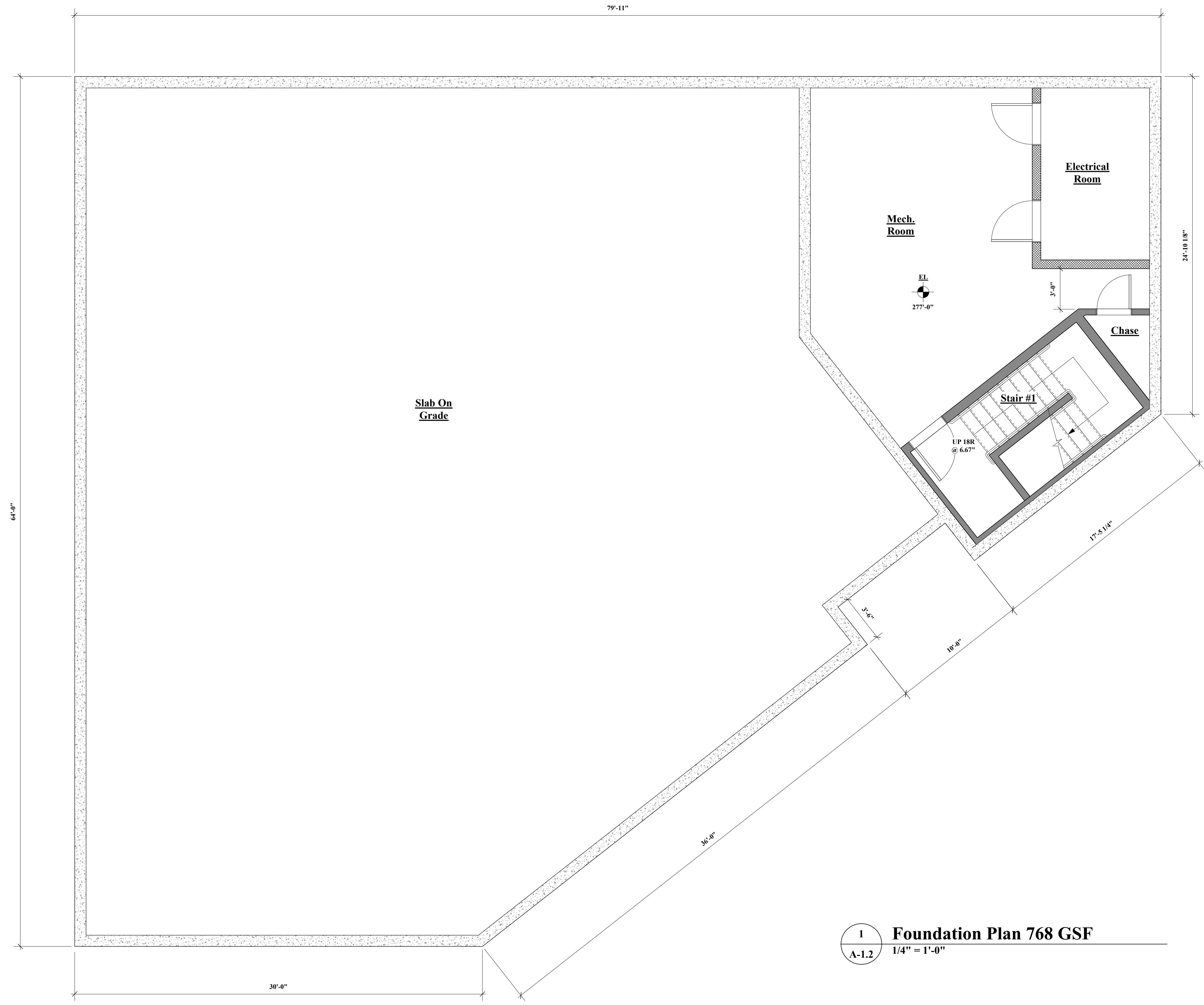
REV #	DATE	ISSUANCE
1	12.19.19	UPDATES
2	04.24.20	UPDATES

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**Foundation
Plan**

JOB NO	0240
DATE	04.24.2020
DWG BY	EAL
CKD BY	MLM
SCALE	1/4" = 1'-0"

A-1.1



1 Foundation Plan 768 GSF
A-1.2 1/4" = 1'-0"

SUMMARY

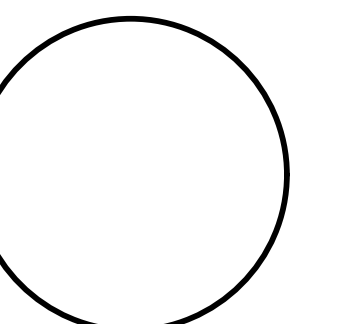
FIRST FLOOR	(5) 1 BR UNITS	3,587 SF
SECOND FLOOR	(5) 2 BR TOWN HOUSE UNITS	3,323 SF
THIRD FLOOR	(5) 2 BR TOWN HOUSE UNITS	3,620 SF
TOTAL	(10)	UNITS 10,530 SF

New Multi-Family Dwelling
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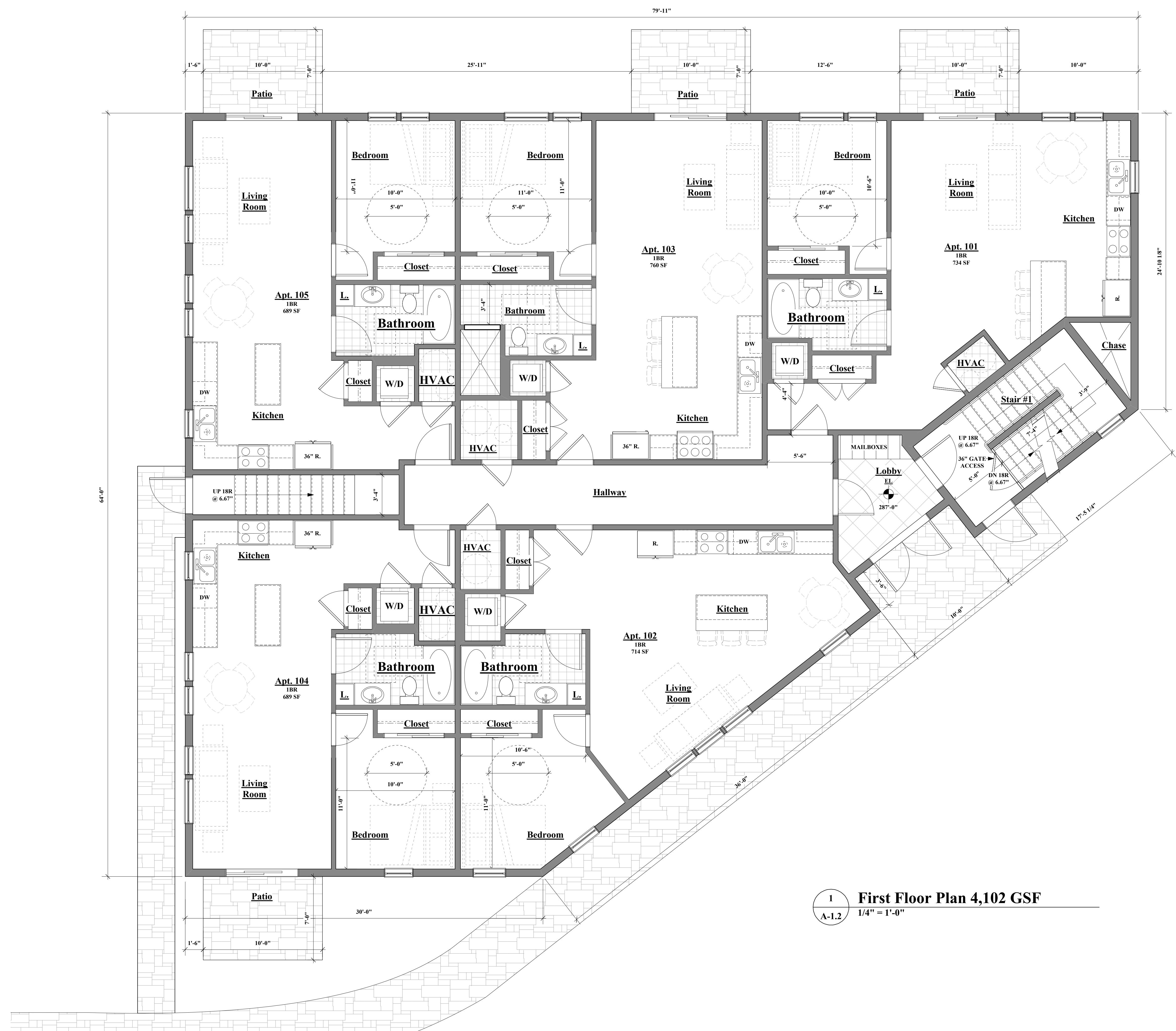
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First Floor Plan

JOB NO	0240
DATE	04.24.2020
DWG BY	EAL
CKD BY	MLM
SCALE	1/4" = 1'-0"

A-1.2



1 First Floor Plan 4,102 GSF
 A-1.2 1/4" = 1'-0"

SUMMARY

FIRST FLOOR	(5) 1 BR UNITS	3,587 SF
SECOND FLOOR	(5) 2 BR TOWN HOUSE UNITS	3,323 SF
THIRD FLOOR	(5) 2 BR TOWN HOUSE UNITS	3,620 SF
TOTAL	(10)	UNITS 10,530 SF

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1 Second Floor Plan 3,824 GSF
A-1.4 1/4" = 1'-0"

REV #	DATE	ISSUANCE
1	12.19.19	UPDATES
2	04.24.20	UPDATES

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**Second
Floor Plan**

JOB NO	0240
DATE	04.24.2020
DWG BY	EAL
CKD BY	MLM
SCALE	1/4" = 1'-0"

A-1.3

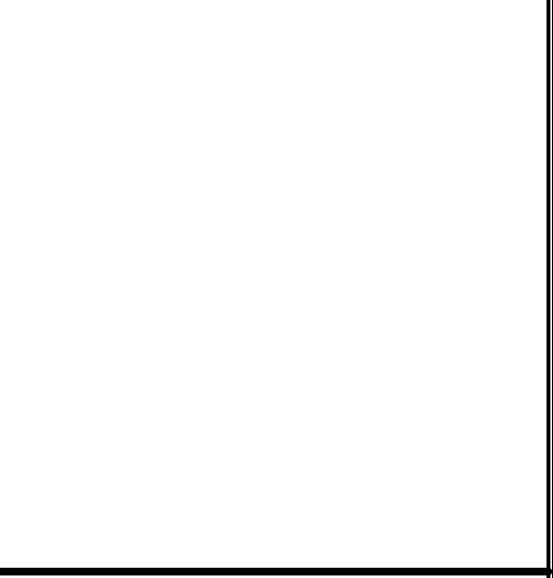


SUMMARY		
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SECOND FLOOR	(5) 2 BR TOWN HOUSE UNITS	3,323 SF
THIRD FLOOR	(5) 2 BR TOWN HOUSE UNITS	3,620 SF
TOTAL	(10)	UNITS 10,530 SF

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2	04.24.20	UPDATES

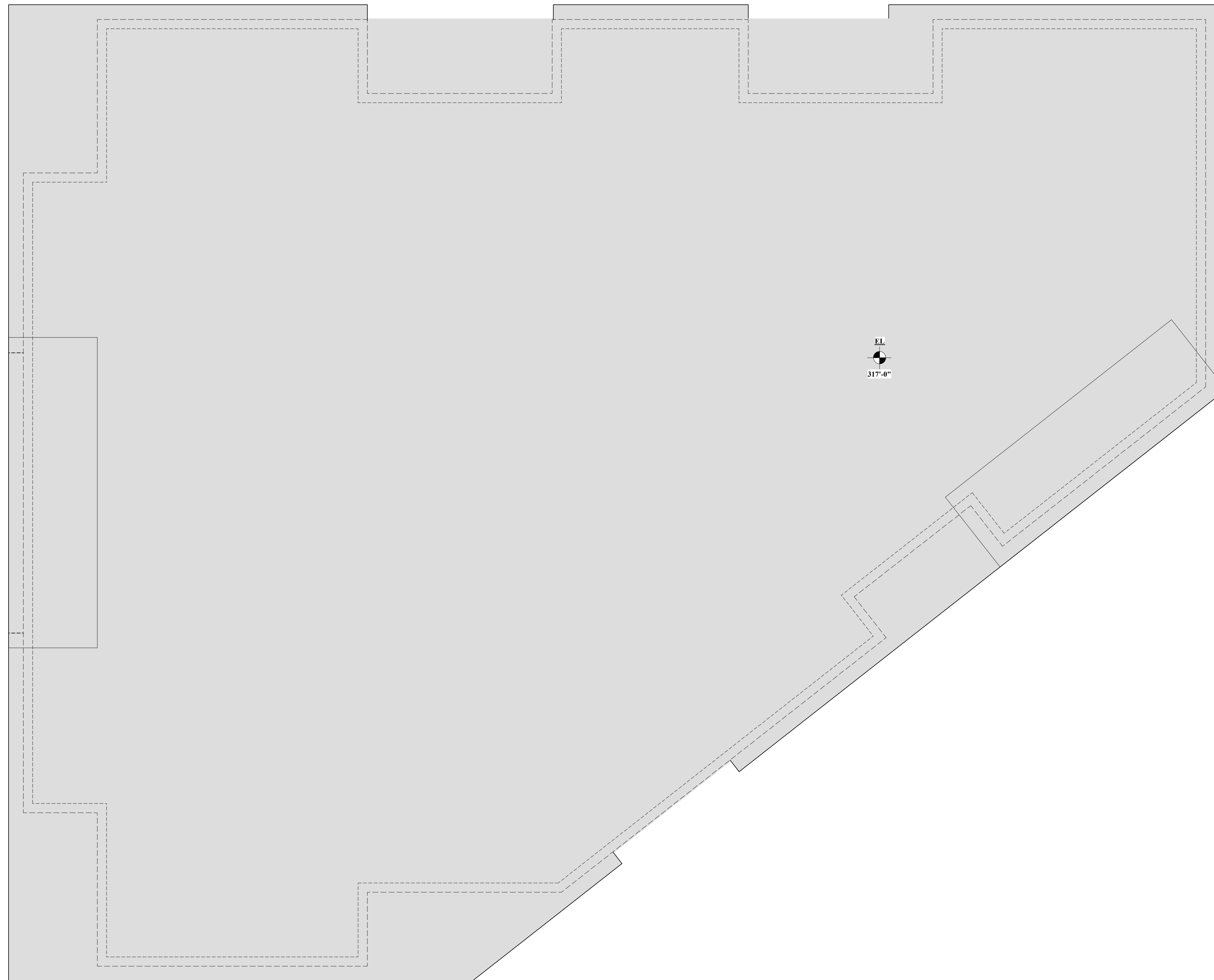
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Third Floor Plan

JOB NO	0240
DATE	04.24.2020
DWG BY	EAL
CKD BY	MLM
SCALE	1/4" = 1'-0"

1 Third Floor Plan 3,620 GSF
 A-1.4 1/4" = 1'-0"

A-1.4



1 **Roof Plan**
 A-1.4 1/4" = 1'-0"

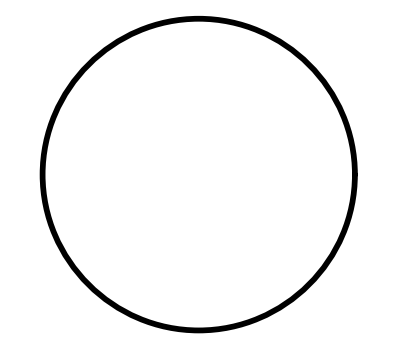
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REV #	DATE	ISSUANCE
1	12.19.19	UPDATES
2	04.24.20	UPDATES

OWNERSHIP & USE OF DOCUMENTS
 These drawings and specifications are the property and copyright of McKay Architects and shall not be used in whole or in part, or shall be assigned to a third party without the express written permission of McKay Architects.
 Contractor to verify all information and dimensions in the field prior to start of construction and is to notify McKay Architects of any discrepancies

Roof Plan

JOB NO	0240	A-1.5
DATE	04.24.2020	
DWG BY	EAL	
CKD BY	MLM	
SCALE	1/4" = 1'-0"	

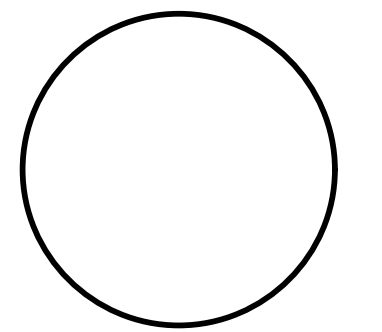
**New
Multi-Family
Dwelling**

**122
Chestnut Street
Franklin, MA**

OWNER

architects
mckay

35 Bryant Street
Dedham, MA 02026
ph:781.326.5400
www.mckayarchitects.net



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**Chestnut Street
Elevation**

JOB NO	0240
DATE	04.24.2020
DWG BY	EAL
CKD BY	MLM
SCALE	1/4" = 1'-0"

A-2.1



1 Chestnut Street Elevation
A-2.1 1/4" = 1'-0"



TOWN OF FRANKLIN

DEPARTMENT OF PUBLIC WORKS

Franklin Municipal Building

257 Fisher Street

Franklin, MA 02038-3026

July 21, 2020

Mr. Anthony Padula, Chairman
Members of the Franklin Planning Board
355 East Central Street
Franklin, MA 02038

RE: Site Plan Modification – 10 Unit Multi-family, 122 Chestnut Street

Dear Mr. Chairman and Members:

We have reviewed the revised materials for the subject project and our previous comments have been addressed.

Should you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Michael Maglio, P.E.
Town Engineer



July 20, 2020

Mr. Anthony Padula, Chairman
Franklin Planning Board
355 East Central Street
Franklin, MA 02038

**Re: 122 Chestnut Street
Site Plan Peer Review Update**

Dear Mr. Padula:

BETA Group, Inc. has reviewed revised documents for the proposed Site Plan Approval application, "122 Chestnut Street," located at 122 Chestnut Street in Franklin, Massachusetts. This letter is provided to update findings, comments, and recommendations.

BASIS OF REVIEW

BETA received the following items:

- Application for Approval of a Site Plan including the following:
 - Form P Site Plan Application Form
 - Certificate of Ownership
- Plans (5 Sheets) entitled: *122 Chestnut Street*, revised July 13, 2020, prepared by Spruhan Engineering, P.C. of Newton, MA
- Stormwater Report, dated July 13, 2020, prepared by Spruhan Engineering, P.C. of Newton, MA
- *Zoning Board of Appeals Decision* dated March 30, 2017.
- *Zoning Board of Appeals Decision* dated July 18, 2019.

Review by BETA included the above items along with the following, as applicable:

- Site Visit
- ***Zoning Chapter 185 From the Code of the Town of Franklin***, dated January 30, 2019.
- ***Zoning Map of the Town of Franklin, Massachusetts***, attested to August 23, 2018
- ***Stormwater Management Chapter 153 From the Code of the Town of Franklin***, Adopted May 2, 2007
- ***Subdivision Regulations Chapter 300 From the Code of the Town of Franklin***, dated January 1, 2016.
- ***Wetlands Protection Chapter 181 From the Code of the Town of Franklin***, dated August 20, 1997.
- ***Town of Franklin Best Development Practices Guidebook***, dated September 2016.

COMPILED REVIEW LETTER KEY

BETA reviewed this project previously and provided review comments in letters to the Board dated January 6, 2020, March 5, 2020, and July 8, 2020 (original comments in standard text), Spruhan Engineering (SE)

provided responses (responses in *italic text*), and BETA has provided comments on the status of each (status in **standard bold text**).

INTRODUCTION

The project site is an 0.53 +/- acre parcel located at 122 Chestnut Street in the Town of Franklin (the "Site"). The Town of Franklin Assessor's office identifies the parcel as Lot 280-077. The Site is located within the Commercial II zoning district. Parcels to the south and east are also located in this district, parcels to the northeast and northwest are within the Single-Family III district, and parcels to the west are within the Single-Family IV district.

The lot is currently vacant and primarily comprised of grass. A limited number of trees are present at the site and a small driveway apron is located at a curb cut on Chestnut Street.

Topography at the Site is generally flat, with a slight slope to the north. The Site is within a Zone II Wellhead Protection Area and is therefore within the Water Resources District. The project is not located in proximity to a DEP mapped Wetland resource area or an estimated habitat of rare or endangered species. The Site is not located within a FEMA-Mapped 100-year flood zone. NRCS soil maps indicate the presence of Merrimac-Urban Land complex with a Hydrologic Soil Group (HSG) rating of A (high infiltration potential).

The project proposes to construct a 4,000 +/- SF structure for use as a ten-unit apartment building. Associated site improvements include a parking area, walkway, and sidewalk. Proposed utilities include sewer, gas, and water. Stormwater management is proposed through catch basin conveyance to a subsurface infiltration system.

FINDINGS, COMMENTS AND RECOMMENDATIONS

GENERAL COMMENTS

- G1. Provide plans that are plotted to the indicated scale(s). *SE: Spruhan Engineering revised scale on plans.* **BETA2: Scale revised – issue resolved.**
- G2. Provide details for pavement, sidewalks, walkways, driveway, wheelchair ramps, dumpster pad and screened enclosure, signs, sewer structure, plantings, and other site features. *SE: Spruhan Engineering added details.* **BETA2: Majority of details not provided – issue remains outstanding.** *SE2: Missing details has been added to the plan, please see Sheet #4 to Sheet #7 and attached Landscape Plan.* **BETA3: Requested details provided except for dumpster pad and enclosure; however, a note has been added to the plans indicating dumpster to be placed on concrete pad and surrounded by chain link fence. Typically, the Board requires chain link fence for dumpsters to include vinyl slats for screening.** *SE3: Chain link fence with vinyl slats note has been added to the plan, also detail for dumpster pad has been added to the details sheet, please see sheet #7.* **BETA4: Detail updated to include vinyl slats – issue resolved.**
- G3. Depict the existing wheelchair ramp at the intersection of Glen Meadow Road. *SE: Spruhan Engineering updated the plans to show the existing wheelchair ramp.* **BETA2: Information provided – issue resolved.**

- G4. Review topography of existing conditions survey. Based upon a site visit there appears to be a low point in proximity to the southerly property line. *SE: Spruhan Engineering believes that the low point is beyond property line but will review and update the plans if necessary.* **BETA2: BETA awaits confirmation by the designer – issue remains outstanding.** *SE2: Confirmed, the topography shown on the plan has been verified.* **BETA2: Information provided – issue resolved.**
- G5. Revise the existing conditions plan to remove the building, detached garage, walks, stairs, and parking areas, which are not present. *SE: Spruhan Engineering updated the Existing conditions plan to exclude the original building and driveway which was on the property.* **BETA2: Plan revised – issue resolved.**
- G6. Relocate the proposed dumpster pad that is currently depicted approximately 6 feet from the adjacent rehabilitation center's property line. *SE: Spruhan Engineering relocated the proposed dumpster and update the plans.* **BETA2: The dumpster pad has been relocated; however, it is unclear how a waste collection vehicle will be able to access the area if resident's vehicles are parked in the adjacent spaces. Also, based upon discussion at the previous Planning Board hearing, the designer must demonstrate that the waste collection vehicle can exit the site without backing onto a public way §185-21.D.** *SE2: New paved area has been added, turning analysis plan is attached for reference.* **BETA3: Dumpster pad relocated and turn around area provided for waste collection vehicle – issue resolved.**

ZONING

The site is located within the Commercial II (CII) District and the Water Resources Protection District. The proposed use of the Site is multi-family apartment building. This use is not permitted within the Commercial II zoning district per §185 Attachment 7; however, the Board of Appeals has granted variances with conditions for the property that permits a multi-family use.

SCHEDULE OF LOT, AREA, FRONTAGE, YARD AND HEIGHT REQUIREMENTS (§185 ATTACHMENT 9)

The Zoning Board of Appeals has granted a variance for the property which allows relief from the requirements for Lot Area, Lot Width, Lot Depth, Front Yard Setback, and Side Yard Setback. Accounting for these provisions, the projects meets these requirements and is anticipated to comply with Building Height and Lot Coverage.

- Z1. Revise Zoning Legend to include proposed dimensions and note/reference variances granted by the Board of Appeals. *SE: Spruhan Engineering updated Zoning Legend.* **BETA2: Legend revised to include proposed dimensions. BETA defers to the preference of the Board to require references to the granted variances.** *SE2: Legend has been updated to show granted variances, Please see Sheet #2.* **BETA3: References to granted variances provided – issue resolved.**
- Z2. Clarify existing dimensions shown on the Zoning Legend as there are no existing structures on the parcel. *SE: Spruhan Engineering updated the Existing conditions plan to exclude the original building and driveway which was on the property.* **BETA2: Legend revised – issue resolved.**
- Z3. Revise Zoning Legend to include proposed building height and impervious coverage. *SE: Spruhan Engineering updated Zoning Legend.* **BETA2: Information provided – issue resolved.**

PARKING, LOADING AND DRIVEWAY REQUIREMENTS (§185-21)

Access to the Site will be provided through a 24' +/- wide paved driveway from a new curb cut along Chestnut Street. Twenty-one parking spaces are proposed along the eastern side of this driveway. Proposed parking spaces are 9' wide by 19' long. No parking spaces have been designed to meet ADA requirements for accessible parking.

Section §185-21.B.(3)(a) describes the number of parking spaces required for residential buildings. Two spaces must be provided per each dwelling unit proposed. As ten dwelling units are proposed, a minimum of twenty parking spaces are required.

- P1. Provide accessible parking spaces meeting ADA requirements. The common use parking areas require one accessible space (521 CMR 10.1 and 23.2.1) that must also be van accessible. Also, clarify if any of the rental units will be accessible. Per 521 CMR 10.3, parking spaces for dwelling unit occupants must be capable of complying with 521 CMR 23.2 through 521 CMR 23.8. Provide required accessible spaces, signing and striping, and demonstrate that additional accessible spaces can be provided for occupants, if necessary. *SE: Spruhan Engineering provided accessible parking spaces to meet the requirements. Please see sheet#2. BETA2: An accessible space and aisle are depicted on the plans. Provide required signing and striping. SE2: Handicap striping and pole mounted handicap accessible sign has been added to the plan, Please see Sheet #2. BETA3: Required signing and striping provided – issue resolved.*
- P2. Provide an accessible route from parking space(s) to building in accordance with 521 CMR 10.2, including ramps and crosswalk. *SE: Spruhan Engineering provided accessible route from parking spaces to meet the requirements. Please see sheet#2. BETA2: Accessible route provided. Recommend swapping the location of the accessible space and access aisle to provide a direct route to the ramp. SE2: Location of the accessible ramp has been updated. Please see Sheet #2. BETA3: Location revised – issue resolved.*
- P3. Provide spot grades along proposed walkway to clarify height of walkway compared to driveway, as necessary. *SE: Spruhan Engineering updated proposed plot plan showing spot grades on the proposed walkway. Please see Sheet#3. BETA2: Spot grades have been provided; however, they indicate the proposed walkway is between 0.9' and 1.2' above the adjacent parking area. It is recommended to reduce the differential to a typical 6"±. SE2: Spot grades have been updated. Please see Sheet #3. BETA3: Grading revised – issue resolved.*
- P4. Provide trees for parking area in accordance with §185-21.C.(5). *SE: Spruhan Engineering updated proposed plot plan showing location of trees for parking to meet the requirements. Please see sheet#2. BETA2: Trees provided – issue resolved.*
- P5. The proposed curb cut centerline is located approximately 147 feet from the existing curb cut centerline at 130 Chestnut Street and may require a Special Permit in accordance with §185-21.C.(7)(b). BETA notes the existing curb cut at 130 Chestnut appears to function as secondary connection to the parking area for greater than 20 vehicles and that the primary access is well beyond 150 feet. *SE: Client will discuss for special permit. BETA2: The driveway centerlines are depicted less than 150 feet apart on the plans. Recommend for the Board to discuss if a Special Permit is required. SE2: Driveway entrance has been relocated and dimension added to the plan. Please see Sheet #2. BETA3: Greater than 150' separation provided – issue resolved.*

- P6. Provide sight distance (required and provided) on plans §185-21.C.(7)(c). *SE: Client to discuss with planning board. BETA2: Issue remains outstanding. SE2: Sight distance chart has been added to plan, Please see Sheet #2. BETA3: Information provided – issue resolved.*

SIDEWALKS (§185-28)

The project is located within the Commercial II Zoning District and is required to provide concrete sidewalks along the street frontage unless the Board determines that site conditions preclude their usefulness. A concrete sidewalk is proposed from the building walkway to the intersection of Glen Meadow Road and will provide a continuous connection to East Central Street. An existing sidewalk is located on the opposite side of Chestnut Street; however, there are no additional sidewalks on the project side of the roadway extending to the northeast.

- S11. Provide sidewalks along the entire street frontage in accordance with §185-28 or request waiver from the Board. **BETA2: Sidewalks provided – issue resolved.**
- S12. Provide wheelchair ramp transitions that are consistent with adjacent properties at the proposed curb cut. **BETA2: Revise details for consistency between views and plans (e.g. curb transitions and driveway width).** *SE2: Details has been revised. BETA3: The plan view still indicates 2' radius stones, which is inconsistent with profile view and adjacent properties. SE3: Detail has been revised, please see Sheet #4. BETA4: Detail revised. The Board may wish to consider a condition of approval that requires the driveway opening to fully comply with Massachusetts Architectural Access Board regulations (e.g. 2% maximum cross slope for 36" minimum width, refer to MassDOT Standard Detail E 107.7.0).*

CURBING (§185-29)

Vertical precast curb is proposed adjacent to parking areas.

- C1. Revise curb detail to indicate that precast curb shall be reinforced. *SE: Spruhan Engineering changed to vertical granite curb. BETA2: Granite curb proposed – issue resolved.*
- C2. Provide vertical granite curb along the proposed frontage sidewalk to match existing curb on Chestnut Street. *SE: Spruhan Engineering updated proposed plot plan showing vertical granite curb everywhere. BETA2: Granite curb proposed – issue resolved.*

SITE PLAN REVIEW (§185-31)

The proposed development is subject to Site Plan Review and must comply with the requirements of this section.

- S1. Revise locus map to include boundaries of the Site and abutting land uses (§185-31.C.(3)(d)). *SE: Spruhan Engineering revised and updated plans to include the requested information. BETA2: Boundaries of site and zoning districts not depicted. Also, Single-Family IV and Residential VI districts not shown. SE2: Locus map has been revised to show requested information. BETA3: Requested information generally provided – issue dismissed.*
- S2. Clarify existing land use (§185-31.C.(3)(e)). *SE: Spruhan Engineering revised and updated plans to include the requested information. BETA2: Land use clarified – issue resolved.*

- S3. Indicate presence of Water Resource District (§185-31.C(3)(h)). *SE: Spruhan Engineering will revised and updated plans to include the requested information.* **BETA2: Information provided – issue resolved.**
- S4. Provide location of proposed outdoor lighting (§185-31.C(3)(i)) and associated photometric plan (§185-31.C(3)(l)). *SE: Spruhan Engineering added the location of proposed outdoor lighting and attaching the mentioned plan.* **BETA2: Lighting plan provided, which indicates general conformance with the recommendations of the Illuminating Engineering Society. Minor spillage onto the adjacent property is anticipated to be mitigated by a proposed 6' fence – issue resolved.**
- S5. Provide a landscape plan showing location of existing vegetation along Glen Meadow Road and proposed plantings (§185-31.C(3)(k)). *SE: Spruhan Engineering landscaped plan to be submitted by architect.* **BETA2: BETA will review the landscape plan upon receipt – issue remains outstanding.** *SE2: Landscape plan has been attached to the set of plans.* **BETA3: Landscape plan provided – issue resolved.**
- S6. Provide parking schedule (§185-31.C(3)(o)). *SE: Spruhan Engineering: Client will provide parking schedule.* **BETA2: Issue remains outstanding.** *SE2: Parking schedule has been added to the plan. Please see Sheet #2.* **BETA3: Parking schedule provided – issue resolved.**

SCREENING (§185-35)

The project proposes outdoor parking for 10 or more cars, which must be screened from adjacent residential districts/uses. Residential properties are present to the northwest and southeast. A potential residential use exists at the adjacent 130 Chestnut Street property. No screening or landscaping has been proposed.

- SC1. Provide screening in areas greater than 10 feet from the street line along the property frontage adjacent to parking areas. Supplemental plantings should be also be considered along the southerly parking boundary to enhance existing vegetative screening. *SE: Spruhan Engineering: landscaped plan to be submitted by architect.* **BETA2: BETA will review the landscape plan upon receipt – issue remains outstanding.** *SE2: Landscape plan has been attached to the set of plans.* **BETA3: Screening provided – issue resolved.**
- SC2. In consideration that the adjacent use at 130 Chestnut Street includes (temporary) residences, recommend providing screening along the northeasterly property line adjacent to the parking area. *SE: Spruhan Engineering: landscaped plan to be submitted by architect.* **BETA2: BETA will review the landscape plan upon receipt – issue remains outstanding.** *SE2: Landscape plan has been attached to the set of plans.* **BETA3: A 6' vinyl fence is proposed for screening – issue resolved.**

WATER RESOURCES DISTRICT (§185-40)

The Site is located entirely within the Water Resource District due to the presence of a Zone II Wellhead Protection Area.

- WR1. Section §185-40.D.(l)(ii) requires that the proposed groundwater recharge efforts must be approved by a hydrogeologist; however, provided that the stormwater management system is revised to fully comply with the Massachusetts Stormwater Management Standards there should be

no adverse impact to groundwater as a result of the project. BETA defers to the preference of the Board to require approval by a hydrogeologist. *SE: Spruhan Engineering: Has been addressed by applicant.* **BETA2: As discussed at the previous hearing, review by a hydrogeologist is not required – issue dismissed.**

WR2. Note that any fill placed in quantity greater than 15 yards must be certified in accordance with §185-40.E.(5). *SE: Spruhan Engineering agrees, however no fill on this site.* **BETA2: Information provided – issue resolved.**

WR3. Remove outlets from subsurface infiltration system as identified in drainage calculations. All stormwater runoff from impervious areas must be recharged on-site (§185-40.E.(4)). *SE: Spruhan Engineering changed the configuration of the drainage system to meet the requirements and ensure storage capacity of system is adequate for all storm events.* **BETA2: Outlets removed – issue resolved.**

UTILITIES

The proposed development is shown to be serviced by water, fire service, sewer, and gas utilities. Detailed review of utilities is anticipated to be provided by the DPW.

U1. Depict anticipated locations of additional utilities (electric, etc.) that will service the development. *SE: Spruhan Engineering revised and updated plans to show the requested information.* **BETA2: Issue remains outstanding.** *SE2: Proposed electric line and transformer location added to the plan.* **BETA3: Information provided – issue resolved.**

U2. Provide anticipated locations of proposed gate valves, curb stops, and other appurtenances. *SE: Spruhan Engineering revised and updated plans to show the requested information.* **BETA2: Issue remains outstanding.** *SE2: All gate valves and curb stops has been added to the plan, please see sheets #2 and #3.* **BETA3: Valve locations provided – issue resolved.**

U3. Indicate proposed material for water service connections. *SE: Spruhan Engineering revised and updated plans to show the requested information.* **BETA2: Size and materials provided. Revise 4" fire service to be Class 52 ductile iron pipe.** *SE2: Fire service pipe material has been updated. Please see Sheet #3.* **BETA3: Fire service material revised – issue resolved.**

U4. Confirm proposed 1" domestic service is adequate to serve the development and note that any service greater than 1" requires a saddle at the tap. *SE: Spruhan Engineering revised and changed size of pipe.* **BETA2: Domestic service size revised – issue resolved.**

U5. Remove references to City of Newton on details and revise details, as necessary, to be in conformance with Town of Franklin Department of Public Works Standards for Sewer and Water Materials and Installation. *SE: Spruhan Engineering updated details to comply with Town of Franklin Department of Public Works Standards.* **BETA2: Reference to Newton revised. Recommend for the Board to include a condition that all water, sewer, and drainage installation shall be in conformance with Town Standards.** *SE2: SE agrees.* **BETA2: BETA defers to the preference of the Board to include this condition.**

U6. Provide a note that where any utility installation detail conflicts with the Town of Franklin Department of Public Works Standards for Sewer and Water Materials and Installation (Town Standards) that the Town Standards shall govern. *SE: Spruhan Engineering Added the note to the detail sheet.* **BETA2: Note provided – issue resolved.**

STORMWATER MANAGEMENT

The project proposes to direct runoff from impervious areas into a closed drainage system comprised of roof leaders, a trench drain, and catch basin to be conveyed to a new subsurface infiltration system. All runoff from impervious will be directed to the infiltration system.

GENERAL

- SW1. Provide cleanouts for roof leaders along the perimeter of the proposed building. *SE: Spruhan Engineering Added the note to the detail sheet.* **BETA2: Cleanouts provided – issue resolved.**
- SW2. Revise RCP in areas subject to traffic loads to be a minimum of 12” in accordance with Town construction standards. Where cover is less than 42”, Class V RCP is required. *SE: Spruhan Engineering revised and changed pipe materials.* **BETA2: Drainage pipe has been revised to PVC in areas subject to traffic loads, which is not permitted. Revise pipe to RCP with a minimum dimension of 12” – issue remains outstanding.** *SE2: Drain pipe size and material has been changed to 12” RCP, please see Sheet #3.* **BETA3: Pipe material for parking drainage revised to 12” RCP. PVC pipe is proposed beneath a portion of the parking area where roof drains connect to the subsurface infiltration system and should also be revised to RCP unless a waiver is granted by the Board.** *SE3: Pipe size and material below driveway has been revised, please see sheet #3.* **BETA4: Pipe material revised – issue resolved.**
- SW3. Revise proposed roof leaders to a material that is available in the specified size. *SE: Spruhan Engineering revised and changed pipe materials.* **BETA2: Material revised – issue resolved.**
- SW4. Confirm the proposed roof leaders are adequately sized for the calculated flows. *SE: Spruhan Engineering revised and changed pipe size (Confirmed by Manning Equation).* **BETA2: Information provided – issue resolved.**
- SW5. Provide a stamped MassDEP stormwater checklist. *SE: Spruhan Engineering will provide.* **BETA2: Issue remains outstanding.** *SE2: Stormwater checklist has been attached.* **BETA3: Checklist provided – issue resolved.**
- SW6. Indicate proposed top of stone elevation (above chambers) on detail. *SE: Spruhan Engineering updated storm-tech detail showing top of stone elevation.* **BETA2: Information provided – issue resolved.**
- SW7. Provide spot grades at select locations (e.g. pavement corners) to demonstrate positive drainage. *SE: Spruhan Engineering updated the proposed plot plan and civil plan showing spot grades.* **BETA2: Spot grades provided – issue resolved.**
- SW8. The proposed trench drain may be subject to concentrated flows at the northern end and will be more susceptible to clogging than a catch basin. Recommend to minimize the impervious area directed to the trench drain and to consider supplementing or replacing it with an additional catch basin(s). *SE: Spruhan Engineering have spoken with developer and added an extra catch basin before the trench drain which will have a much larger catchment area then trench drain.* **BETA2: Additional catch basin provided and area directed to the trench drain minimized (~1,300 sq. ft.). As the trench drain will be subject to sediment loads, it should be directed to a structure with a sump. The new catch basin (#2) should be an end of line structure with the trench drain and walkway basin connections relocated to a manhole. Consider providing a cross slope to the walkway to**

eliminate the need for a structure within the walking path. *SE2: Trench drain and area drain are now directed to a drain manhole and walkway area drain has been relocated. Please see Sheet #3.* **BETA3: Provide a sump in the drainage manhole to collect captured sediments and clarify structure callout to indicate “drain manhole.”** *SE3: Manhole note has been revise, also detail for Drain Manhole has been added to details sheet, please see sheets #3 and #7.* **BETA4: Sump provided – issue resolved.**

SW8A. Review and revise rim/inverts as necessary to ensure the proposed drainage infrastructure can be constructed. **BETA notes the difference in rim/invert elevations is as little as 1 foot.** *SE3: All inverts on drainage infrastructure has been revised.* **BETA4: No further comment.**

SW8B. Revise drainage layout to remove bends and wye connections for RCP pipe. A drainage manhole should be provided at pipe junctions. *SE3: All Bends and wye connections for RCP Pipe has been removed, proposed drainage manhole at all junctions has been added to the plan, please see Sheet #3.* **BETA4: Manholes added at junctions – issue resolved.**

MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS:

The project is not located in proximity to wetland resources and will not disturb greater than one acre; however, under Section §185-31C.(3)(m), the Board may require the project to comply with all federal and state requirements, including the Massachusetts Stormwater Management Standards, Town of Franklin’s Subdivision of Land Stormwater Management Regulations, §300-11 as applicable, Chapter 153, Stormwater Management, of Franklin’s Town Code, and the Town of Franklin Best Development Practices Guidebook.

No untreated stormwater (Standard Number 1): *No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

The project does not propose any new untreated stormwater discharges to wetlands – **complies with standard.**

Post-development peak discharge rates (Standard Number 2): *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

The project proposes an increase in impervious area and will use a subsurface infiltration system to mitigate increases in post-development peak discharge rates and total runoff volumes.

SW9. Revise cover type “grass, fair” to “grass, good” in the existing conditions model. Based upon a field visit by BETA existing grass coverage is greater than 75%. *SE: Spruhan Engineering updated Hydrocad Calculations.* **BETA2: Calculation revised – issue resolved.**

SW10. Provide watershed plans showing the pre- and post-development watershed areas and design points. Based upon review of the existing conditions more than one analysis point should be provided. Flow from the site is currently directed to Chestnut Street, the adjacent property at 130 Chestnut Street, and a possible low point/ponding area along the southerly property line. *SE: Spruhan Engineering is providing watershed plans.* **BETA2: Watershed plans provided. In consideration that the design intent is to infiltrate 100% of the impervious area, there is no need to evaluate additional watersheds – issue resolved.**

SW11. Remove impervious area associated with the one-story building and driveway in the existing conditions. These features are not present. *SE: Spruhan Engineering updated the drainage analysis*

and storm water report. To exclude the original building and driveway which was on the property.
BETA2: Calculation revised – issue resolved.

SW12. Clarify how infiltration system outlets will function. The HydroCAD calculations show two 6" vertical orifices at an elevation below the pavement structure. Refer to comment WR3. *SE: Spruhan Engineering changed the configuration of the drainage system to meet the requirements of comment WR3 which shows system is large enough to take all storm events without overflow thus eliminating the need for orifices and updated HydroCAD calculations and stormwater report.* **BETA2: Overflows eliminated – issue resolved.**

SW13. Revise invert elevations for chamber units and stone to be consistent between HydroCAD calculations and plans. *SE: Spruhan Engineering revised and updated HydroCAD calculations and stormwater report.* **BETA2: Calculations and plans revised – issue resolved.**

Recharge to groundwater (Standard Number 3): *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to maximum extent practicable.*

NRCS soil maps indicate the presence of Merrimac-Urban land complex, with a Hydrologic Soil Group Rating (HSG) of A (high infiltration potential). A soil log, located on the Details sheet, indicates the presence of coarse and medium sand in the C layer of the soil profile. The proponent proposes a subsurface infiltration system to provide groundwater recharge.

SW14. Indicate the location of the test pit location on the plans. If not within or in direct proximity to the proposed infiltration area, provide an additional test pit to confirm subsurface conditions. *SE: Spruhan Engineering added the location of the test pit on the Civil Plan.* **BETA2: Test pit location provided – issue resolved.**

SW15. Provide groundwater recharge calculations and demonstrate that the system will drain within 72 hours. *SE: Spruhan Engineering added recharge calculations to stormwater report.* **BETA2: Calculation provided – issue resolved.**

SW15A. Justify the exfiltration rate of 30 in/hr used in the HydroCAD calculations. Sand is associated with a Rawls rate of 8.27 in/hr. Saturated hydraulic conductivity testing is required for rates differing from Rawls. BETA3: Issue remains outstanding. *SE3: Exfiltration rate has been updated to Rawls rates of 8.27 in/hr, therefore the system size has increased, please see revised Stormwater Report and Sheet #3.* **BETA4: Rate revised to 8.27 in/hr – issue resolved.**

80% TSS Removal (Standard Number 4): *For new development, stormwater management systems must be designed to remove 80% of the annual load of Total Suspended Solids.*

The project proposes to direct runoff from roofs and parking areas to a subsurface infiltration system. Pretreatment is proposed in the form of a hooded deep-sump catch basin.

SW16. Provide TSS removal calculations for the treatment train conveying flow from parking areas. *SE: Spruhan Engineering added TSS removal calculations to stormwater report.* **BETA2: Calculation provided – issue resolved.**

SW17. Revise design to include adequate pretreatment prior to infiltration. The proposed trench drain and online catch basin do not receive removal credit. Refer to comment SW20. *SE: Spruhan Engineering added TSS removal calculations to stormwater report.* **BETA2: Additional treatment provided – issue resolved.**

SW18. Provide water quality volume calculations. *SE: Spruhan Engineering will provide.* **BETA2: All impervious area directed to the stormwater system – issue dismissed.**

SW19. Provide a Long-Term Pollution Prevention Plan (LTPPP) meeting the requirements of the Massachusetts Stormwater Handbook. The LTPPP can be incorporated into the site Operation and Maintenance Plan. *SE: Spruhan Engineering added TSS removal calculations to stormwater report.* **BETA2: Information provided – issue resolved.**

Higher Potential Pollutant Loads (Standard Number 5): *Stormwater discharges from Land Uses with Higher Potential Pollutant Loads require the use of specific stormwater management BMPs.*

The project does not propose any Land Uses with Higher Potential Pollutant Loads – **not applicable.**

Critical Areas (Standard Number 6): *Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas.*

The project proposes a discharge within a Zone II Wellhead Protection Area and is thus subject to the requirements of this standard.

SW20. Provide at least 44% pretreatment prior to discharge to the infiltration system. BETA notes that the Board typically prefers the use of a proprietary water quality unit (e.g. Stormceptor, CDS, etc.) for pretreatment in the Water Resource District. *SE: Spruhan Engineering added TSS removal calculations to stormwater report.* **BETA2: Adequate pretreatment provided – issue resolved.**

Redevelopment (Standard Number 7): *Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable.*

The project is being designed as a new development – **not applicable.**

Construction Period Erosion and Sediment Controls (Standard Number 8): *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

The project as currently depicted will not disturb in excess of one acre of land; therefore, a Notice of Intent with EPA and a Stormwater Pollution Prevention Plan (SWPPP) are not required. The project proposes the use of silt fence and haybales as a perimeter erosion control.

SW21. Provide general notes, good housekeeping practices, and maintenance requirements for proposed erosion and sedimentation controls. *SE: Spruhan Engineering added erosion control plan.* **BETA2: Notes provided – issue resolved.**

SW22. The Best Development Practices Guidebook does not permit the use of haybales or silt fence. Revise perimeter controls to use straw wattles or compost filter tubes. *SE: Spruhan Engineering added erosion control plan showing straw wattles.* **BETA2: Remove silt fence from Details (Sheet 4 of 9).** *SE2: Detail has been removed, please see Sheet #4.* **BETA3: Detail removed – issue resolved.**

SW23. If permitted by the DPW, provide drain inlet sediment control protection at catch basins along Chestnut Street that are subject to stormwater flow from the property. *SE: Spruhan Engineering added sediment control on catch basins on erosion control plan.* **BETA2: Protection provided – issue resolved.**

SW24. Provide construction period stabilized construction entrance with minimum recommended dimensions of 50' L x 20' W. *SE: Spruhan Engineering added proposed stabilized construction entrance on erosion control plan.* **BETA2: Construction entrance provided – issue resolved.**

Mr. Anthony Padula, Chairman
July 20, 2020
Page 12 of 12

Operations/maintenance plan (Standard Number 9): *A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

A Long-Term Operation and Maintenance (O&M) Plan has not been provided.

SW25. Provide O&M Plan meeting the requirements of the Massachusetts Stormwater Handbook. *SE: Spruhan Engineering is attaching O&M Plan.* **BETA2: O&M Plan provided – issue resolved.**

Illicit Discharges (Standard Number 10): *All illicit discharges to the stormwater management systems are prohibited.*

SW26. Provide an Illicit Discharge Compliance Statement. *SE: Spruhan Engineering added Illicit Discharge Compliance Statement to the stormwater report.* **BETA2: Statement provided – issue resolved.**

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.



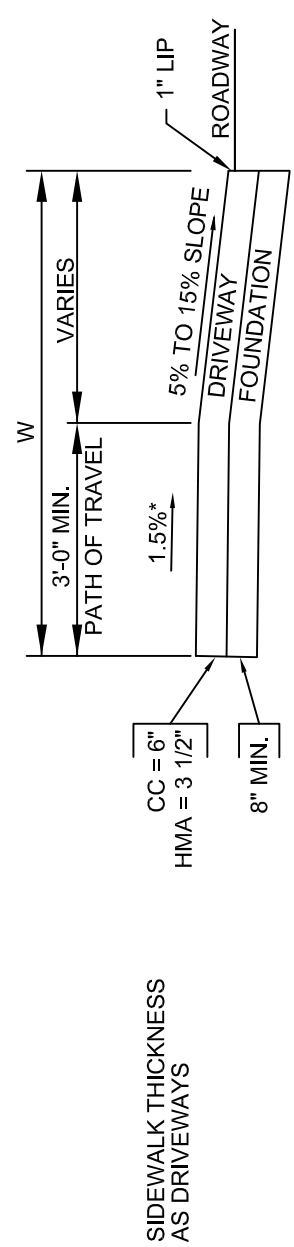
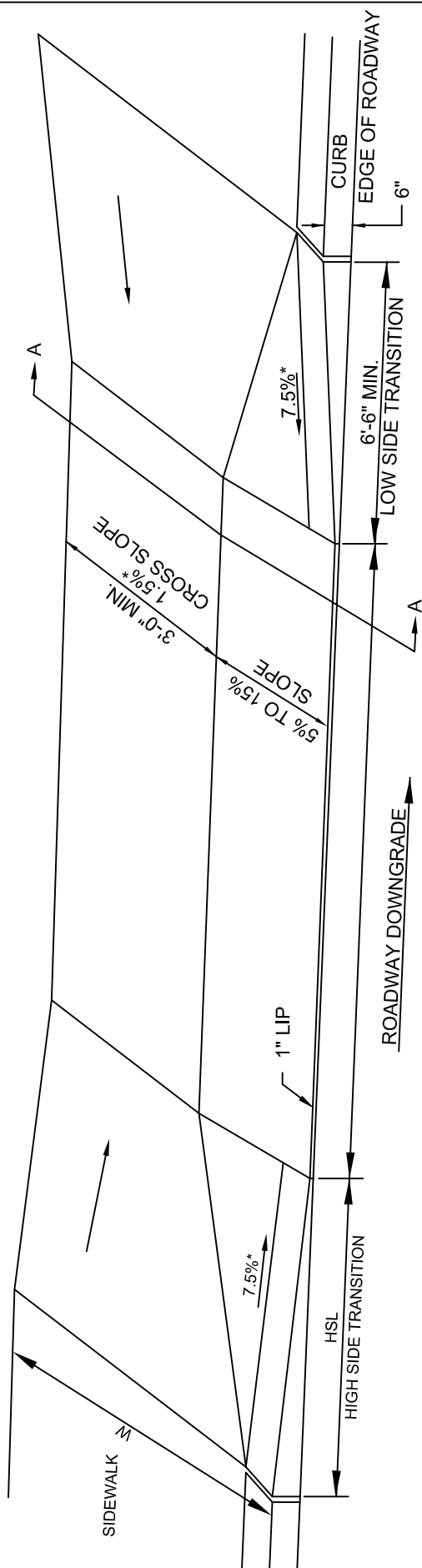
Matthew J. Crowley, PE
Project Manager



Stephen Borgatti
Staff Engineer

cc: Amy Love, Town Planner

Job No: 4830 - 58



SECTION A-A

LEGEND

- HSL = HIGH SIDE TRANSITION LENGTH. SEE E 107.9.0
- W = SIDEWALK WIDTH
- * = TOLERANCE FOR CONSTRUCTION ±0.5%
- CC = CEMENT CONCRETE
- HMA = HOT MIX ASPHALT



**FRANKLIN PLANNING & COMMUNITY
DEVELOPMENT**

355 EAST CENTRAL STREET, ROOM 120
FRANKLIN, MA 02038-1352
TELEPHONE: 508-520-4907

MEMORANDUM

DATE: July 22, 2020
TO: Franklin Planning Board
FROM: Department of Planning and Community Development
RE: 122 Chestnut Street
Site Plan

The DPCD has reviewed the above referenced Site Plan Modification application for the Monday, July 27, 2020 Planning Board meeting and offers the following commentary:

General:

1. The applicant is proposing to construct a 10-unit apartment building.
2. The site is not with Conservation Commission jurisdiction.

Comments:

- Applicant has submitted revised plans based on the Board's comments from the July 13, removing one parking space and transition roundings along the entrance.
- Included also in this packet, are the color renderings of the building.

Recommended the following Special Conditions:

1. Fencing around the dumpster shall include vinyl slats for screening.
2. Recommend for the Board to include a condition that all water, sewer, and drainage installation shall be in conformance with Town Standards.
3. Plans shall include the Certificate of Vote on front page and color renderings of the building.
4. The Board may wish to consider a condition of approval that requires the driveway opening to fully comply with Massachusetts Architectural Access Board regulations (e.g. 2% maximum cross slope for 36" minimum width, refer to MassDOT Standard Detail E 107.7.0.

DPCD has no further comments.

SPRUHAN ENGINEERING, P.C.
80 JEWET STREET,
Newton, MA
Phone: 617-816-07-22/617-782-1533

July 13, 2020

From: Edmond Spruhan, P.E.

To: Mr. Anthony Padula, Chairman
Franklin Planning Board
355 East Central Street
Franklin, MA 02038

Thank you for the enclosed comments on this project.

122 Chestnut Street, Franklin, MA.
Prepared by: Edmund Spruhan, P.E.
Dated: October 29, 2019, Revised: July 13, 2020

GENERAL COMMENTS

G1. Provide plans that are plotted to the indicated scale(s). SE: Spruhan Engineering revised scale on plans. *BETA2: Scale revised – issue resolved.*

G2. Provide details for pavement, sidewalks, walkways, driveway, wheelchair ramps, dumpster pad and screened enclosure, signs, sewer structure, plantings, and other site features. SE: Spruhan Engineering added details. BETA2: Majority of details not provided – issue remains outstanding. SE: Missing details has been added to the plan, please see Sheet#4 to Sheet#7 and attached Landscape plan. *BETA3: Requested details provided except for dumpster pad and enclosure; however, a note has been added to the plans indicating dumpster to be placed on concrete pad and surrounded by chain link fence. Typically, the Board requires chain link fence for dumpsters to include vinyl slats for screening.*

SE3: Chain link fence with vinyl slats note has been added to the plan, also detail for dumpster pad has been added to the details sheet, please see Sheet#7

G3. Depict the existing wheelchair ramp at the intersection of Glen Meadow Road. SE: Spruhan Engineering updated the plans to show the existing wheelchair ramp. *BETA2: Information provided – issue resolved.*

G4. Review topography of existing conditions survey. Based upon a site visit there appears to be a low point in proximity to the southerly property line. SE: Spruhan Engineering believes that the low point is beyond property line but will review and update the plans if necessary. BETA2: BETA awaits confirmation by the designer – issue remains outstanding. SE: Confirmed, the topography shown on the plan has been verified *BETA2: Information provided – issue resolved.*

G5. Revise the existing conditions plan to remove the building, detached garage, walks, stairs, and parking areas, which are not present. SE: Spruhan Engineering updated the Existing conditions plan to exclude the original building and driveway which was on the property. *BETA2: Plan revised – issue resolved.*

G6. Relocate the proposed dumpster pad that is currently depicted approximately 6 feet from the adjacent rehabilitation center's property line. SE: Spruhan Engineering relocated the proposed dumpster and update the plans. BETA2: The dumpster pad has been relocated; however, it is unclear how a waste collection vehicle will be able to access the area if resident's vehicles are parked in the adjacent spaces. Also, based upon discussion at the previous Planning Board hearing, the designer must demonstrate that the waste collection vehicle can exit the site without backing onto a public way §185-21.D. SE: New paved area has been added, turning analysis plan is attached to the set of plans. *BETA2: Information provided – issue resolved.*

ZONING

Z1. Revise Zoning Legend to include proposed dimensions and note/reference variances granted by the Board of Appeals. SE: Spruhan Engineering updated Zoning Legend. BETA2: Legend revised to include proposed dimensions. BETA defers to the preference of the Board to require references to the granted variances. SE: Legend has been updated to show granted variances, Please see Sheet#2. *BETA3: References to granted variances provided – issue resolved.*

Z2. Clarify existing dimensions shown on the Zoning Legend as there are no existing structures on the parcel. SE: Spruhan Engineering updated the Existing conditions plan to exclude the original building and driveway which was on the property. *BETA2: Legend revised – issue resolved.*

Z3. Revise Zoning Legend to include proposed building height and impervious coverage. SE: Spruhan Engineering updated Zoning Legend. *BETA2: Information provided – issue resolved.*

PARKING, LOADING AND DRIVEWAY REQUIREMENTS (§185-21)

P1. Provide accessible parking spaces meeting ADA requirements. The common use parking areas require one accessible space (521 CMR 10.1 and 23.2.1) that must also be van accessible. Also, clarify if any of the rental units will be accessible. Per 521 CMR 10.3, parking spaces for dwelling unit occupants must be capable of complying with 521 CMR 23.2 through 521 CMR 23.8. Provide required accessible spaces, signing and striping, and demonstrate that additional accessible spaces can be provided for occupants, if necessary. SE: Spruhan Engineering provided accessible parking spaces to meet the requirements. Please see sheet#2. BETA2: An accessible space and aisle are depicted on the plans. Provide required signing and striping. SE: Handicap striping and pole mounted handicap accessible sign has been added to the plan, Please see Sheet#2 *BETA3: Required signing and striping provided – issue resolved.*

P2. Provide an accessible route from parking space(s) to building in accordance with 521 CMR 10.2, including ramps and crosswalk. SE: Spruhan Engineering provided accessible route from parking spaces to meet the requirements. Please see sheet#2. BETA2: Accessible route provided. Recommend swapping the location of the accessible space and access aisle to provide a direct route to the ramp. SE: Location of the accessible route has been updated. Please see Sheet #2. *BETA3: Location revised – issue resolved.*

P3. Provide spot grades along proposed walkway to clarify height of walkway compared to driveway, as necessary. SE: Spruhan Engineering updated proposed plot plan showing spot grades on the proposed walkway. Please see Sheet#3. BETA2: Spot grades have been provided; however, they indicate the proposed walkway is between 0.9' and 1.2' above the adjacent parking area. It is recommended to reduce the differential to a typical 6"±. SE: Spot grades has been updated. *Please see Sheet#3 BETA3: Grading revised – issue resolved.*

P4. Provide trees for parking area in accordance with §185-21.C.(5). SE: Spruhan Engineering updated proposed plot plan showing location of trees for parking to meet the requirements. *Please see sheet#2. BETA2: Trees provided – issue resolved.*

P5. The proposed curb cut centerline is located approximately 147 feet from the existing curb cut centerline at 130 Chestnut Street and may require a Special Permit in accordance with §185-21.C.(7)(b). BETA notes the existing curb cut at 130 Chestnut appears to function as secondary connection to the parking area for greater than 20 vehicles and that the primary access is well beyond 150 feet. SE: Client will discuss for special permit. BETA2: The driveway centerlines are depicted less than 150 feet apart on the plans. Recommend for the Board to discuss if a Special Permit is required. SE: Driveway entrance has been relocated and dimension added to the plan. Please see Sheet #2. *BETA2: The driveway centerlines are depicted less than 150 feet apart on the plans. Recommend for the Board to discuss if a Special Permit is required. SE2: Driveway entrance has been relocated and dimension added to the plan. Please see Sheet #2. BETA3: Greater than 150' separation provided – issue resolved.*

P6. Provide sight distance (required and provided) on plans §185-21.C.(7)(c). SE: Client to discuss with planning board. BETA2: Issue remains outstanding. SE: Sight distance chart has been added to plan, Please see Sheet#2. *BETA3: Information provided – issue resolved.*

SIDEWALKS (§185-28)

S11. Provide sidewalks along the entire street frontage in accordance with §185-28 or request waiver from the Board. *BETA2: Sidewalks provided – issue resolved.*

S12. Provide wheelchair ramp transitions that are consistent with adjacent properties at the proposed curb cut. BETA2: Revise details for consistency between views and plans (e.g. curb transitions and driveway width). SE: Details has been revised. *BETA3: The plan view still indicates 2' radius stones, which is inconsistent with profile view and adjacent properties.*

SE3: Detail has been revised, please see Sheet#4

CURBING (§185-29)

Vertical precast curb is proposed adjacent to parking areas.

C1. Revise curb detail to indicate that precast curb shall be reinforced. SE: Spruhan Engineering changed to vertical granite curb. *BETA2: Granite curb proposed – issue resolved.*

C2. Provide vertical granite curb along the proposed frontage sidewalk to match existing curb on Chestnut Street. SE: Spruhan Engineering updated proposed plot plan showing vertical granite curb everywhere. *BETA2: Granite curb proposed – issue resolved.*

SITE PLAN REVIEW (§185-31)

S1. Revise locus map to include boundaries of the Site and abutting land uses (§185-31.C.(3)(d)). SE: Spruhan Engineering revised and updated plans to include the requested information. BETA2: Boundaries of site and zoning districts not depicted. Also, Single-Family IV and Residential VI districts not shown. SE: Locus map has been revised to show requested information. *BETA3: Requested information generally provided – issue dismissed.*

S2. Clarify existing land use (§185-31.C.(3)(e)). SE: Spruhan Engineering revised and updated plans to include the requested information. *BETA2: Land use clarified – issue resolved.*

S3. Indicate presence of Water Resource District (§185-31.C(3)(h)). SE: Spruhan Engineering will revise and updated plans to include the requested information. *BETA2: Information provided – issue resolved.*

S4. Provide location of proposed outdoor lighting (§185-31.C.(3)(i)) and associated photometric plan (§185-31.C.(3)(l)). SE: Spruhan Engineering added the location of proposed outdoor lighting and

attaching the mentioned plan. *BETA2: Lighting plan provided, which indicates general conformance with the recommendations of the Illuminating Engineering Society. Minor spillage onto the adjacent property is anticipated to be mitigated by a proposed 6' fence – issue resolved.*

S5. Provide a landscape plan showing location of existing vegetation along Glen Meadow Road and proposed plantings (§185-31.C.(3)(k)). SE: Spruhan Engineering landscaped plan to be submitted by architect. BETA2: BETA will review the landscape plan upon receipt – issue remains outstanding. SE: Landscape plan has been attached to the set of plans. *BETA3: Landscape plan provided – issue resolved.*

S6. Provide parking schedule (§185-31.C.(3)(o)). SE: Spruhan Engineering: Client will provide parking schedule. BETA2: Issue remains outstanding. SE: Parking Schedule has been added to the plan. Please see Sheet#2. *BETA3: Parking schedule provided – issue resolved.*

SCREENING (§185-35)

C3. Provide screening in areas greater than 10 feet from the street line along the property frontage adjacent to parking areas. Supplemental plantings should be also be considered along the southerly parking boundary to enhance existing vegetative screening. SE: Spruhan Engineering: landscaped plan to be submitted by architect. BETA2: BETA will review the landscape plan upon receipt – issue remains outstanding. SE: Landscape plan has been attached to the set of plans. *BETA3: Screening provided – issue resolved.*

C4. In consideration that the adjacent use at 130 Chestnut Street includes (temporary) residences, recommend providing screening along the northeasterly property line adjacent to the parking area. SE: Spruhan Engineering: landscaped plan to be submitted by architect. BETA2: BETA will review the landscape plan upon receipt – issue remains outstanding. SE: Landscape plan has been attached to the set of plans. *BETA3: A 6' vinyl fence is proposed for screening – issue resolved.*

WATER RESOURCES DISTRICT (§185-40)

WR1. Section §185-40.D.(l)(ii) requires that the proposed groundwater recharge efforts must be approved by a hydrogeologist; however, provided that the stormwater management system is revised to fully comply with the Massachusetts Stormwater Management Standards there should be no adverse impact to groundwater as a result of the project. BETA defers to the preference of the Board to require approval by a hydrogeologist. SE: Spruhan Engineering: Has been addressed by applicant. *BETA2: As discussed at the previous hearing, review by a hydrogeologist is not required – issue dismissed.*

WR2. Note that any fill placed in quantity greater than 15 yards must be certified in accordance with §185-40.E.(5). SE: Spruhan Engineering agrees, however no fill on this site. *BETA2: Information provided – issue resolved.*

WR3. Remove outlets from subsurface infiltration system as identified in drainage calculations. All stormwater runoff from impervious areas must be recharged on-site (§185-40.E.(4)). SE: Spruhan Engineering changed the configuration of the drainage system to meet the requirements and ensure storage capacity of system is adequate for all storm events. *BETA2: Outlets removed – issue resolved.*

UTILITIES

The proposed development is shown to be serviced by water, fire service, sewer, and gas utilities. Detailed review of utilities is anticipated to be provided by the DPW.

U1. Depict anticipated locations of additional utilities (electric, etc.) that will service the development. SE: Spruhan Engineering revised and updated plans to show the requested information. BETA2: Issue remains outstanding. SE: Proposed Electric line and transformer location added to the plan. *BETA3: Information provided – issue resolved.*

U2. Provide anticipated locations of proposed gate valves, curb stops, and other appurtenances. SE: Spruhan Engineering revised and updated plans to show the requested information. BETA2: Issue remains outstanding. SE: All gate valves and curb stops has been added to the plan, please see sheets #2 and #3. *BETA3: Valve locations provided – issue resolved.*

U3. Indicate proposed material for water service connections. SE: Spruhan Engineering revised and updated plans to show the requested information. BETA2: Size and materials provided. Revise 4" fire service to be Class 52 ductile iron pipe. SE: Fire service pipe material has been updated. Please see sheet#3. *BETA3: Fire service material revised – issue resolved.*

U4. Confirm proposed 1" domestic service is adequate to serve the development and note that any service greater than 1" requires a saddle at the tap. SE: Spruhan Engineering revised and changed size of pipe. *BETA2: Domestic service size revised – issue resolved.*

U5. Remove references to City of Newton on details and revise details, as necessary, to be in conformance with Town of Franklin Department of Public Works Standards for Sewer and Water Materials and Installation. SE: Spruhan Engineering updated details to comply with Town of Franklin Department of Public Works Standards. BETA2: Reference to Newton revised. Recommend for the Board to include a condition that all water, sewer, and drainage installation shall be in conformance with Town Standards. SE: Agrees. *BETA2: BETA defers to the preference of the Board to include this condition.*

SE: Also refers to the Board.

U6. Provide a note that where any utility installation detail conflicts with the Town of Franklin Department of Public Works Standards for Sewer and Water Materials and Installation (Town Standards) that the Town Standards shall govern. SE: Spruhan Engineering Added the note to the detail sheet. *BETA2: Note provided – issue resolved.*

STORMWATER MANAGEMENT

GENERAL

SW1. Provide cleanouts for roof leaders along the perimeter of the proposed building. SE: Spruhan Engineering Added the note to the detail sheet. *BETA2: Cleanouts provided – issue resolved.*

SW2. Revise RCP in areas subject to traffic loads to be a minimum of 12" in accordance with Town construction standards. Where cover is less than 42", Class V RCP is required. SE: Spruhan Engineering revised and changed pipe materials. BETA2: Drainage pipe has been revised to PVC in areas subject to traffic loads, which is not permitted. Revise pipe to RCP with a minimum dimension of 12" – issue remains outstanding. SE: Drain pipe size and material has been changed to 12" RCP, please see Sheet#3. *BETA3: Pipe material for parking drainage revised to 12" RCP. PVC pipe is proposed beneath a portion of the parking area where roof drains connect to the subsurface infiltration system and should also be revised to RCP unless a waiver is granted by the Board.*

SE: Pipe size and material below driveway has been revised, please see sheet#3.

SW3. Revise proposed roof leaders to a material that is available in the specified size. SE: Spruhan Engineering revised and changed pipe materials. *BETA2: Material revised – issue resolved.*

SW4. Confirm the proposed roof leaders are adequately sized for the calculated flows. SE: Spruhan Engineering revised and changed pipe size (*Confirmed by Manning Equation*). *BETA2: Information provided – issue resolved.*

SW5. Provide a stamped MassDEP stormwater checklist. SE: Spruhan Engineering will provide. BETA2: Issue remains outstanding. SE: Stormwater check list has been attached. *BETA3: Checklist provided – issue resolved.*

SW6. Indicate proposed top of stone elevation (above chambers) on detail. SE: Spruhan Engineering updated storm-tech detail showing top of stone elevation. *BETA2: Information provided – issue resolved.*

SW7. Provide spot grades at select locations (e.g. pavement corners) to demonstrate positive drainage. SE: Spruhan Engineering updated the proposed plot plan and civil plan showing spot grades. *BETA2: Spot grades provided – issue resolved.*

SW8. The proposed trench drain may be subject to concentrated flows at the northern end and will be more susceptible to clogging than a catch basin. Recommend to minimize the impervious area directed to the trench drain and to consider supplementing or replacing it with an additional catch basin(s). SE: Spruhan Engineering have spoken with developer and added an extra catch basin before the trench drain which will have a much larger catchment area than trench drain. BETA2: Additional catch basin provided and area directed to the trench drain minimized (~1,300 sq. ft.). As the trench drain will be subject to sediment loads, it should be directed to a structure with a sump. The new catch basin (#2) should be an end of line structure with the trench drain and walkway basin connections relocated to a manhole. Consider providing a cross slope to the walkway to eliminate the need for a structure within the walking path. SE: Trench drain and area drain are now directed to a Drain Manhole and walkway area drain has been relocated. Please see sheet#3. *BETA3: Provide a sump in the drainage manhole to collect captured sediments and clarify structure callout to indicate “drain manhole.”*

SE: Manhole note has been revised, also detail for Drain Manhole has been added to details sheet, please see sheets #3 and #7

SW8A. *Review and revise rim/inverts as necessary to ensure the proposed drainage infrastructure can be constructed. BETA notes the difference in rim/invert elevations is as little as 1 foot.*

SE: All inverts on drainage infrastructure has been revised.

SW8B. *Revise drainage layout to remove bends and wye connections for RCP pipe. A drainage manhole should be provided at pipe junctions.*

SE: All Bends and wye connections for RCP Pipe has been removed, proposed drainage manhole at all junctions has been added to the plan, please see Sheet#3.

MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS:

SW9. Revise cover type “grass, fair” to “grass, good” in the existing conditions model. Based upon a field visit by BETA existing grass coverage is greater than 75%. SE: Spruhan Engineering updated HydroCAD Calculations. *BETA2: Calculation revised – issue resolved.*

SW10. Provide watershed plans showing the pre- and post-development watershed areas and design points. Based upon review of the existing conditions more than one analysis point should be provided. Flow from the site is currently directed to Chestnut Street, the adjacent property at 130 Chestnut Street, and a possible low point/ponding area along the southerly property line. SE: Spruhan Engineering is providing watershed plans. *BETA2: Watershed plans provided. In consideration that the design intent is to infiltrate 100% of the impervious area, there is no need to evaluate additional watersheds – issue resolved.*

SW11. Remove impervious area associated with the one-story building and driveway in the existing conditions. These features are not present. SE: Spruhan Engineering updated the drainage analysis and storm water report. To exclude the original building and driveway which was on the property. *BETA2: Calculation revised – issue resolved.*

SW12. Clarify how infiltration system outlets will function. The HydroCAD calculations show two 6” vertical orifices at an elevation below the pavement structure. Refer to comment WR3. SE: Spruhan Engineering changed the configuration of the drainage system to meet the requirements of comment WR3 which shows system is large enough to take all storm events without overflow thus eliminating the need for orifices and updated HydroCAD calculations and stormwater report. *BETA2: Overflows eliminated – issue resolved.*

SW13. Revise invert elevations for chamber units and stone to be consistent between HydroCAD calculations and plans. SE: Spruhan Engineering revised and updated HydroCAD calculations and stormwater report. *BETA2: Calculations and plans revised – issue resolved.*

SW14. Indicate the location of the test pit location on the plans. If not within or in direct proximity to the proposed infiltration area, provide an additional test pit to confirm subsurface conditions. SE: Spruhan Engineering added the location of the test pit on the Civil Plan. *BETA2: Test pit location provided – issue resolved.*

SW15. Provide groundwater recharge calculations and demonstrate that the system will drain within 72 hours. SE: Spruhan Engineering added recharge calculations to stormwater report. *BETA2: Calculation provided – issue resolved.*

SW15A. Justify the exfiltration rate of 30 in/hr used in the HydroCAD calculations. Sand is associated with a Rawls rate of 8.27 in/hr. Saturated hydraulic conductivity testing is required for rates differing from Rawls. *BETA3: Issue remains outstanding.*

SE: Exfiltration rate has been updated to Rawls rates of 8.27 in/hr, therefore the system size has increased, please see revised Stormwater Report and Sheet#3.

SW16. Provide TSS removal calculations for the treatment train conveying flow from parking areas. SE: Spruhan Engineering added TSS removal calculations to stormwater report. *BETA2: Calculation provided – issue resolved.*

SW17. Revise design to include adequate pretreatment prior to infiltration. The proposed trench drain and online catch basin do not receive removal credit. Refer to comment SW20. SE: Spruhan Engineering added TSS removal calculations to stormwater report. *BETA2: Additional treatment provided – issue resolved.*

SW18. Provide water quality volume calculations. SE: Spruhan Engineering will provide. *BETA2: All impervious area directed to the stormwater system – issue dismissed.*

SW19. Provide a Long-Term Pollution Prevention Plan (LTPPP) meeting the requirements of the Massachusetts Stormwater Handbook. The LTPPP can be incorporated into the site Operation and Maintenance Plan. SE: Spruhan Engineering added TSS removal calculations to stormwater report. *BETA2: Information provided – issue resolved.*

SW20. Provide at least 44% pretreatment prior to discharge to the infiltration system. BETA notes that the Board typically prefers the use of a proprietary water quality unit (e.g. Stormceptor, CDS, etc.) for pretreatment in the Water Resource District. SE: Spruhan Engineering added TSS removal calculations to stormwater report. *BETA2: Adequate pretreatment provided – issue resolved.*

SW21. Provide general notes, good housekeeping practices, and maintenance requirements for proposed erosion and sedimentation controls. SE: Spruhan Engineering added erosion control plan. *BETA2: Notes provided – issue resolved.*

SW22. The Best Development Practices Guidebook does not permit the use of haybales or silt fence. Revise perimeter controls to use straw wattles or compost filter tubes. SE: Spruhan Engineering added erosion control plan showing straw wattles. *BETA2: Remove silt fence from Details (Sheet 4 of 9). SE: Detail has been removed, please see Sheet#4. BETA3: Detail removed – issue resolved.*

SW23. If permitted by the DPW, provide drain inlet sediment control protection at catch basins along Chestnut Street that are subject to stormwater flow from the property. SE: Spruhan Engineering added sediment control on catch basins on erosion control plan. *BETA2: Protection provided – issue resolved.*

SW24. Provide construction period stabilized construction entrance with minimum recommended dimensions of 50' L x 20' W. SE: Spruhan Engineering added proposed stabilized construction entrance on erosion control plan. *BETA2: Construction entrance provided – issue resolved.*

SW25. Provide O&M Plan meeting the requirements of the Massachusetts Stormwater Handbook. SE: Spruhan Engineering is attaching O&M Plan. *BETA2: O&M Plan provided – issue resolved.*

SW26. Provide an Illicit Discharge Compliance Statement. SE: Spruhan Engineering added Illicit Discharge Compliance Statement to the stormwater report. *BETA2: Statement provided – issue resolved.*

I hope that this information is helpful to you. Please do not hesitate to call with any questions.

Respectfully submitted,

Edmond Spruhan

Edmond T. Spruhan

PLANTING PLAN (TREES)

TREE SCHEDULE			
ID	QTY	LATIN NAME	COMMON NAME
AR	2	ACER RUBRUM	RED MAPLE
JVES	13	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	EMERALD SENTINEL JUNIPER
PG	1	PICEA GLAUCA	WHITE SPRUCE
PP	2	PICEA PUNGENS	COLORADO SPRUCE

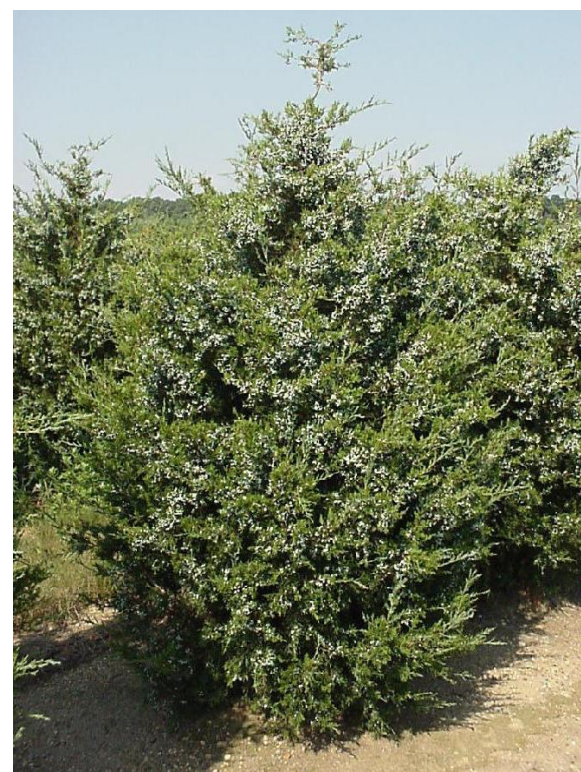
RED MAPLE

ACER RUBRUM



EMERALD SENTINEL JUNIPER

JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'



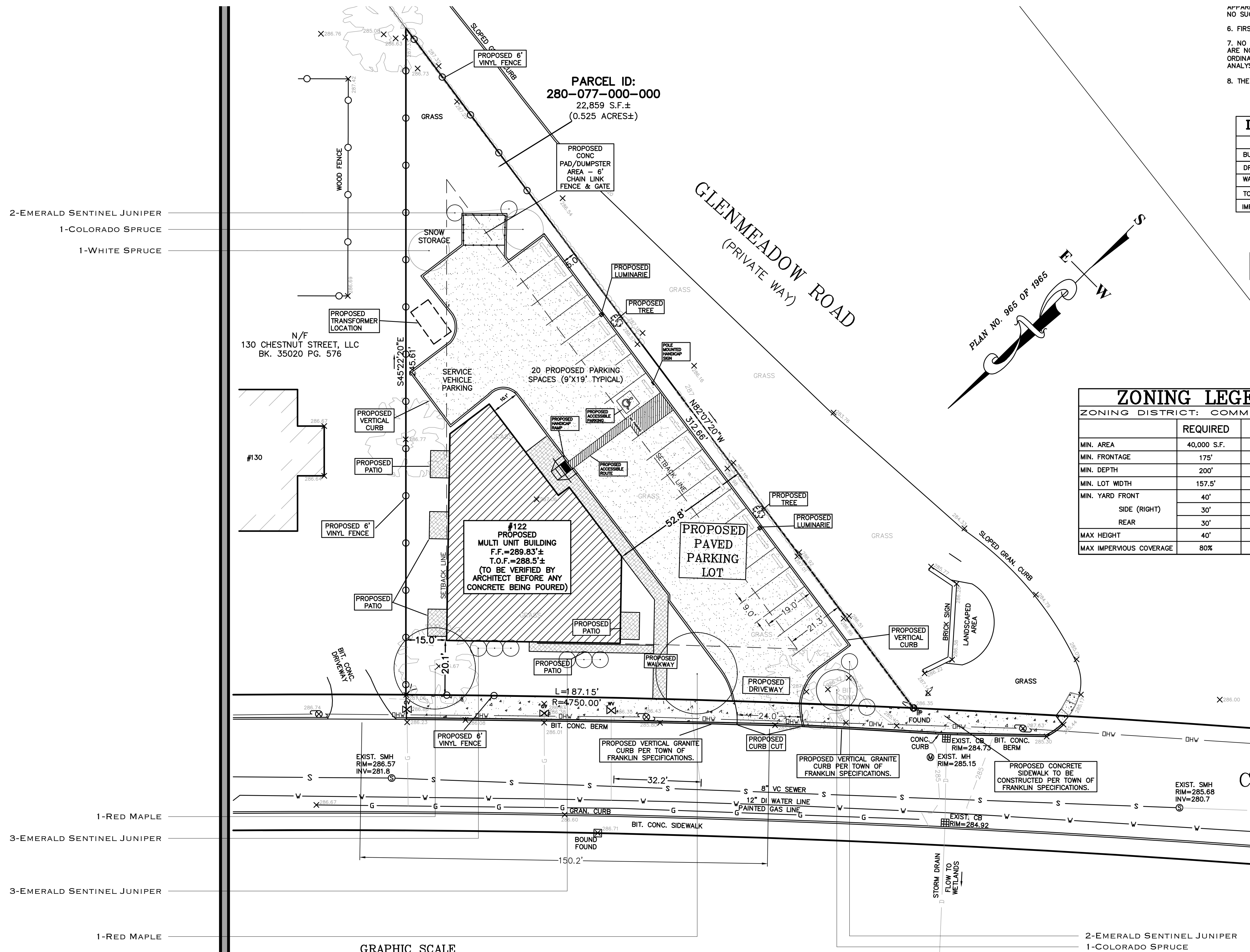
WHITE SPRUCE

PICEA GLAUCA



SPRUCE (COLORADO)

PICEA PUNGENS



- 2-EMERALD SENTINEL JUNIPER
- 1-COLORADO SPRUCE
- 1-WHITE SPRUCE

- 1-RED MAPLE
- 3-EMERALD SENTINEL JUNIPER
- 3-EMERALD SENTINEL JUNIPER
- 1-RED MAPLE

ZONING LEGE		
ZONING DISTRICT: COMME		
	REQUIRED	P
MIN. AREA	40,000 S.F.	:
MIN. FRONTAGE	175'	:
MIN. DEPTH	200'	:
MIN. LOT WIDTH	157.5'	:
MIN. YARD FRONT	40'	:
	SIDE (RIGHT)	30'
	REAR	30'
	MAX HEIGHT	40'
	MAX IMPERVIOUS COVERAGE	80%

SHEET TITLE:
PLANTING PLAN
SCALE:
1"=20'0"
DATE: 07.14.20

PREPARED FOR:
MICHAEL O'BRIEN
122 CHESTNUT STREET
FRANKLIN, MA

PROJECT:
MICHAEL O'BRIEN
122 CHESTNUT STREET
FRANKLIN, MA

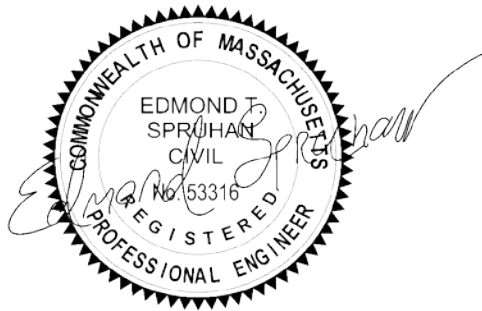
ERIK J SKALA,
LANDSCAPE DESIGNER
BROAD MEADOW FARMS
56 BROAD MEADOW ROAD
NEEDHAM, MA 02492

L-4.1

SPRUHAN ENGINEERING, P.C.

STORMWATER REPORT

122 CHESTNUT STREET, FRANKLIN, MA



Prepared By: Spruhan Engineering, P.C.

Contents

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1.0 Introduction

Spruhan Engineering, P.C. has prepared this Storm water Report for the proposed development located at 122 Chestnut Street, Newton, Massachusetts.

The proposed development consists of a new multifamily building and new paved driveway. The purpose of this report is to demonstrate that the proposed conditions do not create any increased flowrate or runoff from the site.

2.0 Existing Conditions

The existing property is located at 122 Chestnut Street, Franklin, Massachusetts. The site is bounded by residential dwellings on the rear and sides. The property is located at Chestnut Street and Glenmeadow Road and is bounded by residential properties to the north side. This is an empty lot with an area of 22,859 S.F. mostly covered by grass.

2.1 Existing Topography and Drainage Infrastructure.

In general, the property slopes from South (right) to North(left) ranging between approximately 1.6%. As there is no drainage system currently installed, all storm water scours across the surface at grade.

3.0 Proposed Conditions

3.1 Project Description

The proposed development consists of a multifamily building and new paved driveway. The proposed roof will have an area of 4,111 S.F. The proposed driveway will have an area of 9,552 S.F, the proposed walkways will have an area of 790 S.F. and the remaining landscaped area on the lot will have a footprint of 8,545 S.F.

3.2 Storm Water Runoff

HydroCAD was used to model the site for the existing and proposed conditions for the 2-year, 10-year, 25-year, and 100-year type III storm events based on NOAA's National weather service information for Norfolk County Area. HydroCAD calculations can be seen in Appendix A. The following table shows a summary of the existing and proposed conditions on the site as they relate to flowrate and volume of storm water runoff for each of the storm events.

3.3 Infiltration systems

One system is proposed to control the runoff generated by the proposed roof and paved driveway. The system consists of 16 subsurface stormtech plastic chambers covered with gravel.

The system is 22' x 56'x 5'.

	<u>Summary Table (Hyrocad results)</u>			
	Runoff Rate		Volume of Runoff	
	EXISTING	PROPOSED	EXISTING	PROPOSED
2 Year Storm	0.00 cfs	0.00 cfs	6 cf	2 cf
10 Year Storm	0.03 cfs	0.01 cfs	474 cf	177 cf
25 Year Storm	0.13 cfs	0.05 cfs	1,072 cf	401 cf
100 Year Storm	0.53 cfs	0.20 cfs	2,349 cf	878 cf

4.0 Soil Information

The NRCS Web Soil Survey shows the division of two Map Units inside our area of interest. These are listed next and the percentages of Area of Interest in the Map unit Legend Table:

- Map unit symbol: 602; Name: urban land, 0 to 15 percent slopes.
- Map unit symbol: 626B; Name: Merrimac-Urban Land complex, 0 to 8 percent slopes.

Map unit 602 does not show the Hydrologic soil group but map unit 629 C shows hydrologic soil group as “A”, this information is shown in Appendix B, in the Map unit descriptions.

This confirms the information found in the site visit test hole, as the soils log show a Loamy Sand which has the NRCS “A” properties and these were applied to the HydroCAD software calcs.

Further detailed information is described in Appendix B.

5.0 Total Suspended Solids (TSS) removal calculations

At a minimum all projects subject to a Major Stormwater Management Permit shall comply with the performance standards of the most recent version of Massachusetts Stormwater Standards and accompanying Stormwater Management Handbook (Handbook), and the Town of Dedham Drainage and Stormwater Design Standards. The following design standard considering TSS removal must be addressed:

Stormwater management systems shall be designed to remove 80% of the average annual post-construction impervious area load of Total Suspended Solids (TSS). This Standard is met when:

- a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
- b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
- c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The 80% credit was achieved in this project through the use of the following strategies:

- Pre-treatment: Deep Hooded Sump Catch Basin + Oil Grit separator.

Total Pre-treatment TSS = 64%

- Infiltration trench (structural control): 80% TSS removal rate.

Based on documentation for the stormceptor device selected for pre-treatment, the actual TSS removal rate will vary depending on the intensity of the storm. Documentation states that this removal rate can range between 52-77%. In order to remain conservative in the design, 52% was selected in the calculations.

Total TSS Removal achieve is 93%. The breakdown of these calculations can be seen in Appendix C.

6.0 Groundwater recharge calculations

The average time between storm events in Massachusetts is about two to three days. Recharge is maximized when the recharge system is emptied from one storm, prior to the onset of the next. Hydrology Handbook for Conservation Commissioners March 2002 8-5 Maintaining saturated soil conditions for extended periods may adversely affect the performance of recharge systems. Therefore, it is desirable to dewater infiltration systems within 72 hours. The time required to dewater a recharge system may be estimated by the following equation:

$$TD = VRS / (f / 12 * AR)$$

Where: TD = Dewatering Time (hours)

VRS = 1511 Volume of the recharge system storage (ft³)

AR = 770 Recharge surface area (ft²)

f = 8.27 (Rawl's rates) Design Infiltration Rate (inches/hr)

12 = Conversion from inches to feet

$$TD = 1,383 / (8.27 / 12 * 770) = 2.6 \text{ Hr}$$

7.0 Long-Term Pollution Prevention Plan (LTPPP)

Responsible party during construction: Mike O'Brien, (508)-400-5216.

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

- No outdoor maintenance or washing of vehicles allowed.
- The property owner shall be responsible for “good housekeeping” including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Proper storage and removal of solid waste (dumpsters).
- Sweeping of driveways a minimum of twice per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the “O&M Plan”.
- Snow removal shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, infiltration basins or similar stormwater controls. Salting and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.
- **OPERATION AND MAINTENANCE TRAINING PROGRAM**
- The Owner will coordinate an annual in-house training session to discuss the Operations and Maintenance Plan, the Long-Term Pollution Prevention Plan, and the Spill Prevention Plan and response procedures. Annual training will include the following: Discuss the Operations and Maintenance Plan
- Explain the general operations of the stormwater management system and its BMPs
- Identify potential sources of stormwater pollution and measures / methods of reducing or eliminating that pollution
- Emphasize good housekeeping measures Discuss the Spill Prevention and Response Procedures
- Explain the process in the event of a spill

- Identify potential sources of spills and procedures for cleanup and /or reporting and notification
- Complete a yearly inventory or Materials Safety Data sheets of all tenants and confirm that no potentially harmful chemicals are in use.

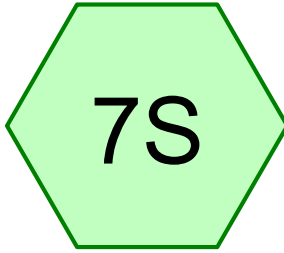
- Trash and other debris shall be removed from all areas of the site at least twice yearly.
- Reseed any bare areas as soon as they occur. Erosion control measures shall be installed in these areas to prevent deposits of sediment from entering the drainage system.
- Grass shall be maintained at a minimum blade height of two to three inches and only 1/3 of the plant height shall be removed at a time.
- Plants shall be pruned as necessary.
- The use of fertilizers will be kept at a level consistent with typical commercial use. Fertilizer will be applied a maximum of once to twice per year during the initial planting and stabilization of landscaped areas. Once plants are established and growing well fertilizer will be applied judiciously.
- The use of pesticides will be kept at a level consistent with typical commercial use. Where possible mechanical methods (i.e. pest traps) or biological methods (i.e. beneficial insects) of pest control shall be implemented. If pesticides (insecticide, herbicide, and fungicide) are required to be used, a pesticide which poses the lowest risk to public health and the environment shall be used.
- Pet waste shall be disposed of in accordance with local regulations. Pet waste shall not be disposed of in a storm drain or catch basin.
- Snow piles shall be located adjacent to or on pervious surfaces in upland areas. This will allow snow melt water to filter in to the soil, leaving behind sand and debris which can be removed in the springtime.
- In no case shall snow be disposed of or stored in resource areas (wetlands, floodplain, streams or other water bodies).
- In no case shall snow be disposed of or stored in the detention basins, infiltration basins or bioretention areas. • If necessary, stockpiled snow will be removed from the Site and disposed of at an off-site location in accordance with all local, state and federal regulations.
- The amount of sand and deicing chemicals shall be kept at the minimum amount required to provide safe pedestrian and vehicle travel.
- Sand and deicing chemicals should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials. Stockpile areas shall be located outside resource areas.

8.0 Illicit discharge compliance statement

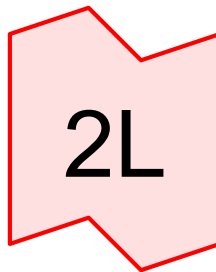
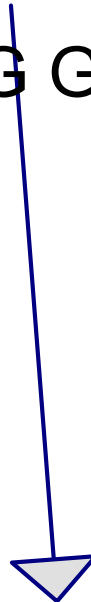
This statement is provided in accordance with the provisions of the Massachusetts Stormwater Management Standard 10 and of the Massachusetts Stormwater Management Handbook. Note the following:

- All stormwater management systems contain no connection to the site's wastewater sewer system or to any other non-stormwater collection system.
- Groundwater collection systems on the site are not connected to the site's wastewater sewer system or to any other non-stormwater collection system.
- The facility's Operations & Maintenance Plan is designed to prevent any discharge of non-stormwater to the drainage system.
- Any illicit discharges identified during or after construction will be immediately disconnected.

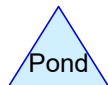
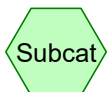
Appendix A – HydroCAD Calculations



EXISTING GRASS



EXISTING RUNOFF



Routing Diagram for EXISTING

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EXISTING

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Page 2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
22,859	39	>75% Grass cover, Good, HSG A (7S)
22,859	39	TOTAL AREA

EXISTING

Prepared by {enter your company name here}

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Page 3

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
22,859	HSG A	7S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
22,859		TOTAL AREA

EXISTING

Type III 24-hr 2-Year Rainfall=3.36"

Prepared by {enter your company name here}

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Page 4

Summary for Subcatchment 7S: EXISTING GRASS

Runoff = 0.00 cfs @ 23.85 hrs, Volume= 6 cf, Depth= 0.00"

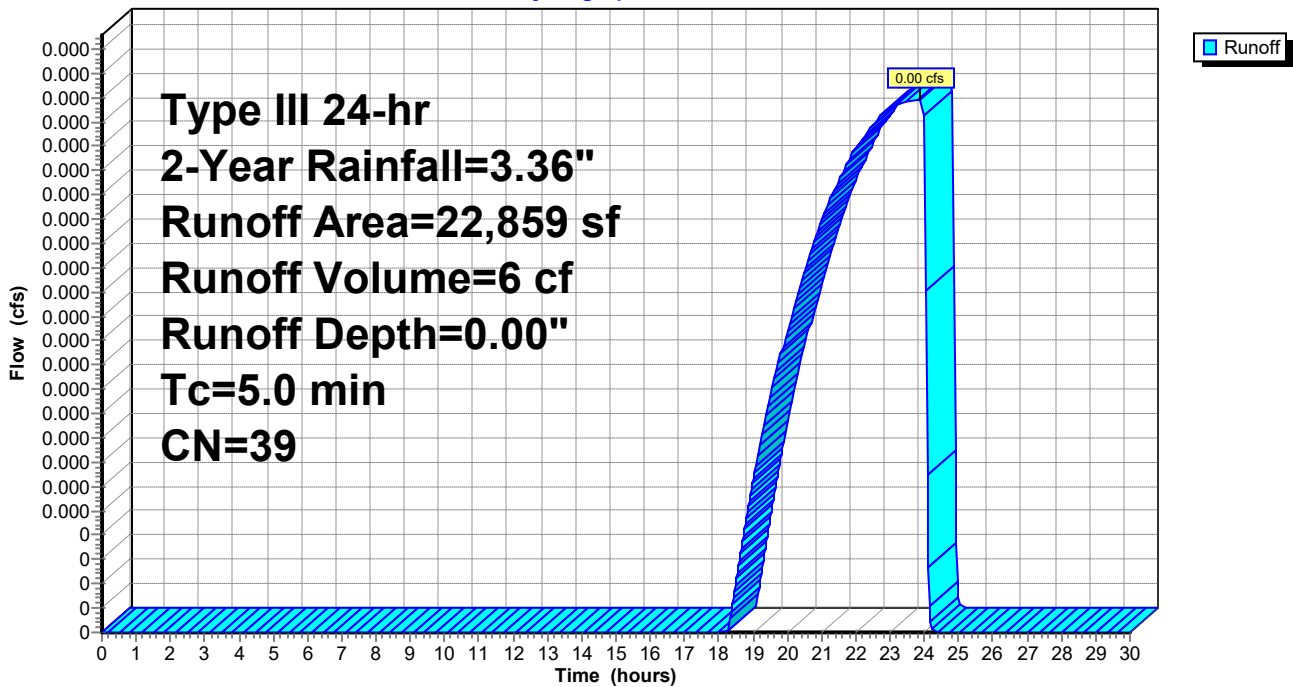
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
22,859	39	>75% Grass cover, Good, HSG A
22,859	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: EXISTING GRASS

Hydrograph



EXISTING

Type III 24-hr 2-Year Rainfall=3.36"

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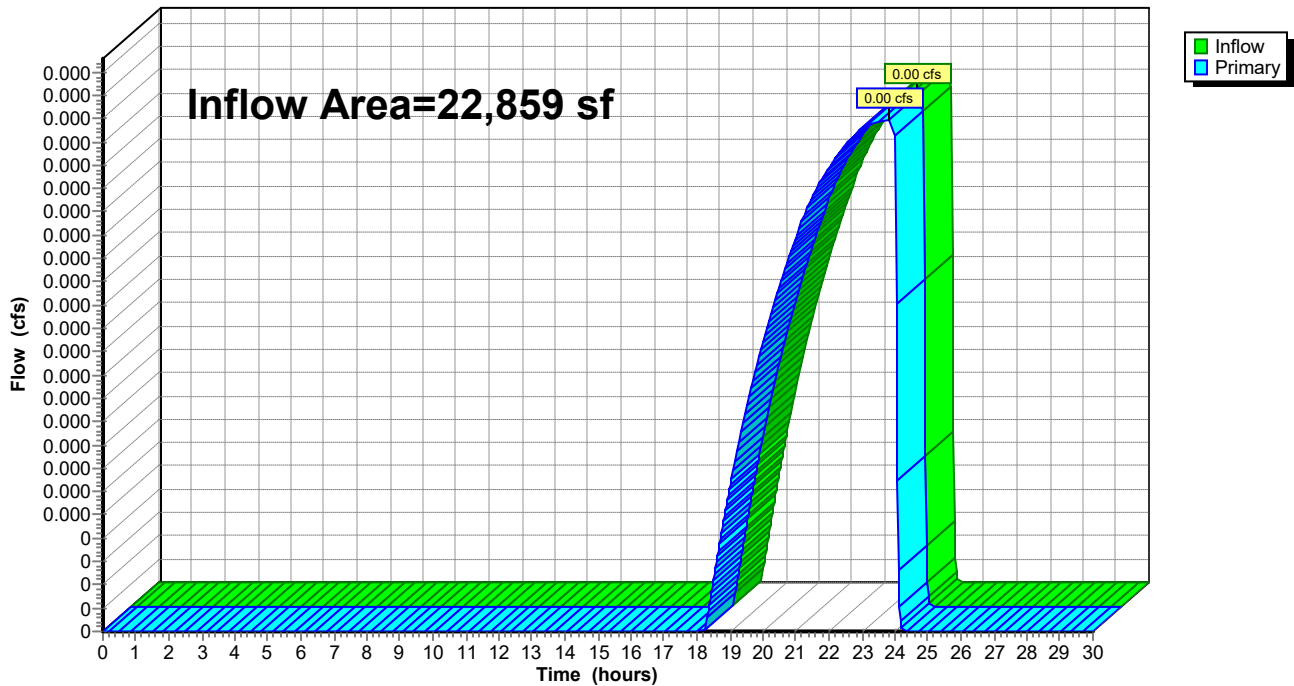
Summary for Link 2L: EXISTING RUNOFF

Inflow Area = 22,859 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 23.85 hrs, Volume= 6 cf
Primary = 0.00 cfs @ 23.85 hrs, Volume= 6 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: EXISTING RUNOFF

Hydrograph



EXISTING

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Type III 24-hr 10-Year Rainfall=5.23"

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Page 6

Summary for Subcatchment 7S: EXISTING GRASS

Runoff = 0.03 cfs @ 12.42 hrs, Volume= 474 cf, Depth= 0.25"

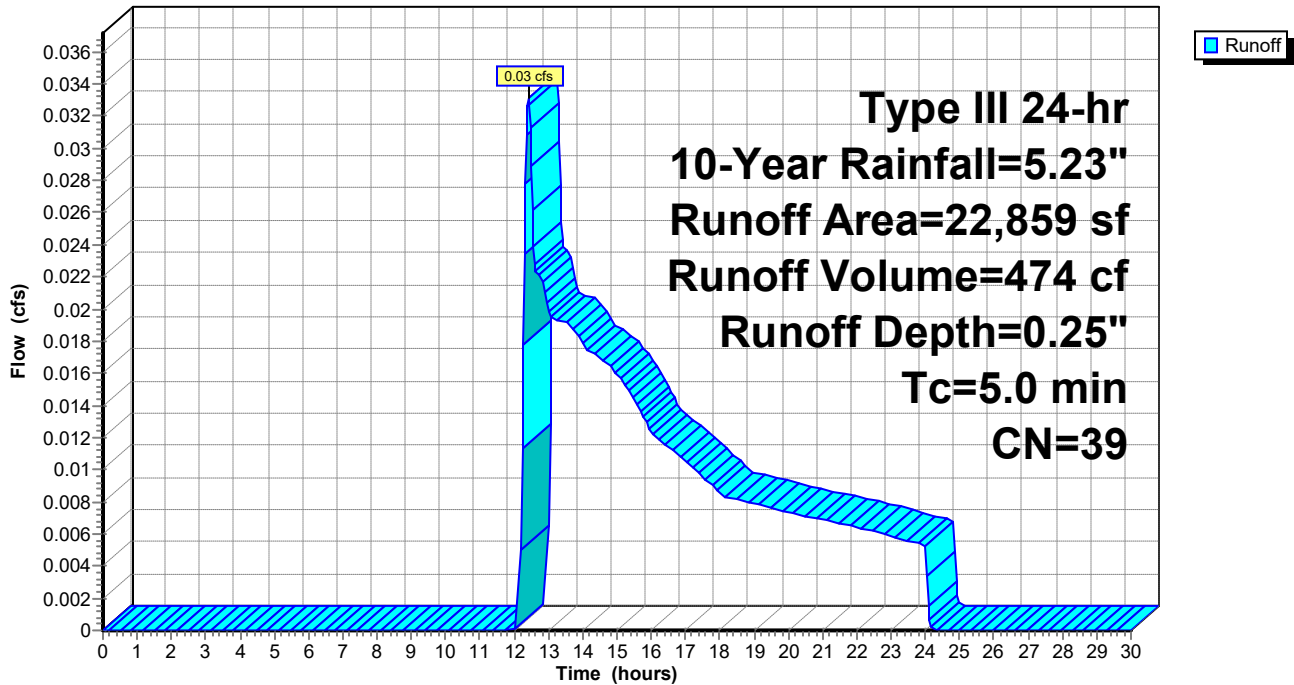
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.23"

Area (sf)	CN	Description
22,859	39	>75% Grass cover, Good, HSG A
22,859	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: EXISTING GRASS

Hydrograph



EXISTING

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Type III 24-hr 10-Year Rainfall=5.23"

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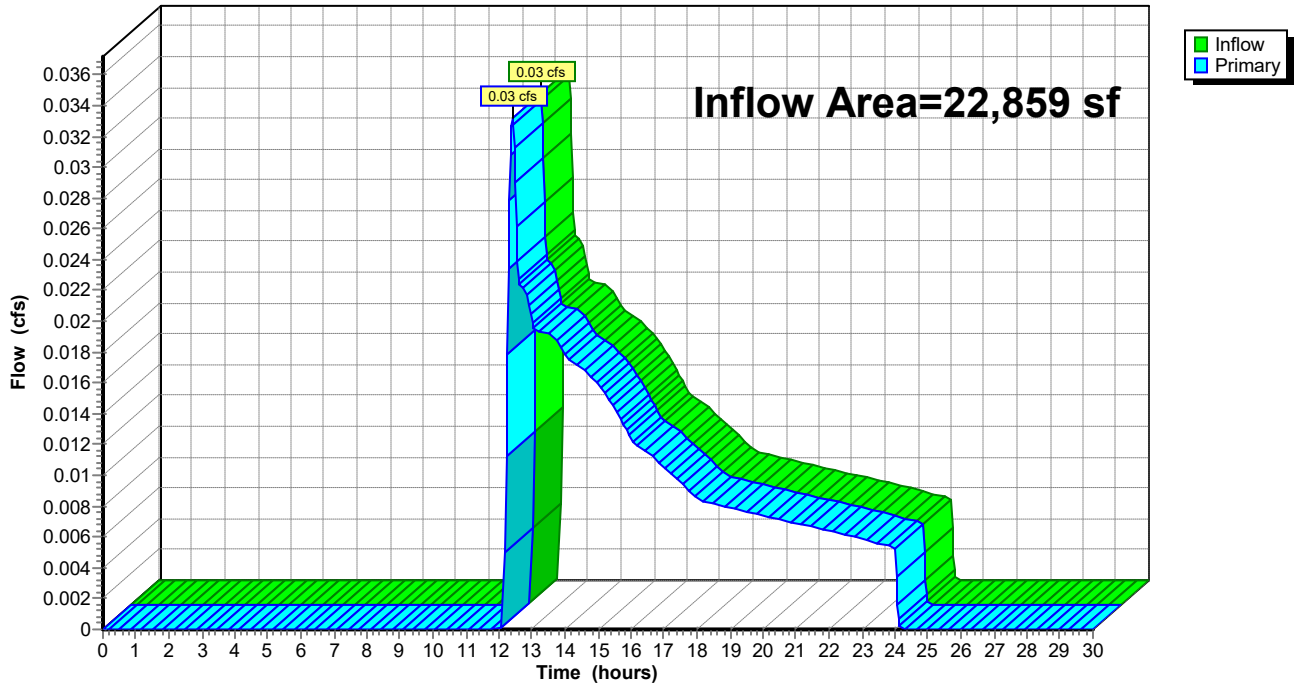
Summary for Link 2L: EXISTING RUNOFF

Inflow Area = 22,859 sf, 0.00% Impervious, Inflow Depth = 0.25" for 10-Year event
Inflow = 0.03 cfs @ 12.42 hrs, Volume= 474 cf
Primary = 0.03 cfs @ 12.42 hrs, Volume= 474 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: EXISTING RUNOFF

Hydrograph



EXISTING

Type III 24-hr 25-Year Rainfall=6.39"

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Summary for Subcatchment 7S: EXISTING GRASS

Runoff = 0.13 cfs @ 12.29 hrs, Volume= 1,072 cf, Depth= 0.56"

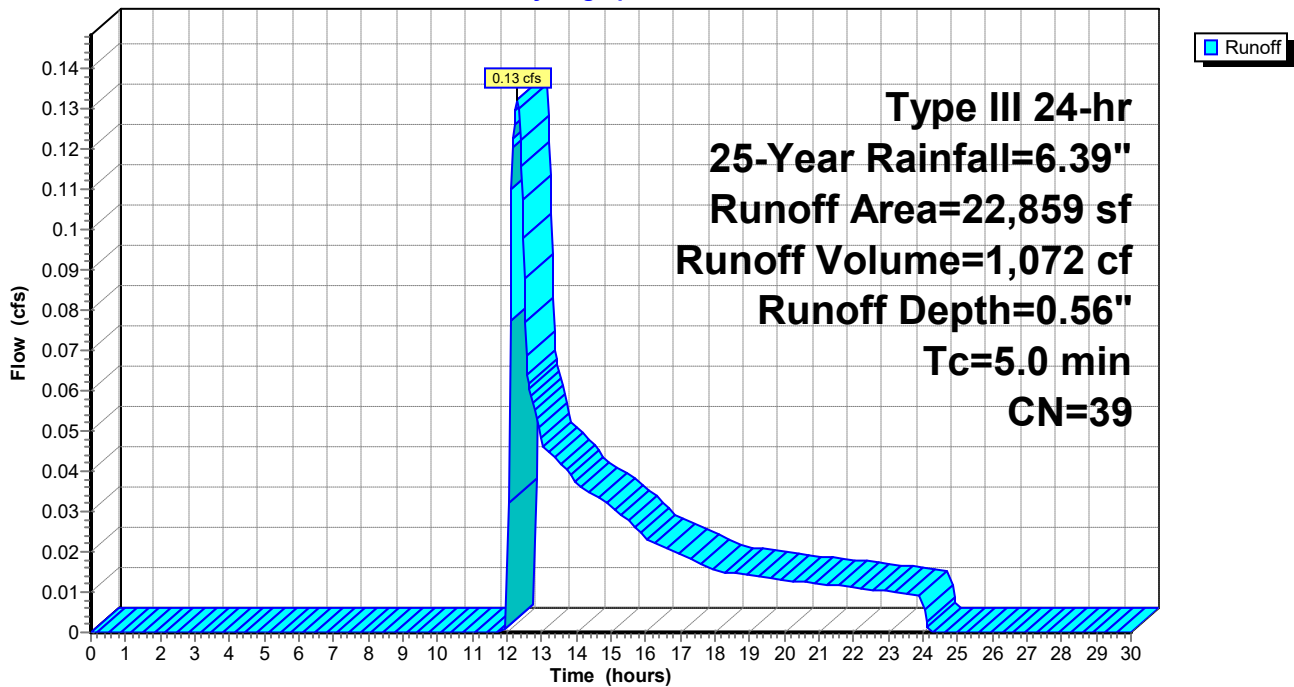
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.39"

Area (sf)	CN	Description
22,859	39	>75% Grass cover, Good, HSG A
22,859	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: EXISTING GRASS

Hydrograph



EXISTING

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Type III 24-hr 25-Year Rainfall=6.39"

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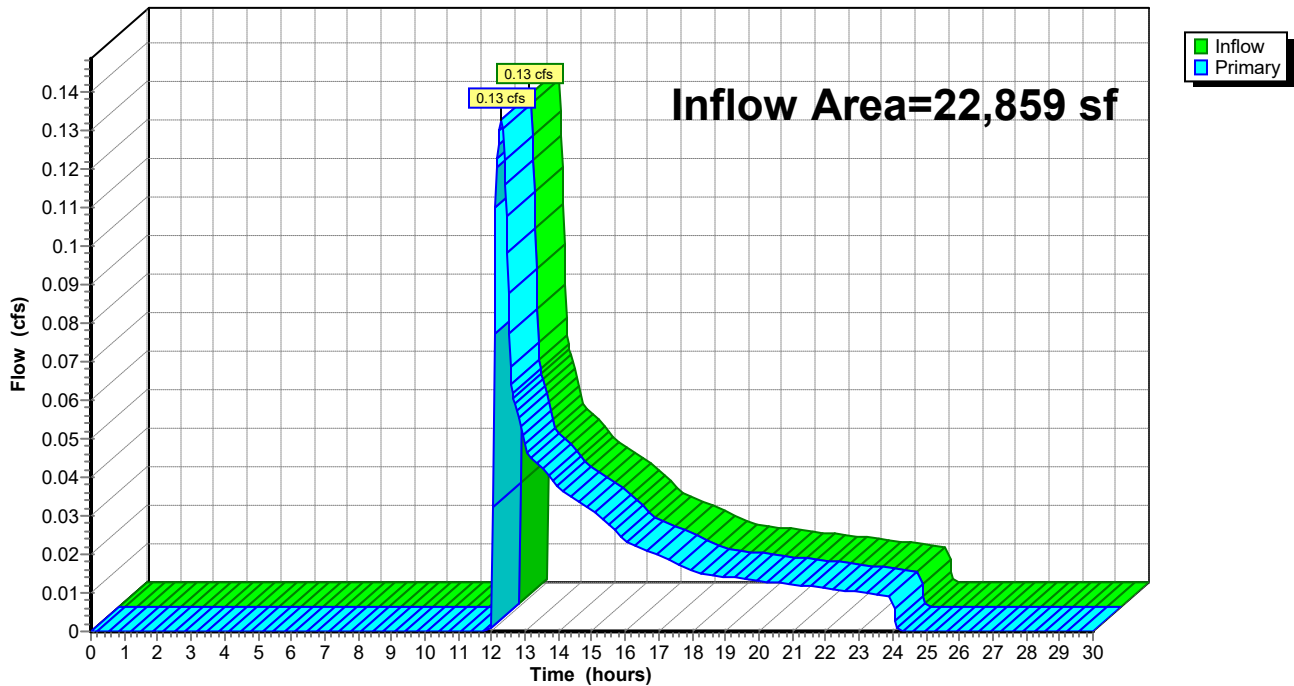
Summary for Link 2L: EXISTING RUNOFF

Inflow Area = 22,859 sf, 0.00% Impervious, Inflow Depth = 0.56" for 25-Year event
Inflow = 0.13 cfs @ 12.29 hrs, Volume= 1,072 cf
Primary = 0.13 cfs @ 12.29 hrs, Volume= 1,072 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: EXISTING RUNOFF

Hydrograph



EXISTING

Type III 24-hr 100-Year Rainfall=8.18"

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Summary for Subcatchment 7S: EXISTING GRASS

Runoff = 0.53 cfs @ 12.10 hrs, Volume= 2,349 cf, Depth= 1.23"

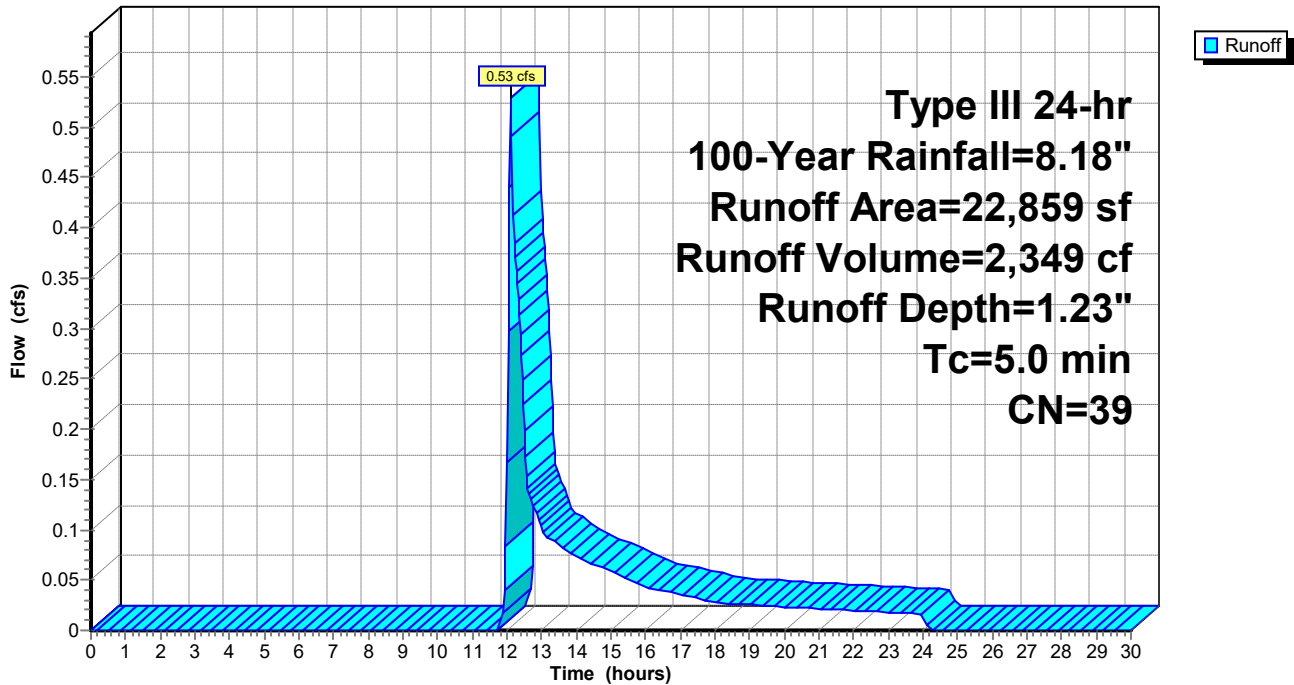
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.18"

Area (sf)	CN	Description
22,859	39	>75% Grass cover, Good, HSG A
22,859	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: EXISTING GRASS

Hydrograph



EXISTING

Type III 24-hr 100-Year Rainfall=8.18"

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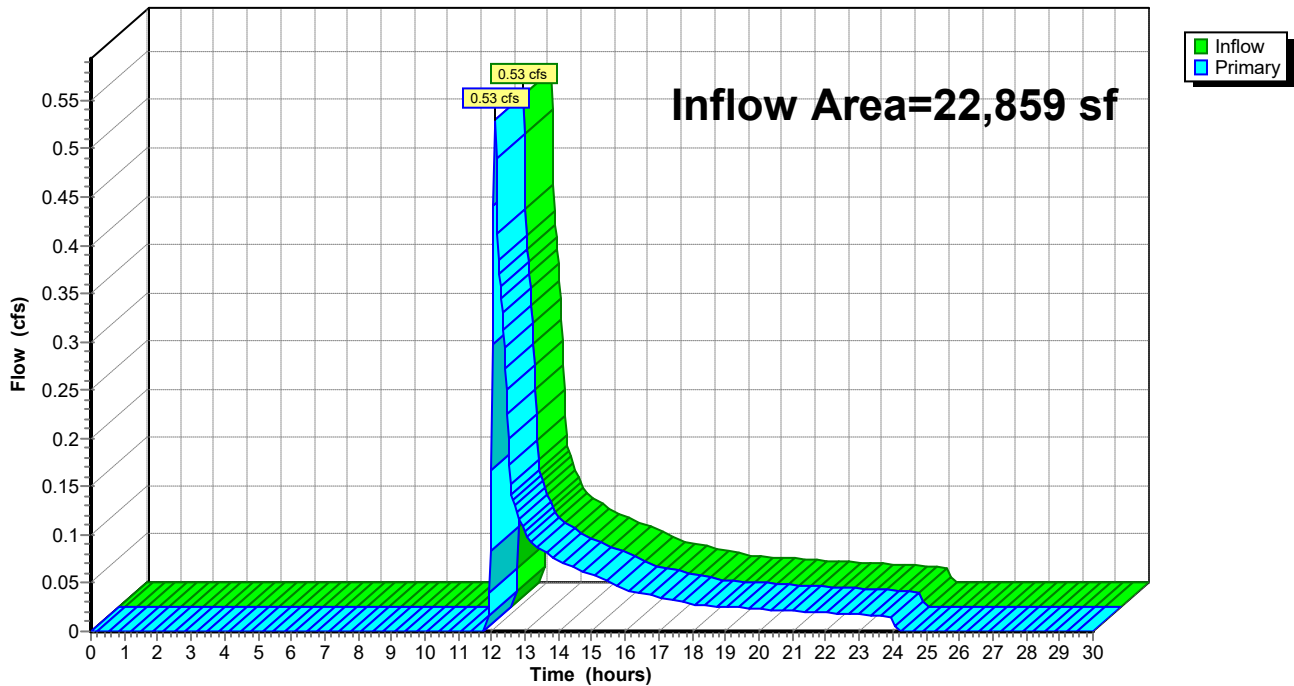
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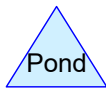
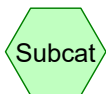
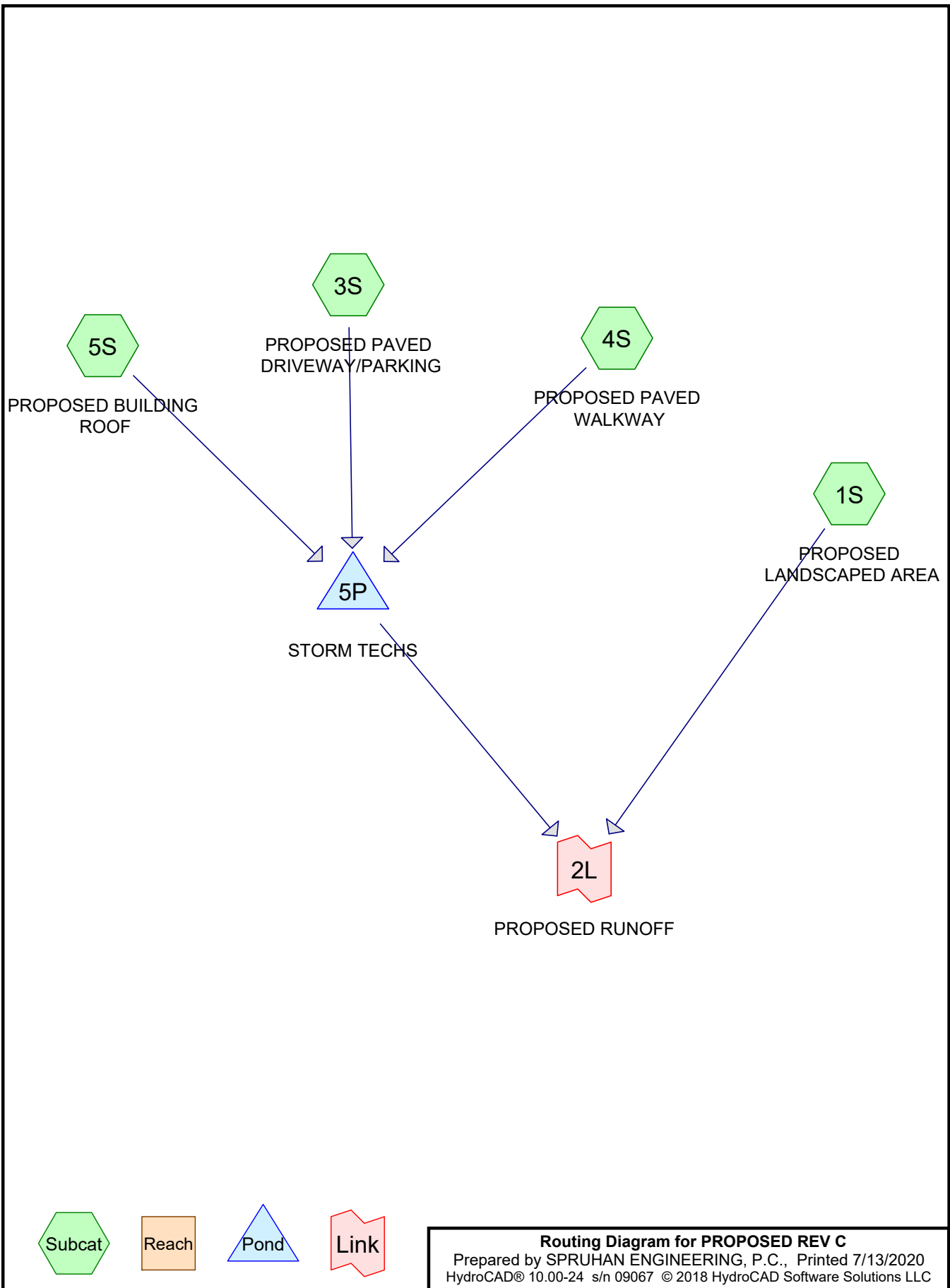
Inflow Area = 22,859 sf, 0.00% Impervious, Inflow Depth = 1.23" for 100-Year event
Inflow = 0.53 cfs @ 12.10 hrs, Volume= 2,349 cf
Primary = 0.53 cfs @ 12.10 hrs, Volume= 2,349 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: EXISTING RUNOFF

Hydrograph





Routing Diagram for PROPOSED REV C
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PROPOSED REV C

Prepared by SPRUHAN ENGINEERING, P.C.

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Page 2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
8,545	39	>75% Grass cover, Good, HSG A (1S)
13,663	98	Roofs, HSG A (3S, 5S)
652	98	Unconnected pavement, HSG A (4S)
22,860	76	TOTAL AREA

PROPOSED REV C

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Page 3

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
22,860	HSG A	1S, 3S, 4S, 5S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
22,860		TOTAL AREA

PROPOSED REV C

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Type III 24-hr 2-Year Rainfall=3.36"

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Summary for Subcatchment 1S: PROPOSED LANDSCAPED AREA

Runoff = 0.00 cfs @ 23.85 hrs, Volume= 2 cf, Depth= 0.00"

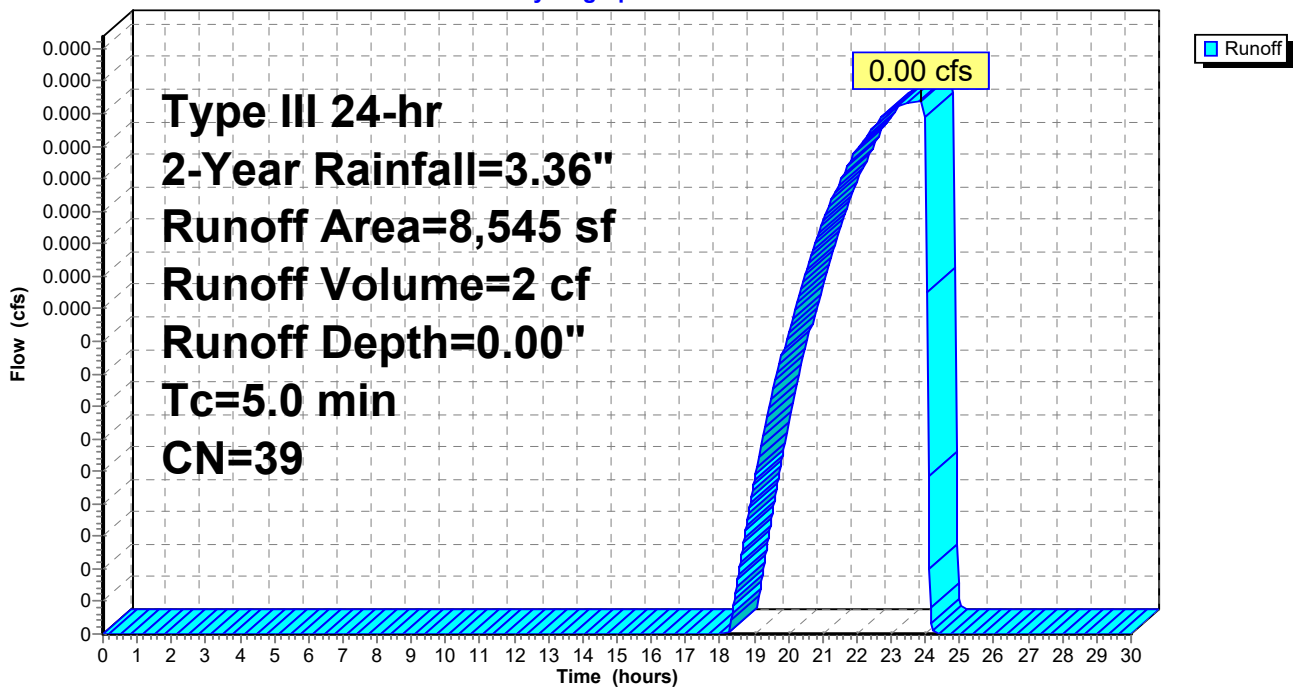
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
8,545	39	>75% Grass cover, Good, HSG A
8,545	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: PROPOSED LANDSCAPED AREA

Hydrograph



PROPOSED REV C

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Type III 24-hr 2-Year Rainfall=3.36"

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Page 5

Summary for Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING

Runoff = 0.74 cfs @ 12.07 hrs, Volume= 2,489 cf, Depth= 3.13"

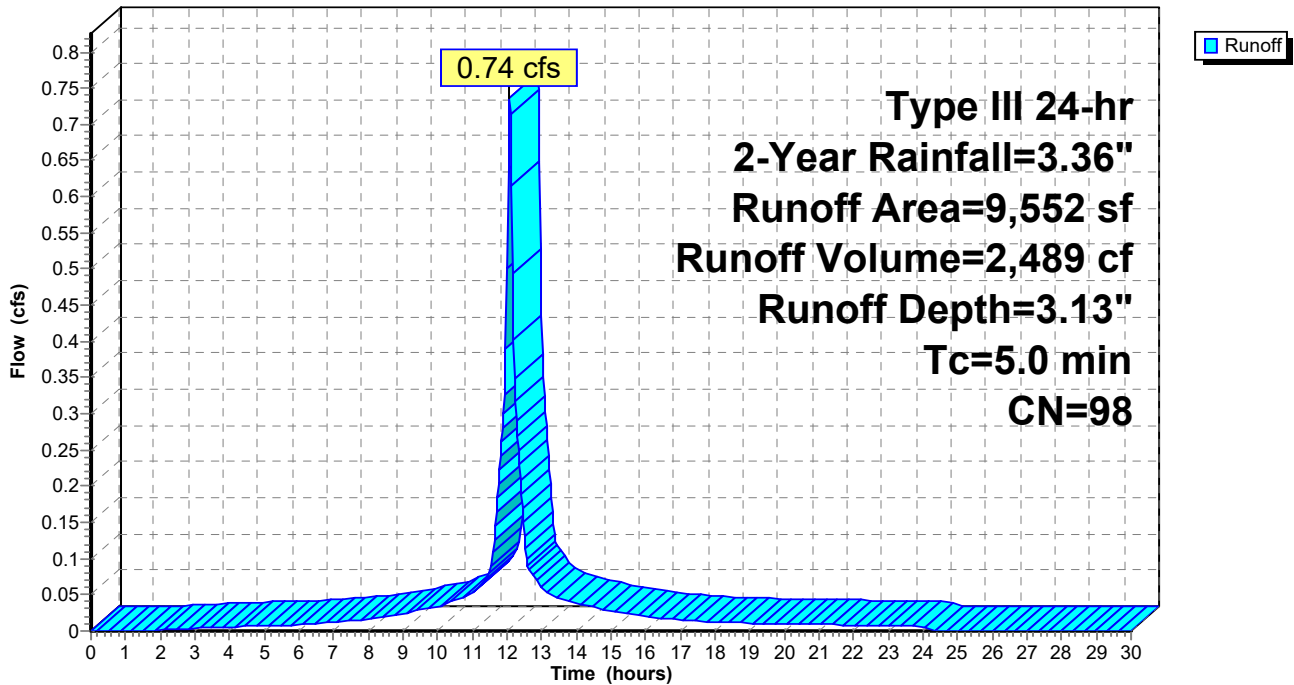
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
9,552	98	Roofs, HSG A
9,552	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING

Hydrograph



PROPOSED REV C

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Type III 24-hr 2-Year Rainfall=3.36"

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Page 6

Summary for Subcatchment 4S: PROPOSED PAVED WALKWAY

Runoff = 0.05 cfs @ 12.07 hrs, Volume= 170 cf, Depth= 3.13"

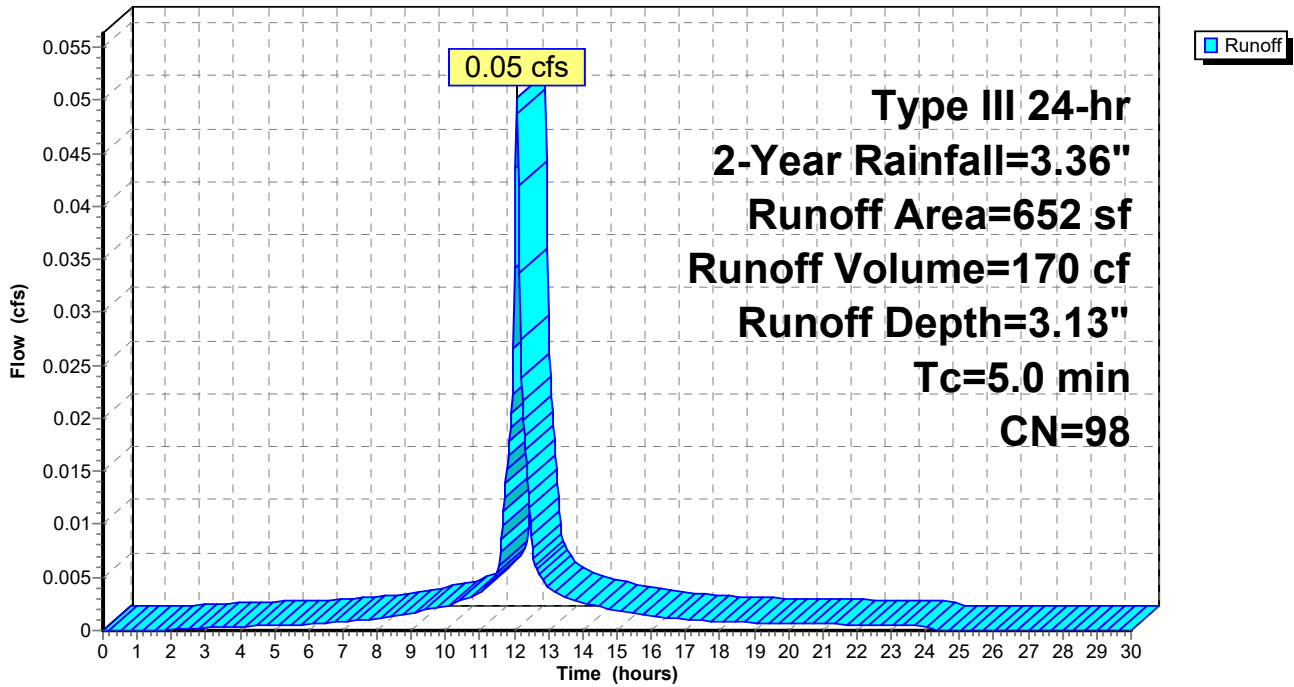
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
652	98	Unconnected pavement, HSG A
652	98	100.00% Impervious Area
652		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 4S: PROPOSED PAVED WALKWAY

Hydrograph



PROPOSED REV C

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Type III 24-hr 2-Year Rainfall=3.36"

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Summary for Subcatchment 5S: PROPOSED BUILDING ROOF

Runoff = 0.32 cfs @ 12.07 hrs, Volume= 1,071 cf, Depth= 3.13"

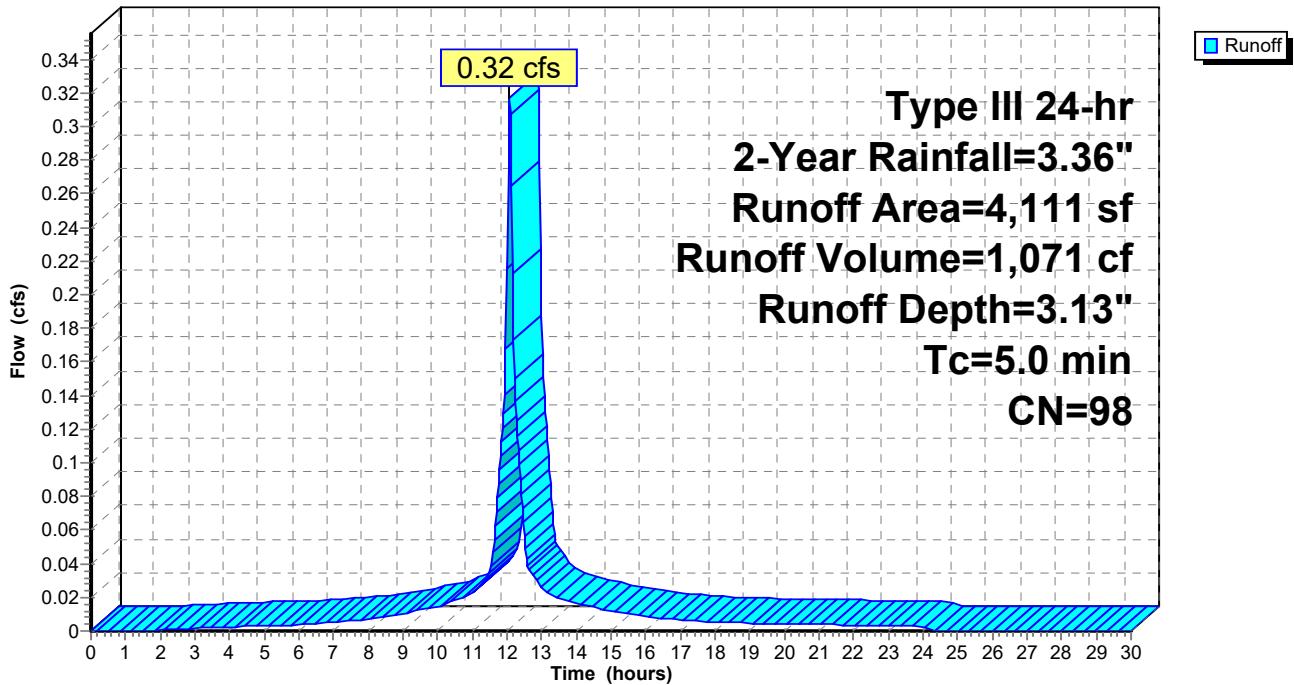
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
4,111	98	Roofs, HSG A
4,111	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 5S: PROPOSED BUILDING ROOF

Hydrograph



PROPOSED REV C

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Type III 24-hr 2-Year Rainfall=3.36"

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Summary for Pond 5P: STORM TECHS

Inflow Area = 14,315 sf, 100.00% Impervious, Inflow Depth = 3.13" for 2-Year event
 Inflow = 1.10 cfs @ 12.07 hrs, Volume= 3,730 cf
 Outflow = 0.28 cfs @ 12.42 hrs, Volume= 3,730 cf, Atten= 74%, Lag= 21.1 min
 Discarded = 0.28 cfs @ 12.42 hrs, Volume= 3,730 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
 Peak Elev= 280.53' @ 12.42 hrs Surf.Area= 1,233 sf Storage= 756 cf

Plug-Flow detention time= 14.9 min calculated for 3,730 cf (100% of inflow)
 Center-of-Mass det. time= 14.7 min (769.2 - 754.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	279.00'	2,173 cf	56.00'W x 22.02'L x 5.00'H Field A 6,167 cf Overall - 735 cf Embedded = 5,431 cf x 40.0% Voids
#2A	281.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 8 Rows
#3	284.00'	5 cf	Ponding Listed below -Impervious
		2,913 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
284.00	0
287.50	2
287.70	5

Device	Routing	Invert	Outlet Devices
#1	Discarded	279.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.28 cfs @ 12.42 hrs HW=280.53' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.28 cfs)

PROPOSED REV C

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Type III 24-hr 2-Year Rainfall=3.36"

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Pond 5P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +37.0" End Stone x 2 = 22.02' Base Length

8 Rows x 51.0" Wide + 18.0" Spacing x 7 + 69.0" Side Stone x 2 = 56.00' Base Width

24.0" Base + 30.0" Chamber Height + 6.0" Cover = 5.00' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

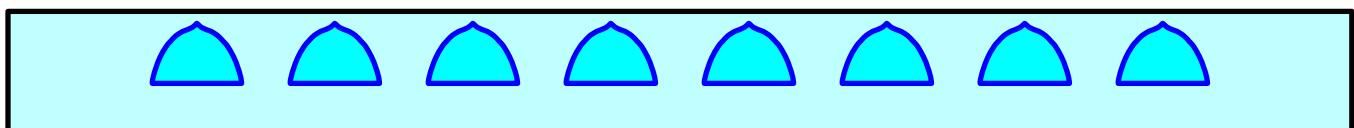
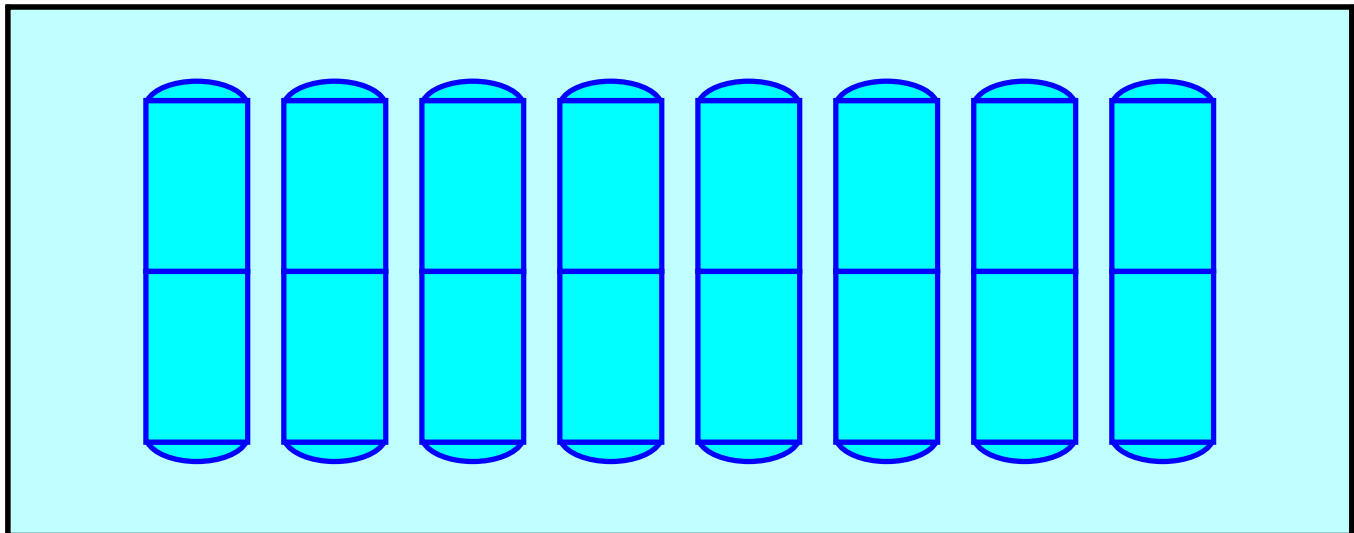
6,166.5 cf Field - 735.0 cf Chambers = 5,431.5 cf Stone x 40.0% Voids = 2,172.6 cf Stone Storage

Chamber Storage + Stone Storage = 2,907.6 cf = 0.067 af

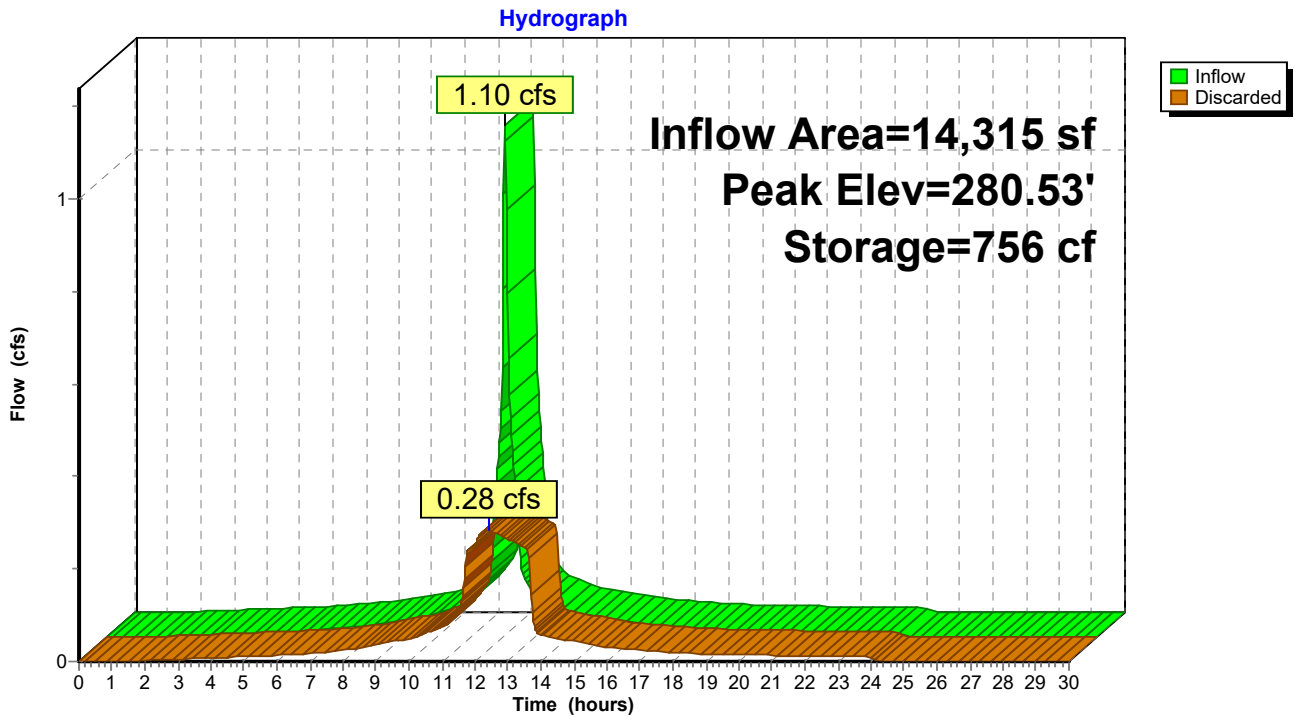
Overall Storage Efficiency = 47.2%

Overall System Size = 22.02' x 56.00' x 5.00'

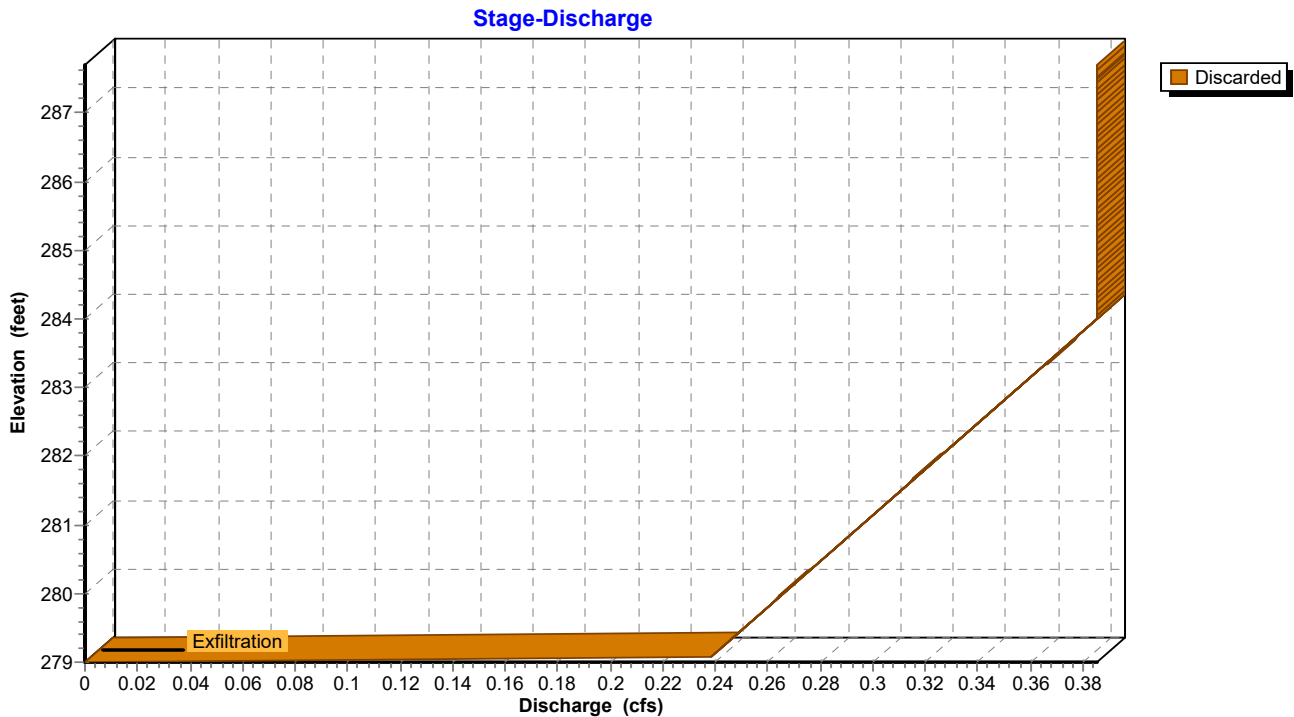
16 Chambers
228.4 cy Field
201.2 cy Stone



Pond 5P: STORM TECHS

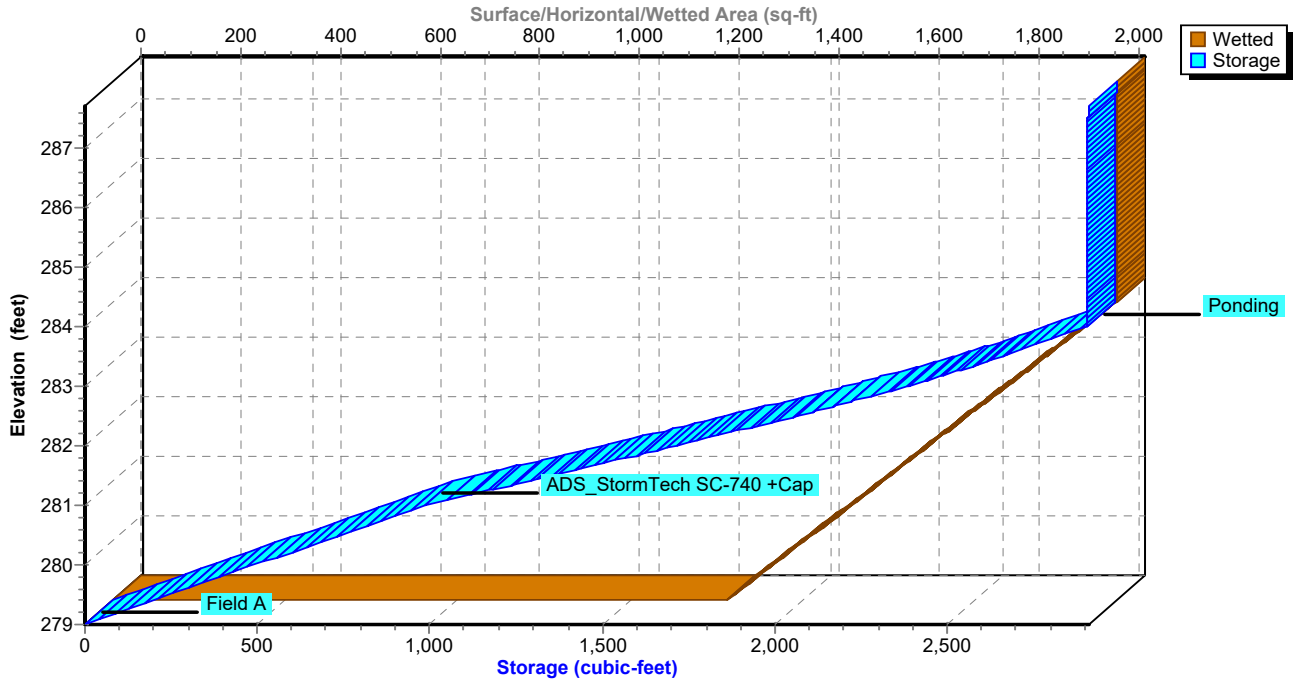


Pond 5P: STORM TECHS



Pond 5P: STORM TECHS

Stage-Area-Storage



PROPOSED REV C

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Type III 24-hr 2-Year Rainfall=3.36"

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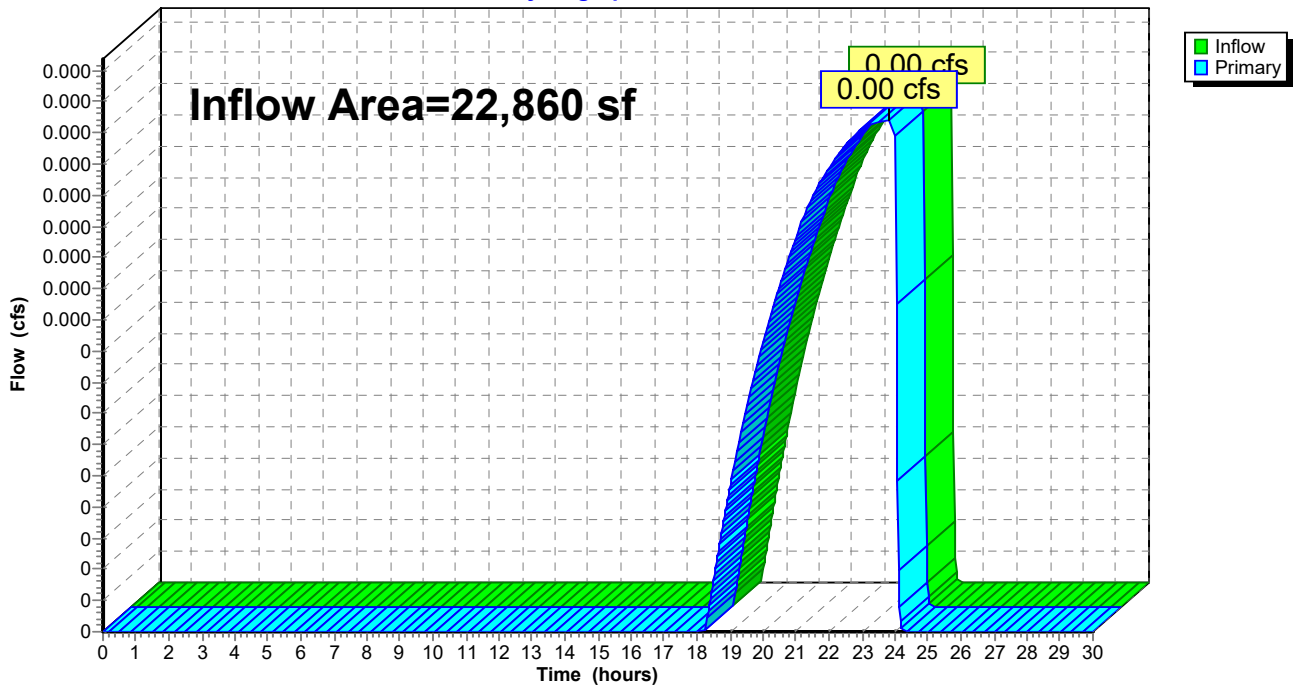
Summary for Link 2L: PROPOSED RUNOFF

Inflow Area = 22,860 sf, 62.62% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 23.85 hrs, Volume= 2 cf
Primary = 0.00 cfs @ 23.85 hrs, Volume= 2 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: PROPOSED RUNOFF

Hydrograph



PROPOSED REV C

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Type III 24-hr 10-Year Rainfall=5.23"

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Summary for Subcatchment 1S: PROPOSED LANDSCAPED AREA

Runoff = 0.01 cfs @ 12.42 hrs, Volume= 177 cf, Depth= 0.25"

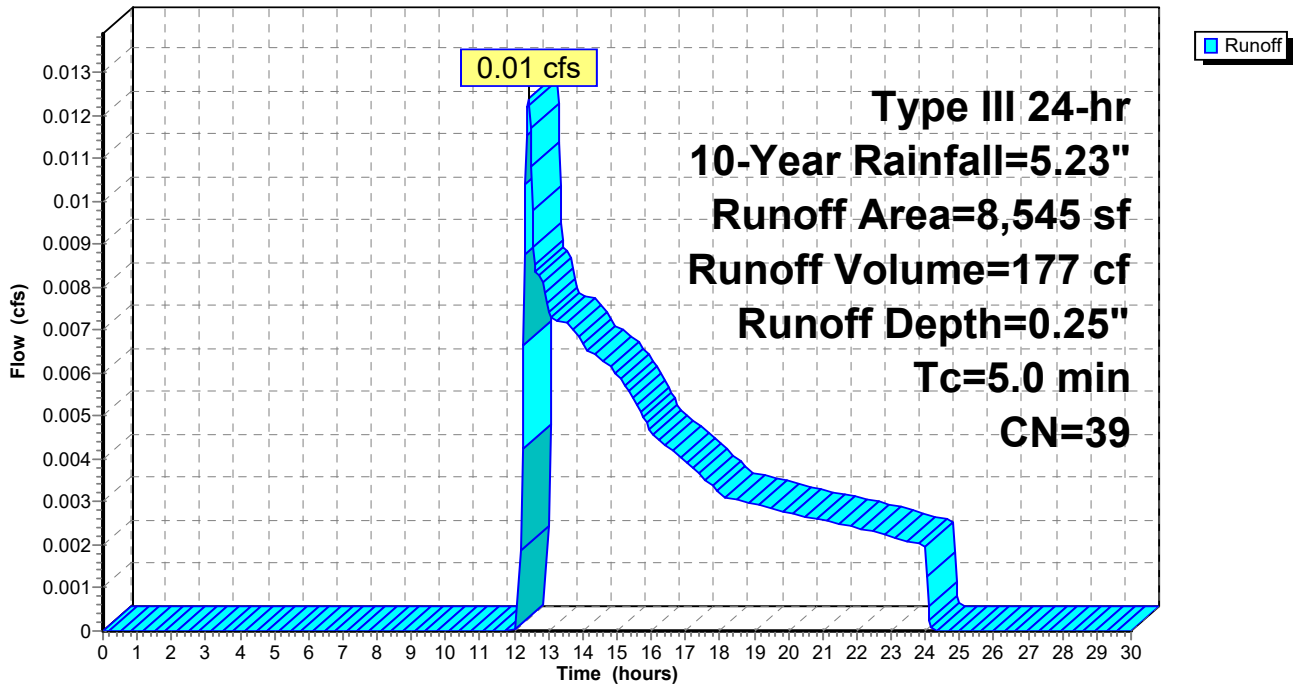
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.23"

Area (sf)	CN	Description
8,545	39	>75% Grass cover, Good, HSG A
8,545	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: PROPOSED LANDSCAPED AREA

Hydrograph



PROPOSED REV C

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Type III 24-hr 10-Year Rainfall=5.23"

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Summary for Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING

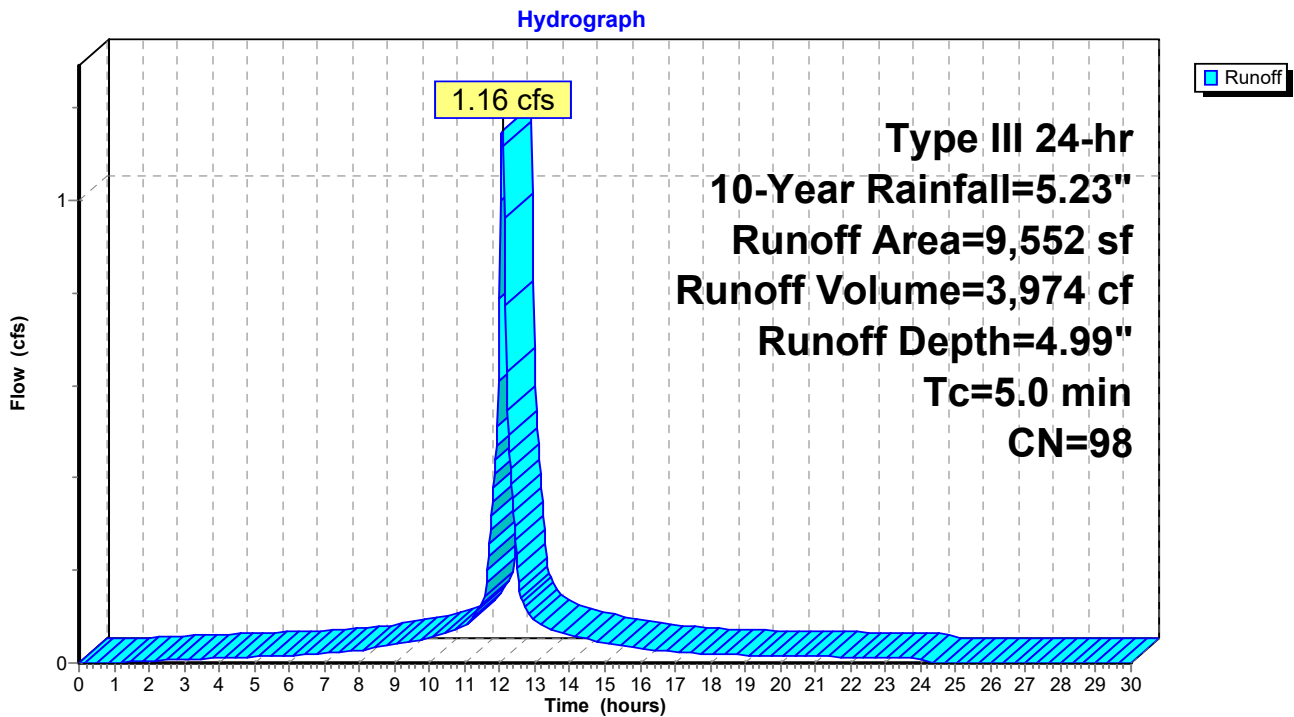
Runoff = 1.16 cfs @ 12.07 hrs, Volume= 3,974 cf, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.23"

Area (sf)	CN	Description
9,552	98	Roofs, HSG A
9,552	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING



PROPOSED REV C

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Type III 24-hr 10-Year Rainfall=5.23"

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Summary for Subcatchment 4S: PROPOSED PAVED WALKWAY

Runoff = 0.08 cfs @ 12.07 hrs, Volume= 271 cf, Depth= 4.99"

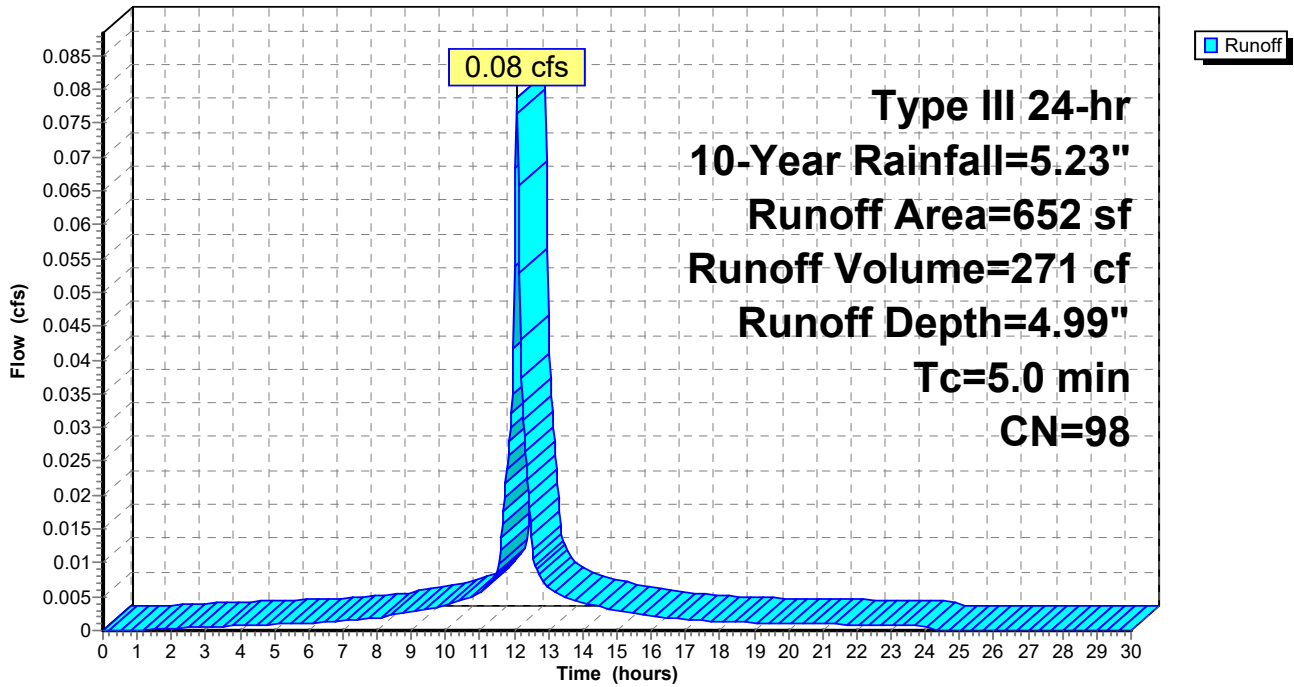
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.23"

Area (sf)	CN	Description
652	98	Unconnected pavement, HSG A
652	98	100.00% Impervious Area
652		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 4S: PROPOSED PAVED WALKWAY

Hydrograph



PROPOSED REV C

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Summary for Subcatchment 5S: PROPOSED BUILDING ROOF

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 1,710 cf, Depth= 4.99"

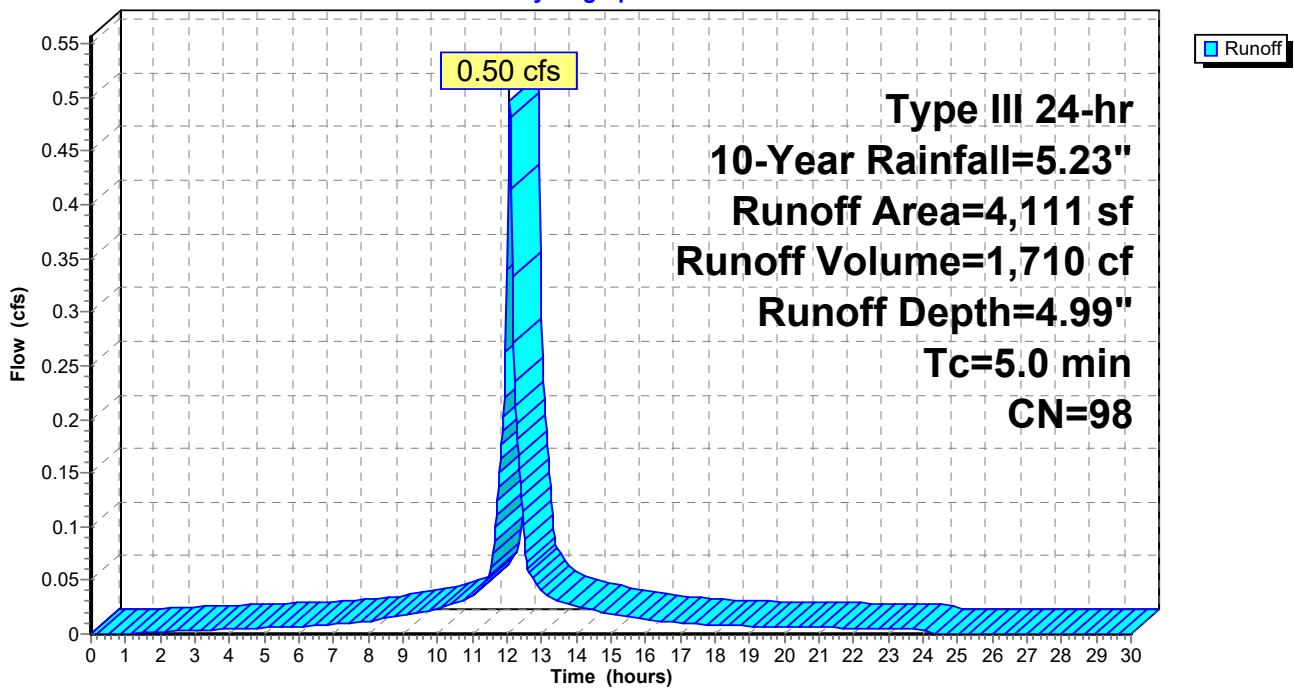
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.23"

Area (sf)	CN	Description
4,111	98	Roofs, HSG A
4,111	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 5S: PROPOSED BUILDING ROOF

Hydrograph



PROPOSED REV C

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Type III 24-hr 10-Year Rainfall=5.23"

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Summary for Pond 5P: STORM TECHS

Inflow Area = 14,315 sf, 100.00% Impervious, Inflow Depth = 4.99" for 10-Year event
 Inflow = 1.73 cfs @ 12.07 hrs, Volume= 5,956 cf
 Outflow = 0.32 cfs @ 12.50 hrs, Volume= 5,956 cf, Atten= 82%, Lag= 26.0 min
 Discarded = 0.32 cfs @ 12.50 hrs, Volume= 5,956 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
 Peak Elev= 281.75' @ 12.50 hrs Surf.Area= 1,233 sf Storage= 1,540 cf

Plug-Flow detention time= 28.7 min calculated for 5,950 cf (100% of inflow)
 Center-of-Mass det. time= 28.7 min (775.1 - 746.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	279.00'	2,173 cf	56.00'W x 22.02'L x 5.00'H Field A 6,167 cf Overall - 735 cf Embedded = 5,431 cf x 40.0% Voids
#2A	281.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 8 Rows
#3	284.00'	5 cf	Ponding Listed below -Impervious
		2,913 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
284.00	0
287.50	2
287.70	5

Device	Routing	Invert	Outlet Devices
#1	Discarded	279.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.32 cfs @ 12.50 hrs HW=281.75' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.32 cfs)

PROPOSED REV C

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Type III 24-hr 10-Year Rainfall=5.23"

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Pond 5P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +37.0" End Stone x 2 = 22.02' Base Length

8 Rows x 51.0" Wide + 18.0" Spacing x 7 + 69.0" Side Stone x 2 = 56.00' Base Width

24.0" Base + 30.0" Chamber Height + 6.0" Cover = 5.00' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

6,166.5 cf Field - 735.0 cf Chambers = 5,431.5 cf Stone x 40.0% Voids = 2,172.6 cf Stone Storage

Chamber Storage + Stone Storage = 2,907.6 cf = 0.067 af

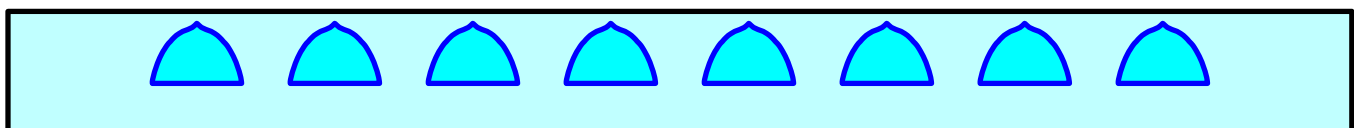
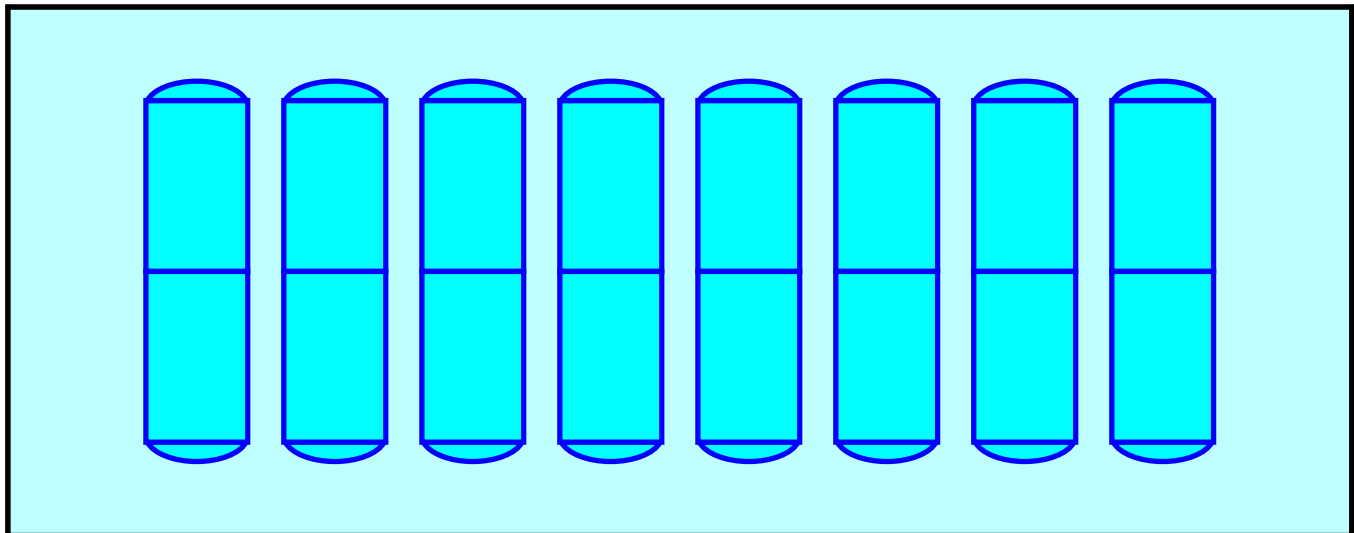
Overall Storage Efficiency = 47.2%

Overall System Size = 22.02' x 56.00' x 5.00'

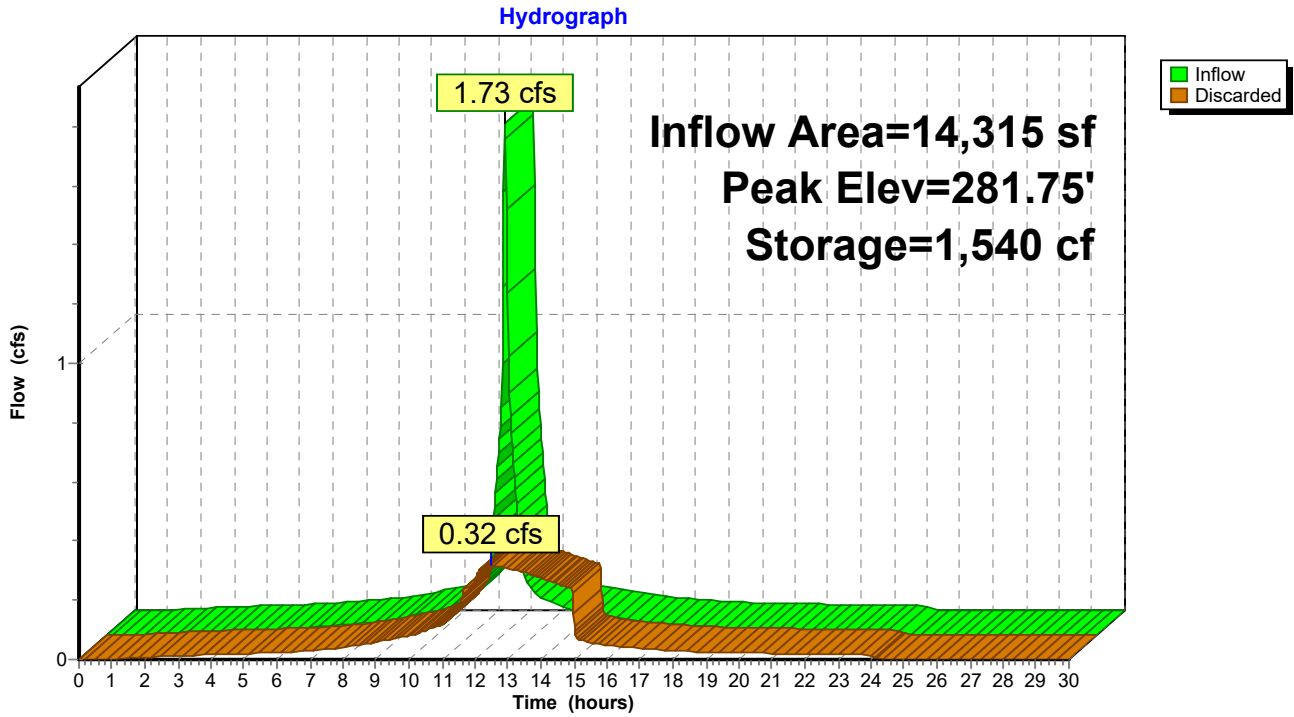
16 Chambers

228.4 cy Field

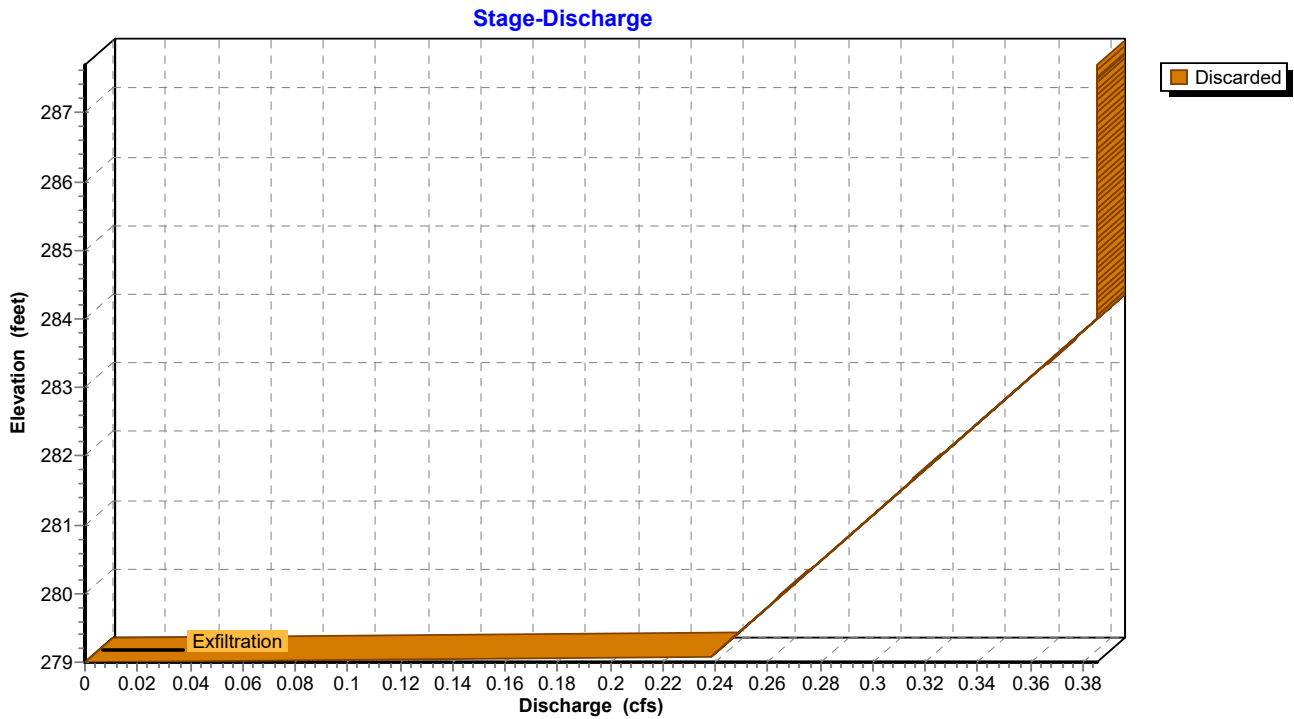
201.2 cy Stone



Pond 5P: STORM TECHS

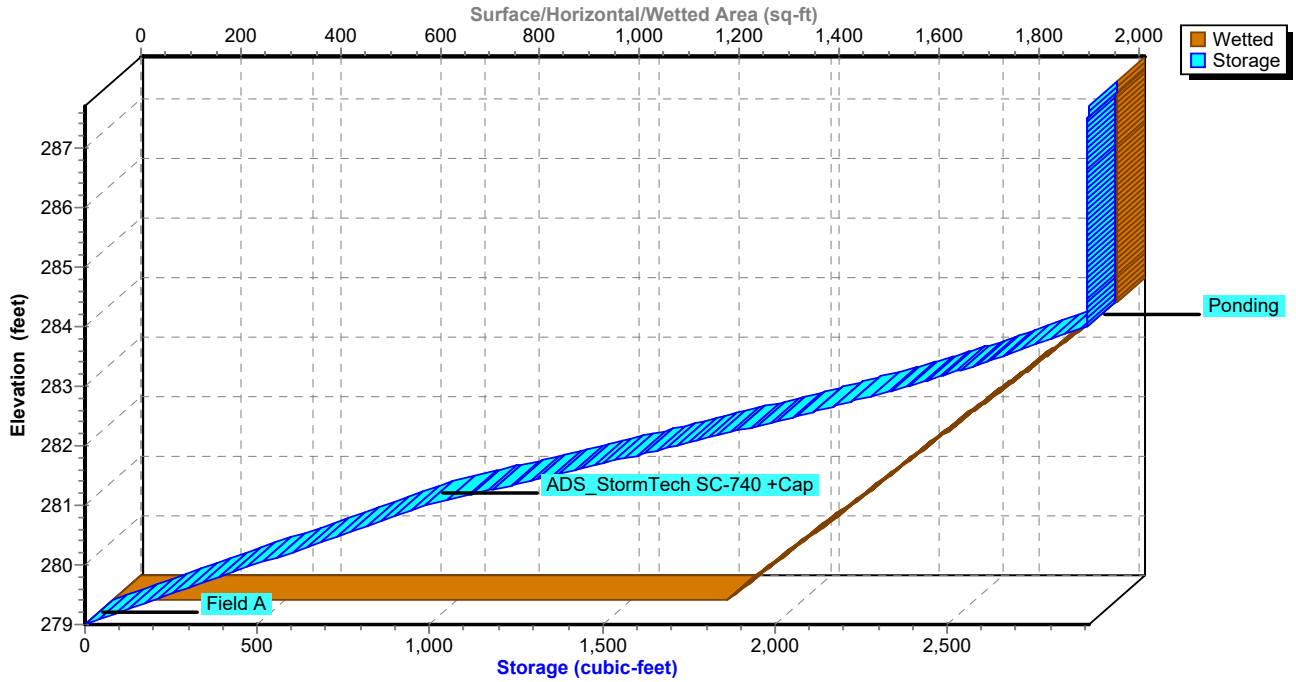


Pond 5P: STORM TECHS



Pond 5P: STORM TECHS

Stage-Area-Storage



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Type III 24-hr 10-Year Rainfall=5.23"

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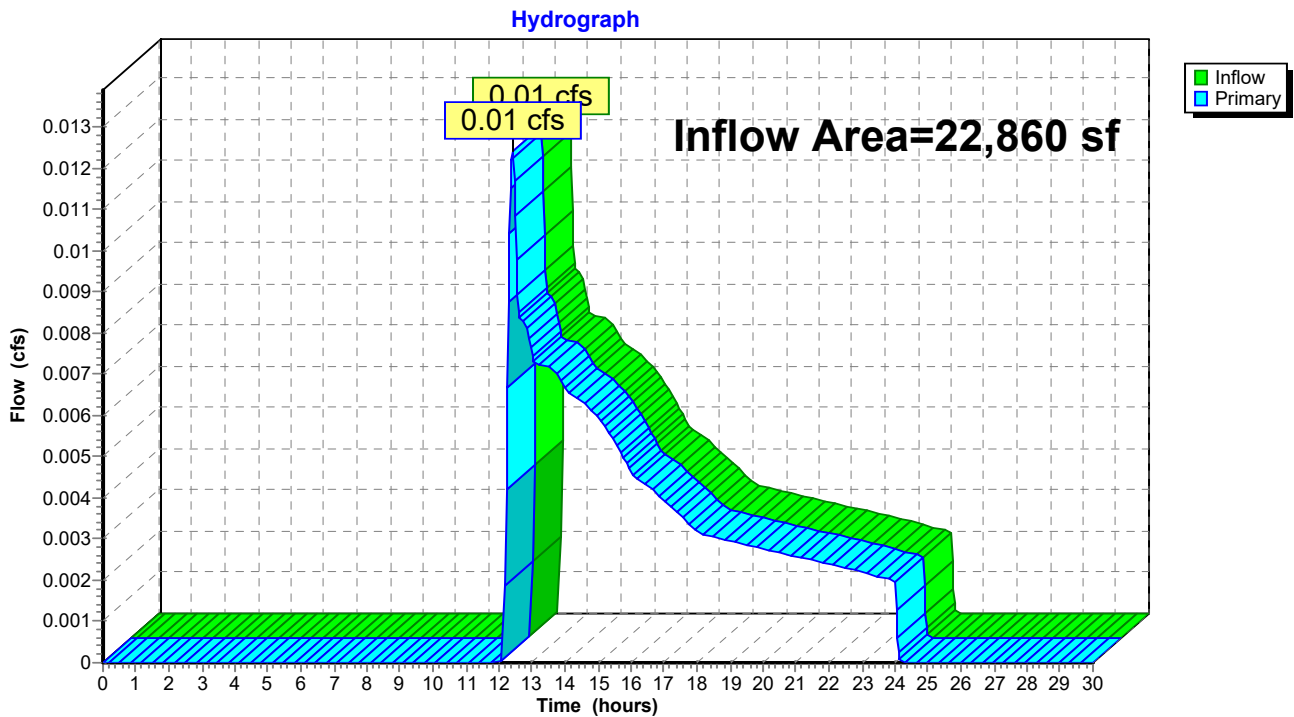
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Summary for Link 2L: PROPOSED RUNOFF

Inflow Area = 22,860 sf, 62.62% Impervious, Inflow Depth = 0.09" for 10-Year event
Inflow = 0.01 cfs @ 12.42 hrs, Volume= 177 cf
Primary = 0.01 cfs @ 12.42 hrs, Volume= 177 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: PROPOSED RUNOFF



PROPOSED REV C

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Type III 24-hr 25-Year Rainfall=6.39"

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Summary for Subcatchment 1S: PROPOSED LANDSCAPED AREA

Runoff = 0.05 cfs @ 12.29 hrs, Volume= 401 cf, Depth= 0.56"

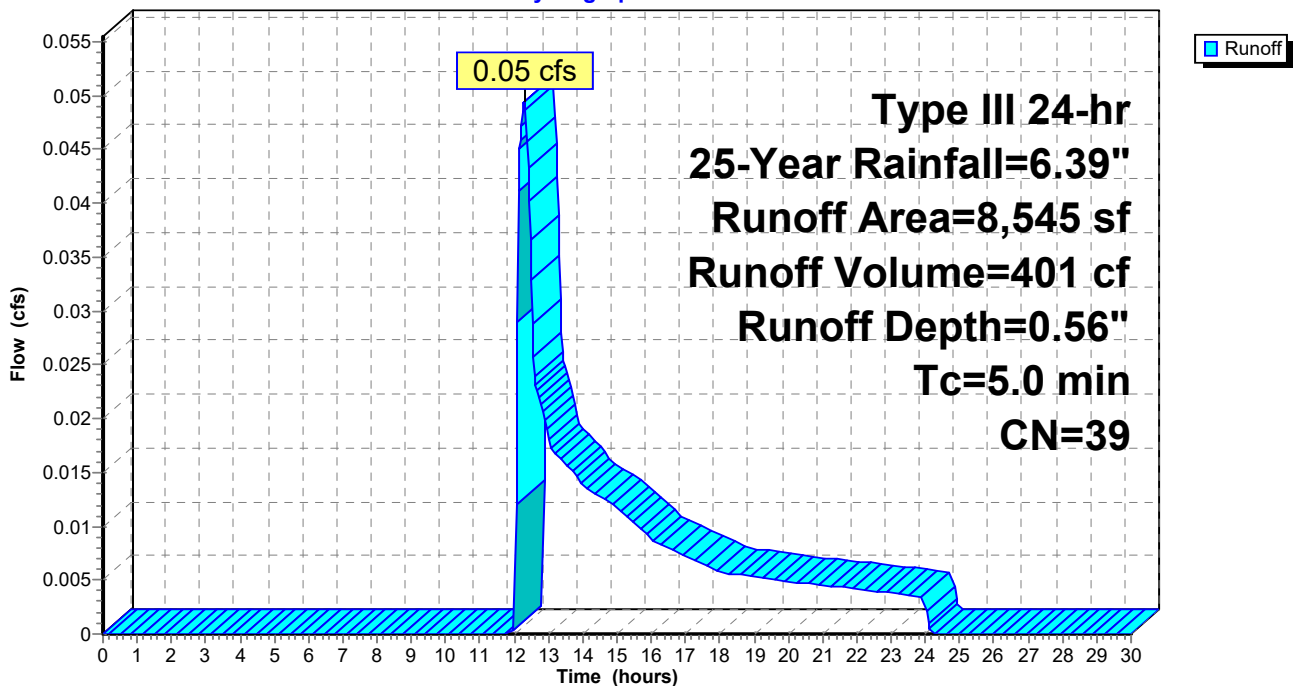
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.39"

Area (sf)	CN	Description
8,545	39	>75% Grass cover, Good, HSG A
8,545	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: PROPOSED LANDSCAPED AREA

Hydrograph



PROPOSED REV C

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Type III 24-hr 25-Year Rainfall=6.39"

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Summary for Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING

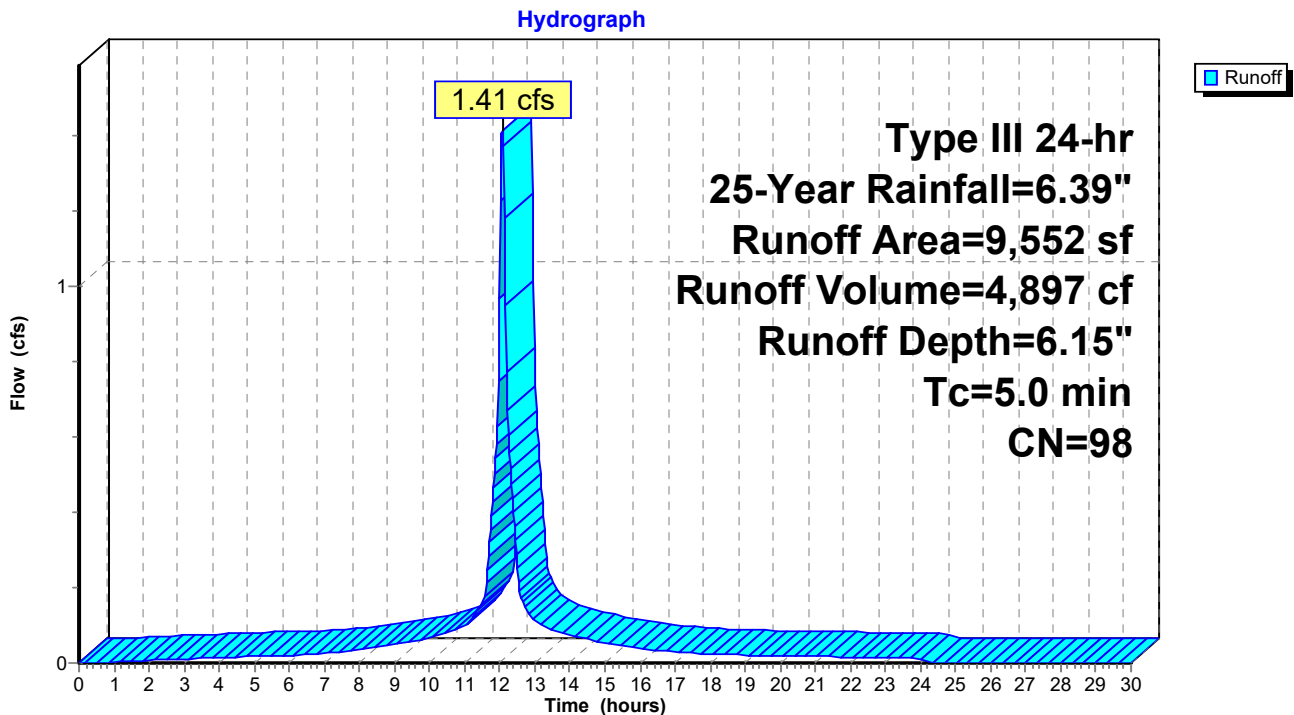
Runoff = 1.41 cfs @ 12.07 hrs, Volume= 4,897 cf, Depth= 6.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.39"

Area (sf)	CN	Description
9,552	98	Roofs, HSG A
9,552	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING



PROPOSED REV C

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Type III 24-hr 25-Year Rainfall=6.39"

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Summary for Subcatchment 4S: PROPOSED PAVED WALKWAY

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 334 cf, Depth= 6.15"

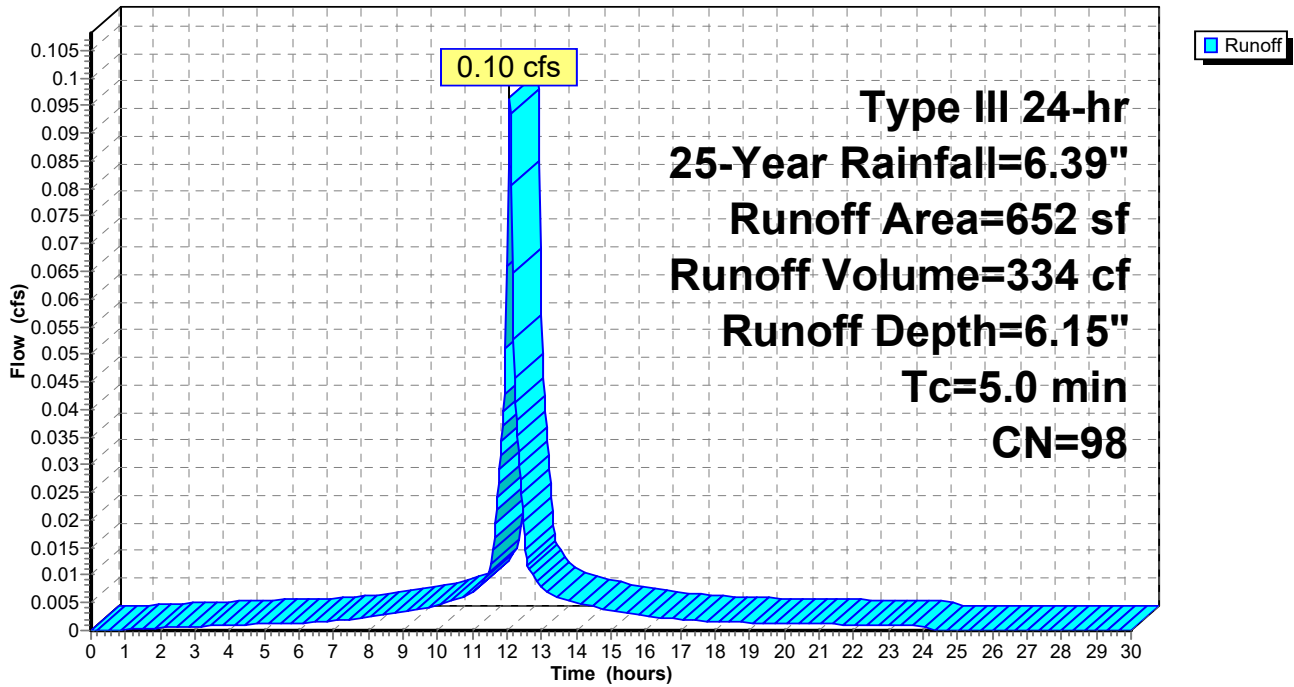
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.39"

Area (sf)	CN	Description
652	98	Unconnected pavement, HSG A
652	98	100.00% Impervious Area
652		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 4S: PROPOSED PAVED WALKWAY

Hydrograph



PROPOSED REV C

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Type III 24-hr 25-Year Rainfall=6.39"

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Summary for Subcatchment 5S: PROPOSED BUILDING ROOF

Runoff = 0.61 cfs @ 12.07 hrs, Volume= 2,107 cf, Depth= 6.15"

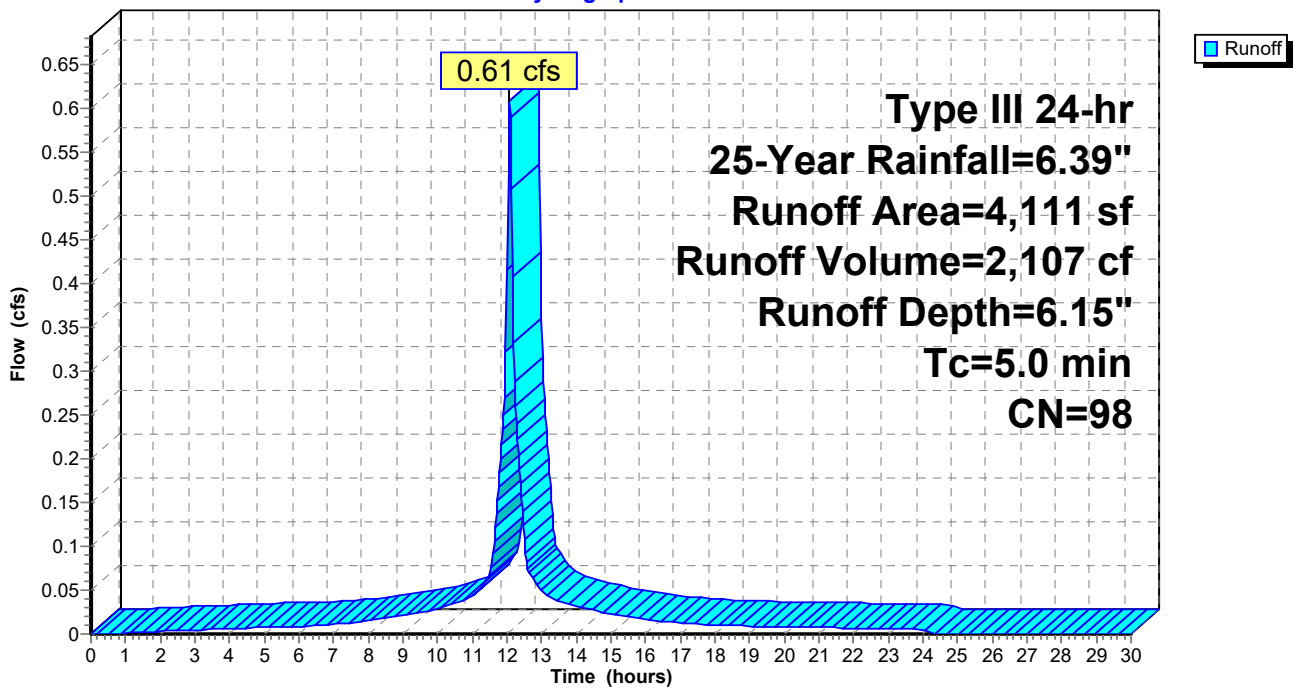
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.39"

Area (sf)	CN	Description
4,111	98	Roofs, HSG A
4,111	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 5S: PROPOSED BUILDING ROOF

Hydrograph



PROPOSED REV C

Type III 24-hr 25-Year Rainfall=6.39"

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Summary for Pond 5P: STORM TECHS

Inflow Area = 14,315 sf, 100.00% Impervious, Inflow Depth = 6.15" for 25-Year event
 Inflow = 2.12 cfs @ 12.07 hrs, Volume= 7,338 cf
 Outflow = 0.34 cfs @ 12.53 hrs, Volume= 7,338 cf, Atten= 84%, Lag= 27.7 min
 Discarded = 0.34 cfs @ 12.53 hrs, Volume= 7,338 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
 Peak Elev= 282.48' @ 12.53 hrs Surf.Area= 1,233 sf Storage= 2,054 cf

Plug-Flow detention time= 37.9 min calculated for 7,330 cf (100% of inflow)
 Center-of-Mass det. time= 37.8 min (781.1 - 743.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	279.00'	2,173 cf	56.00'W x 22.02'L x 5.00'H Field A 6,167 cf Overall - 735 cf Embedded = 5,431 cf x 40.0% Voids
#2A	281.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 8 Rows
#3	284.00'	5 cf	Ponding Listed below -Impervious
		2,913 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
284.00	0
287.50	2
287.70	5

Device	Routing	Invert	Outlet Devices
#1	Discarded	279.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.34 cfs @ 12.53 hrs HW=282.48' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.34 cfs)

PROPOSED REV C

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Type III 24-hr 25-Year Rainfall=6.39"

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Pond 5P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +37.0" End Stone x 2 = 22.02' Base Length

8 Rows x 51.0" Wide + 18.0" Spacing x 7 + 69.0" Side Stone x 2 = 56.00' Base Width

24.0" Base + 30.0" Chamber Height + 6.0" Cover = 5.00' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

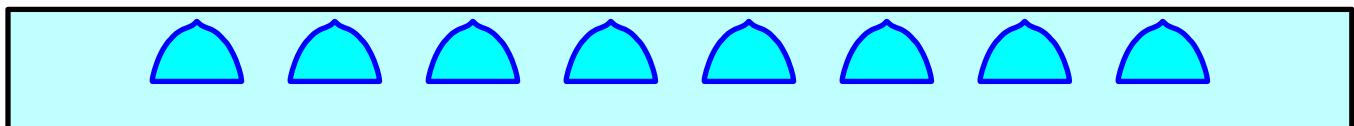
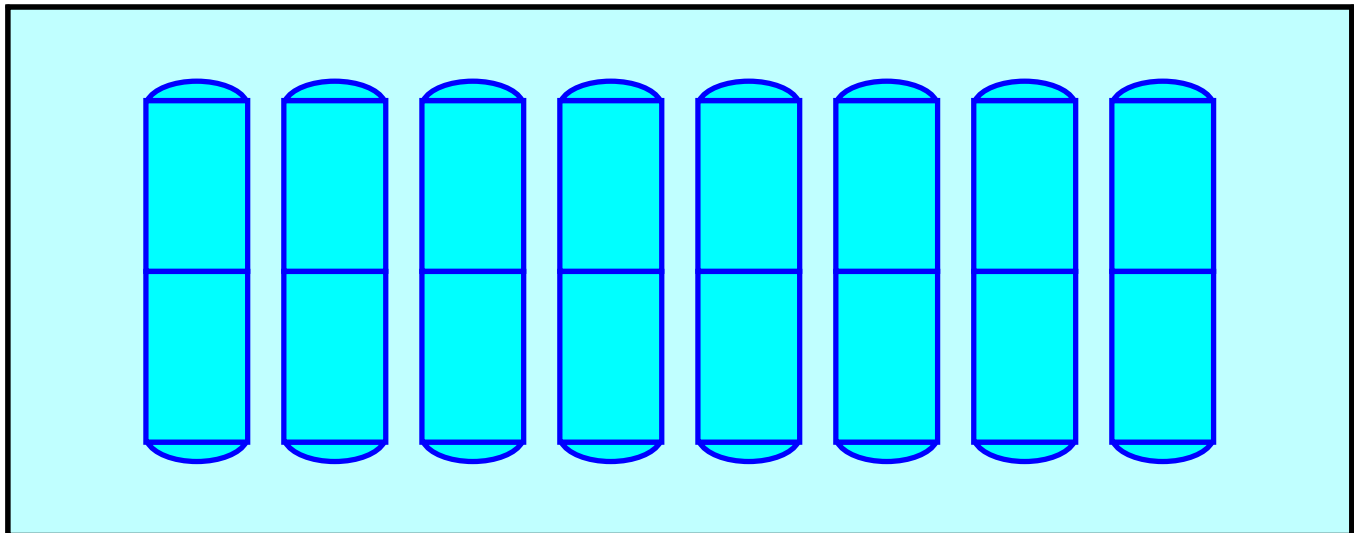
6,166.5 cf Field - 735.0 cf Chambers = 5,431.5 cf Stone x 40.0% Voids = 2,172.6 cf Stone Storage

Chamber Storage + Stone Storage = 2,907.6 cf = 0.067 af

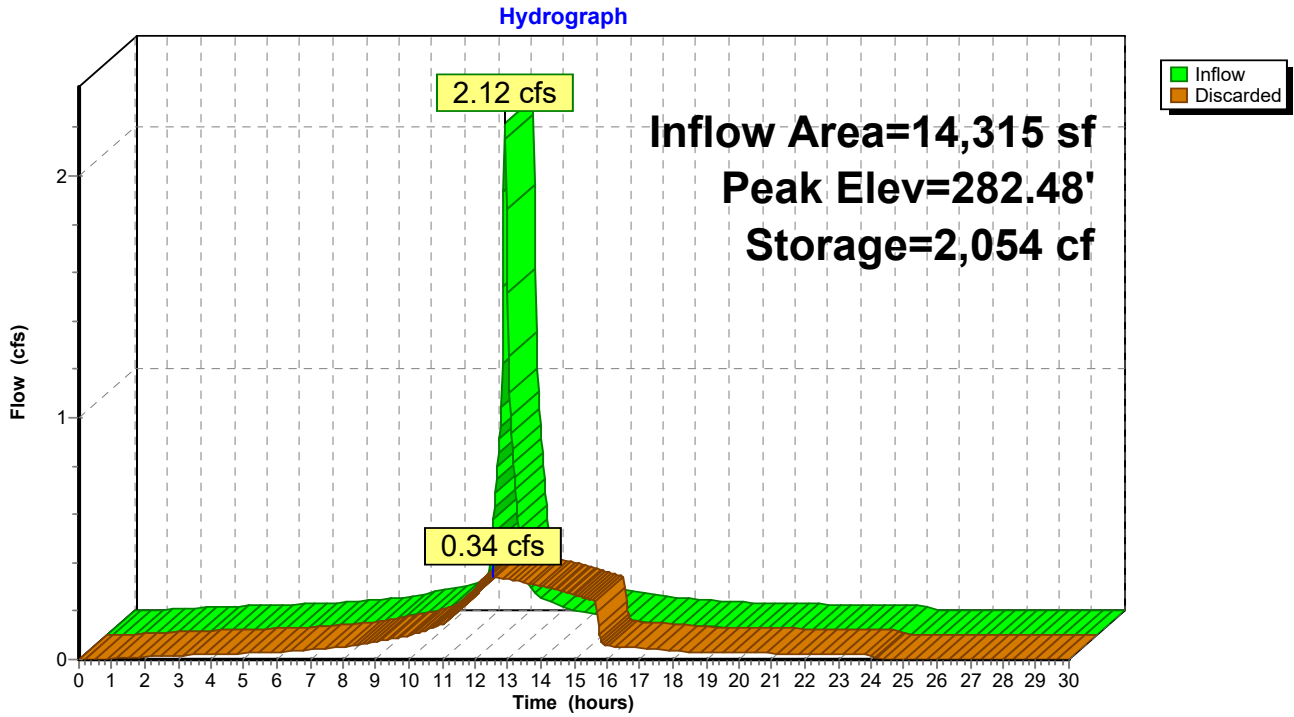
Overall Storage Efficiency = 47.2%

Overall System Size = 22.02' x 56.00' x 5.00'

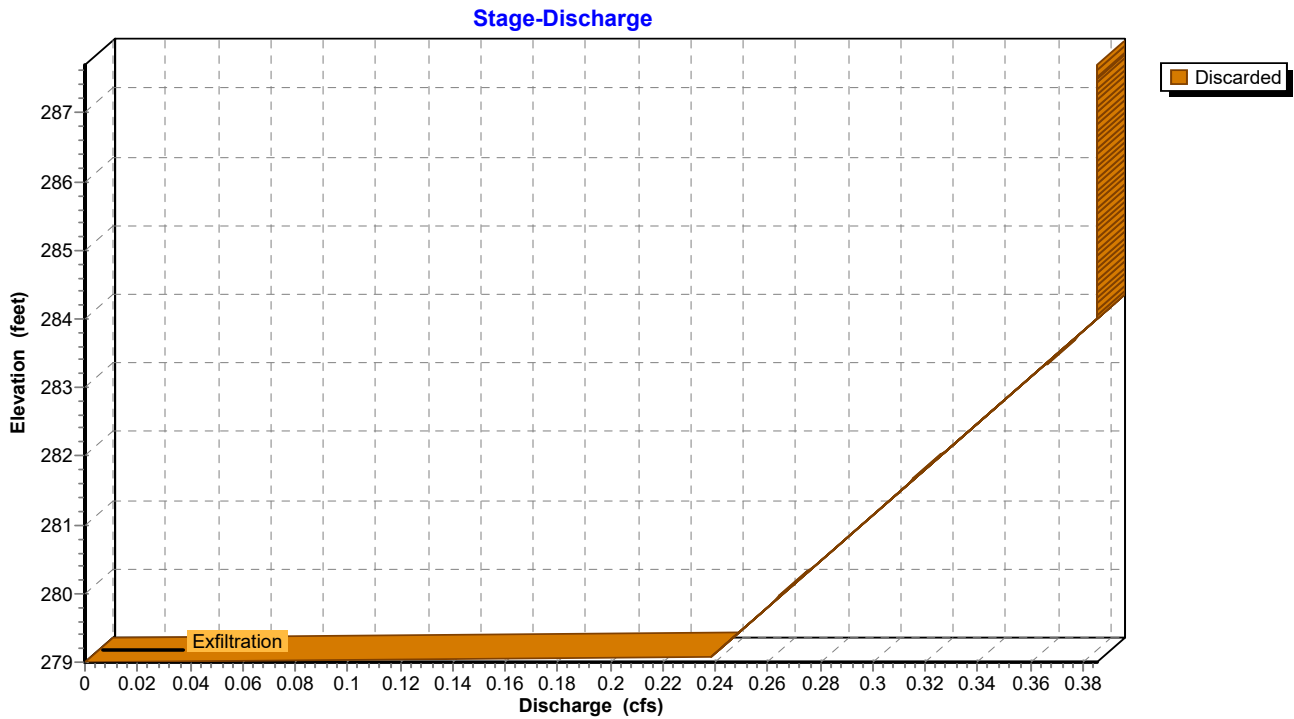
16 Chambers
228.4 cy Field
201.2 cy Stone



Pond 5P: STORM TECHS

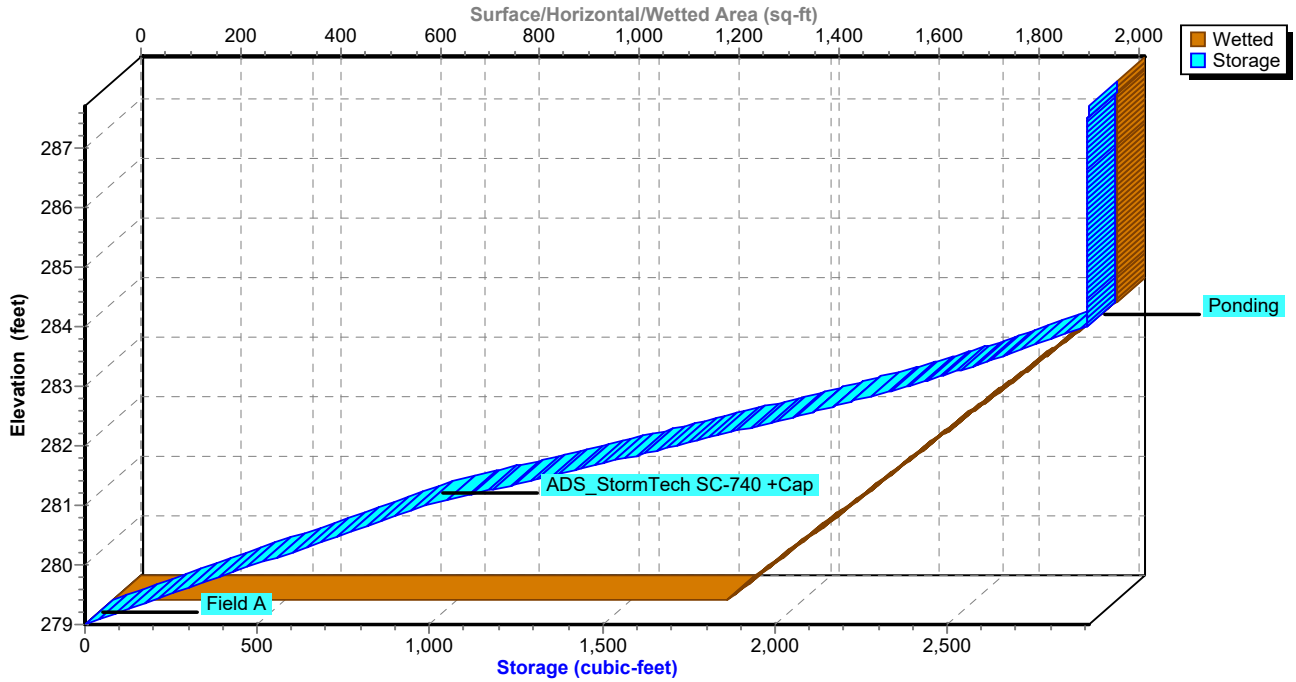


Pond 5P: STORM TECHS



Pond 5P: STORM TECHS

Stage-Area-Storage



PROPOSED REV C

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Type III 24-hr 25-Year Rainfall=6.39"

Printed 7/13/2020

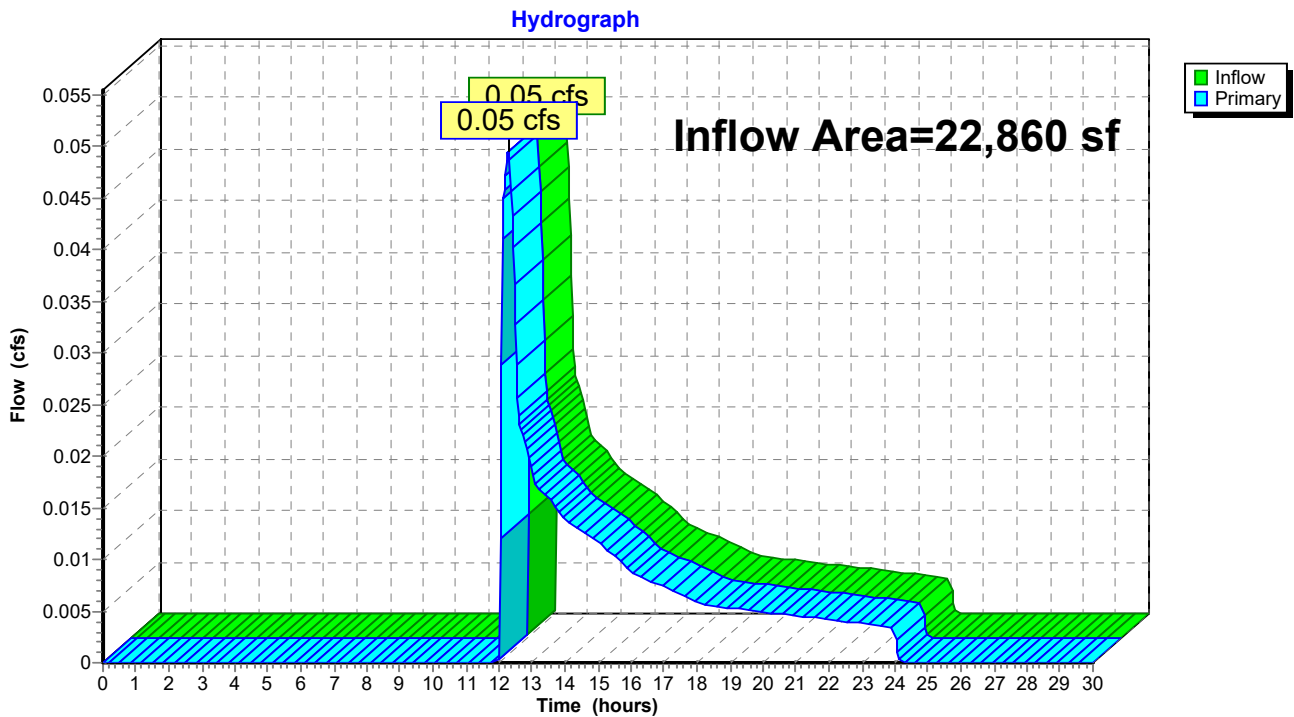
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Summary for Link 2L: PROPOSED RUNOFF

Inflow Area = 22,860 sf, 62.62% Impervious, Inflow Depth = 0.21" for 25-Year event
Inflow = 0.05 cfs @ 12.29 hrs, Volume= 401 cf
Primary = 0.05 cfs @ 12.29 hrs, Volume= 401 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: PROPOSED RUNOFF



PROPOSED REV C

Prepared by SPRUHAN ENGINEERING, P.C.

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Type III 24-hr 100-Year Rainfall=8.18"

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Summary for Subcatchment 1S: PROPOSED LANDSCAPED AREA

Runoff = 0.20 cfs @ 12.10 hrs, Volume= 878 cf, Depth= 1.23"

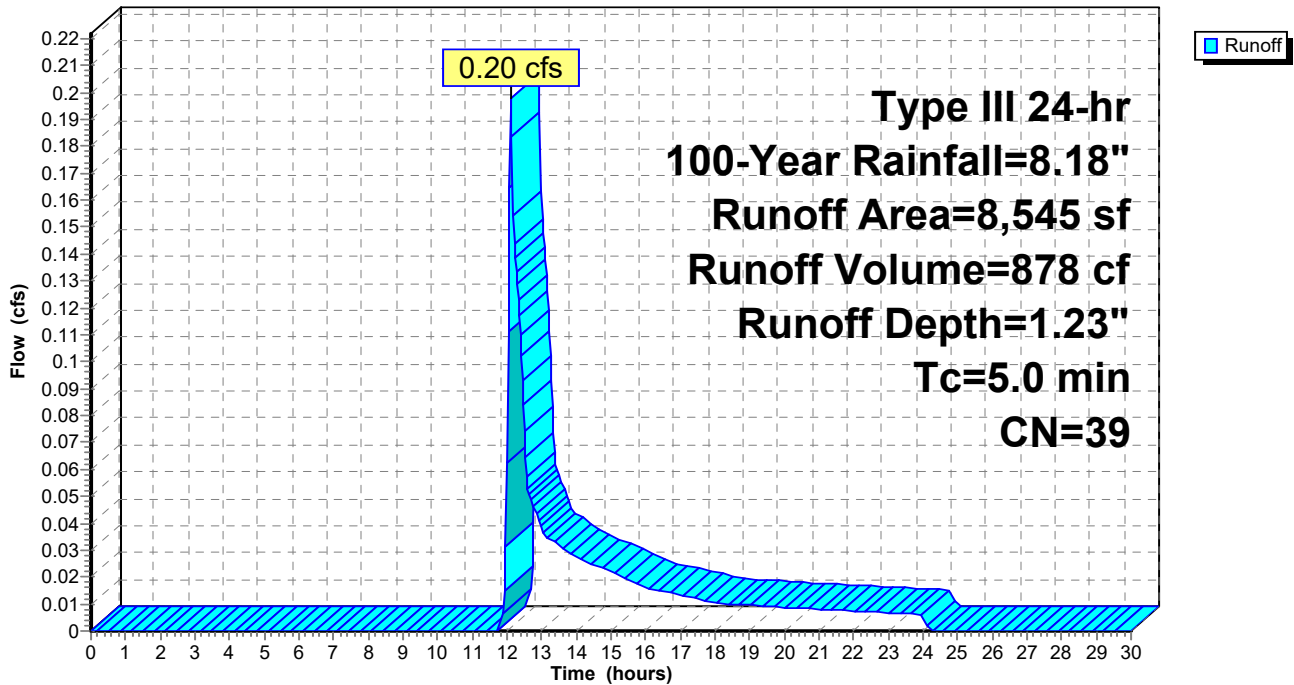
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.18"

Area (sf)	CN	Description
8,545	39	>75% Grass cover, Good, HSG A
8,545	39	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: PROPOSED LANDSCAPED AREA

Hydrograph



PROPOSED REV C

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Type III 24-hr 100-Year Rainfall=8.18"

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Summary for Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING

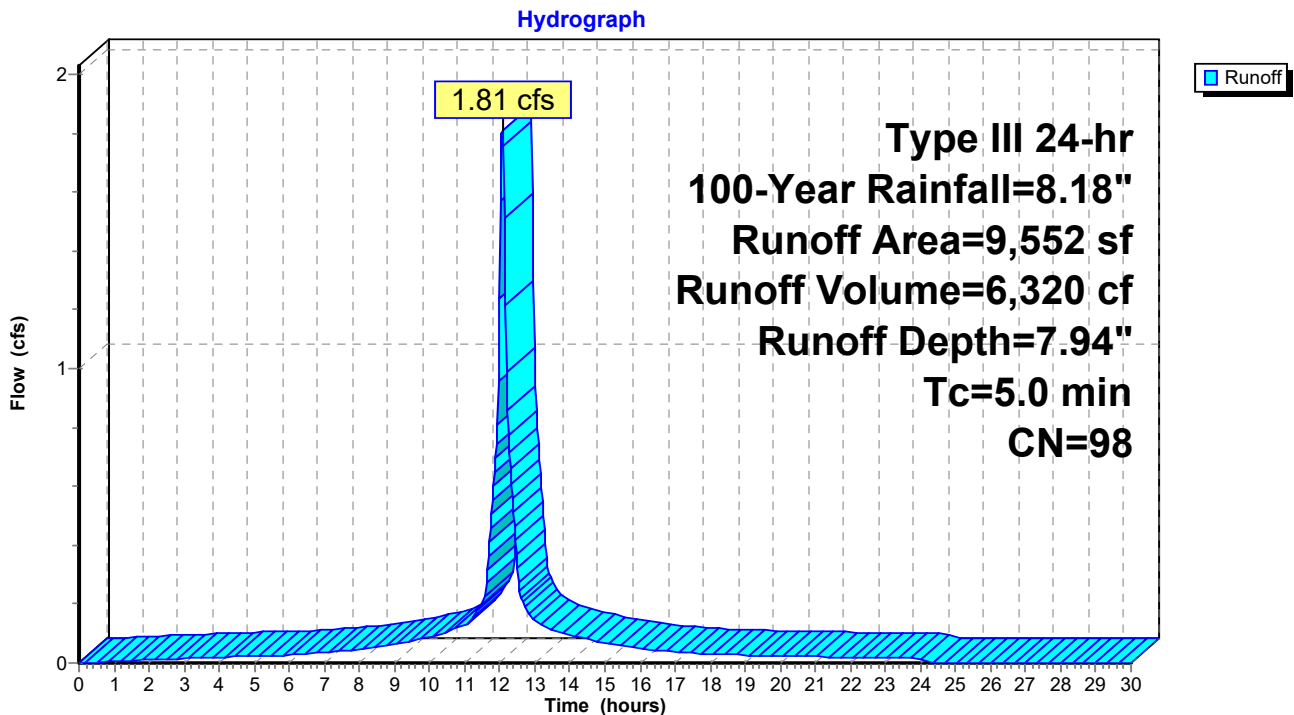
Runoff = 1.81 cfs @ 12.07 hrs, Volume= 6,320 cf, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.18"

Area (sf)	CN	Description
9,552	98	Roofs, HSG A
9,552	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: PROPOSED PAVED DRIVEWAY/PARKING



PROPOSED REV C

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Type III 24-hr 100-Year Rainfall=8.18"

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Summary for Subcatchment 4S: PROPOSED PAVED WALKWAY

Runoff = 0.12 cfs @ 12.07 hrs, Volume= 431 cf, Depth= 7.94"

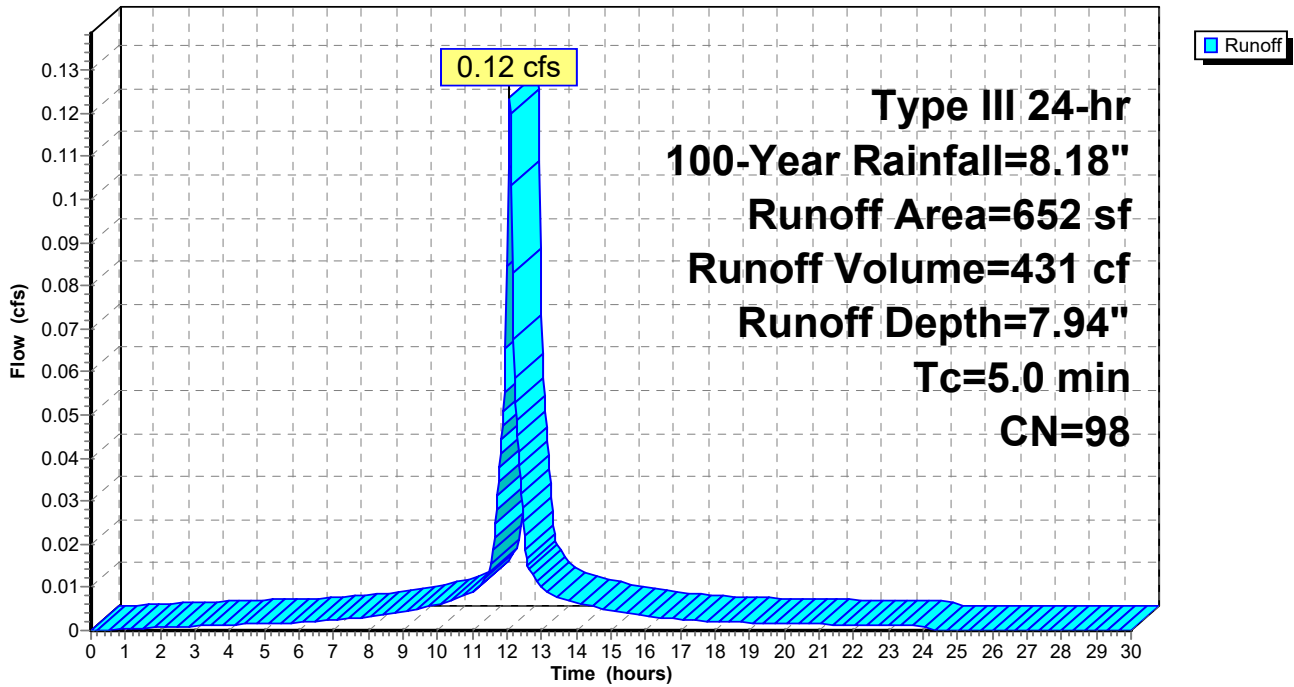
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.18"

Area (sf)	CN	Description
652	98	Unconnected pavement, HSG A
652	98	100.00% Impervious Area
652		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 4S: PROPOSED PAVED WALKWAY

Hydrograph



PROPOSED REV C

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Type III 24-hr 100-Year Rainfall=8.18"

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Summary for Subcatchment 5S: PROPOSED BUILDING ROOF

Runoff = 0.78 cfs @ 12.07 hrs, Volume= 2,720 cf, Depth= 7.94"

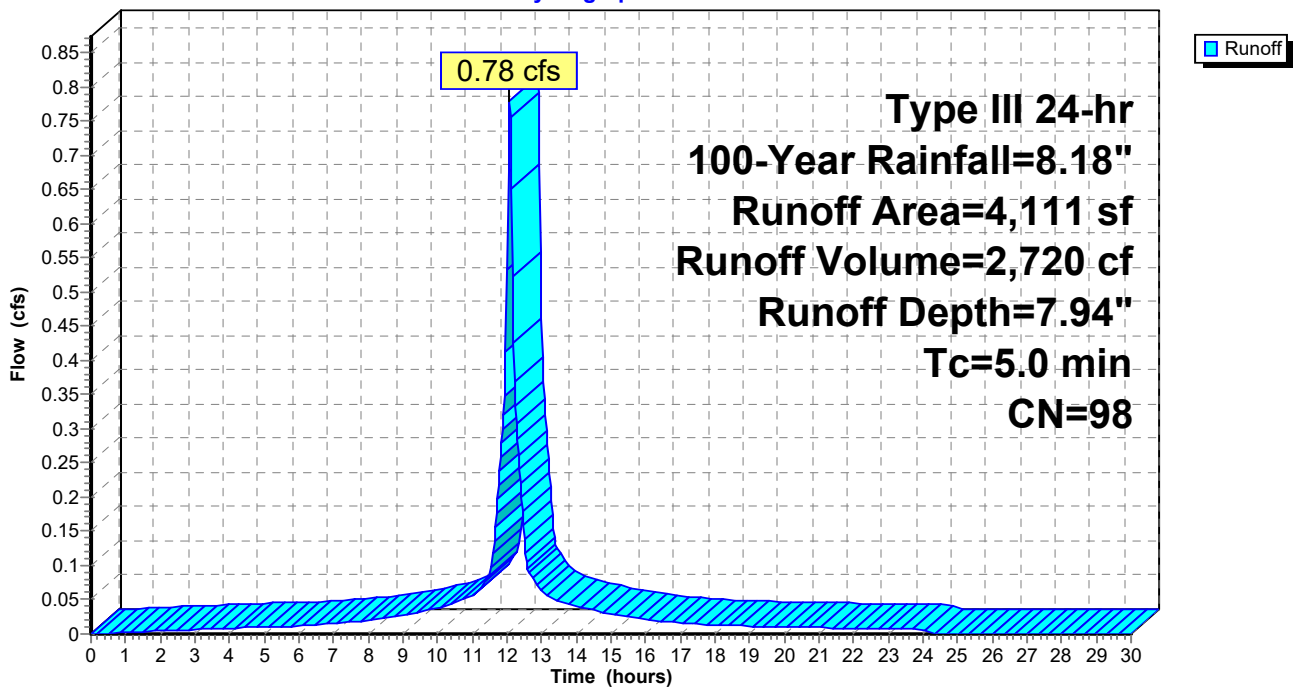
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.18"

Area (sf)	CN	Description
4,111	98	Roofs, HSG A
4,111	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 5S: PROPOSED BUILDING ROOF

Hydrograph



PROPOSED REV C

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Type III 24-hr 100-Year Rainfall=8.18"

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Summary for Pond 5P: STORM TECHS

Inflow Area = 14,315 sf, 100.00% Impervious, Inflow Depth = 7.94" for 100-Year event
 Inflow = 2.72 cfs @ 12.07 hrs, Volume= 9,472 cf
 Outflow = 0.38 cfs @ 12.56 hrs, Volume= 9,471 cf, Atten= 86%, Lag= 29.3 min
 Discarded = 0.38 cfs @ 12.56 hrs, Volume= 9,471 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
 Peak Elev= 283.94' @ 12.56 hrs Surf.Area= 1,233 sf Storage= 2,877 cf

Plug-Flow detention time= 51.7 min calculated for 9,471 cf (100% of inflow)
 Center-of-Mass det. time= 51.7 min (791.7 - 740.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	279.00'	2,173 cf	56.00'W x 22.02'L x 5.00'H Field A 6,167 cf Overall - 735 cf Embedded = 5,431 cf x 40.0% Voids
#2A	281.00'	735 cf	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 8 Rows
#3	284.00'	5 cf	Ponding Listed below -Impervious
		2,913 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
284.00	0
287.50	2
287.70	5

Device	Routing	Invert	Outlet Devices
#1	Discarded	279.00'	8.270 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.38 cfs @ 12.56 hrs HW=283.94' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.38 cfs)

PROPOSED REV C

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Type III 24-hr 100-Year Rainfall=8.18"

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Pond 5P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

2 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 15.86' Row Length +37.0" End Stone x 2 = 22.02' Base Length

8 Rows x 51.0" Wide + 18.0" Spacing x 7 + 69.0" Side Stone x 2 = 56.00' Base Width

24.0" Base + 30.0" Chamber Height + 6.0" Cover = 5.00' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

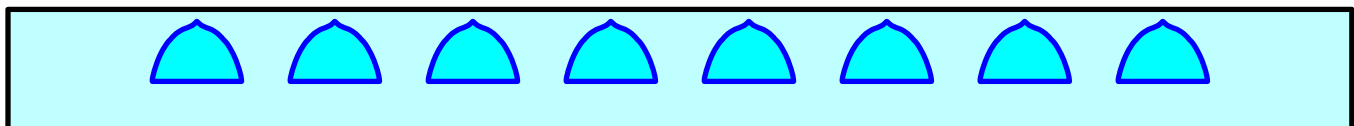
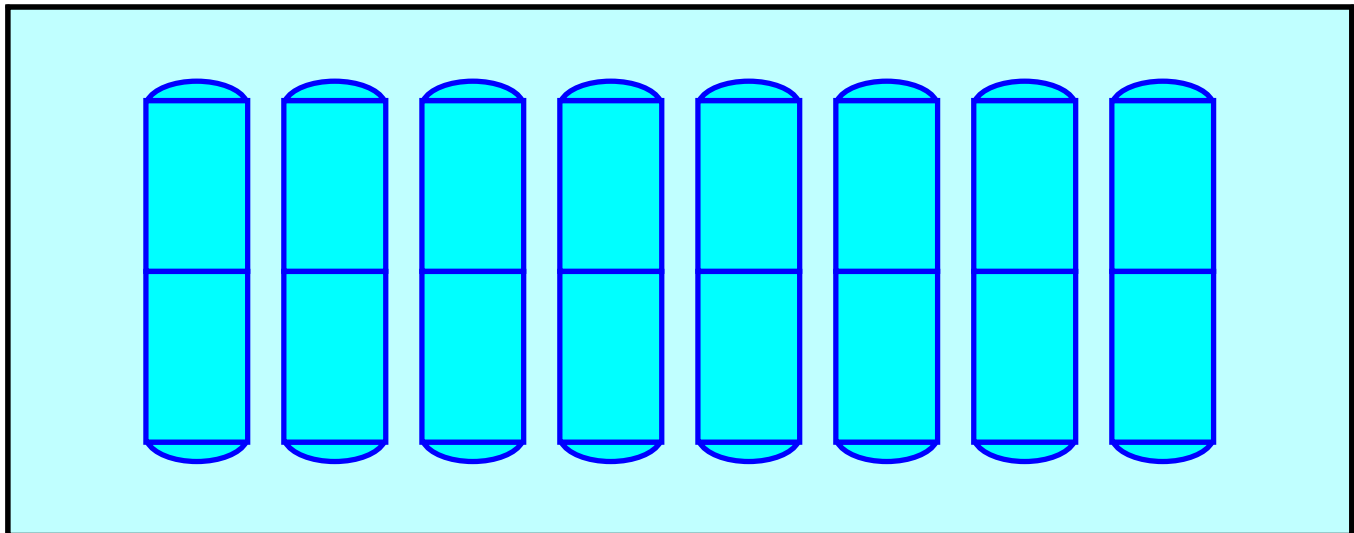
6,166.5 cf Field - 735.0 cf Chambers = 5,431.5 cf Stone x 40.0% Voids = 2,172.6 cf Stone Storage

Chamber Storage + Stone Storage = 2,907.6 cf = 0.067 af

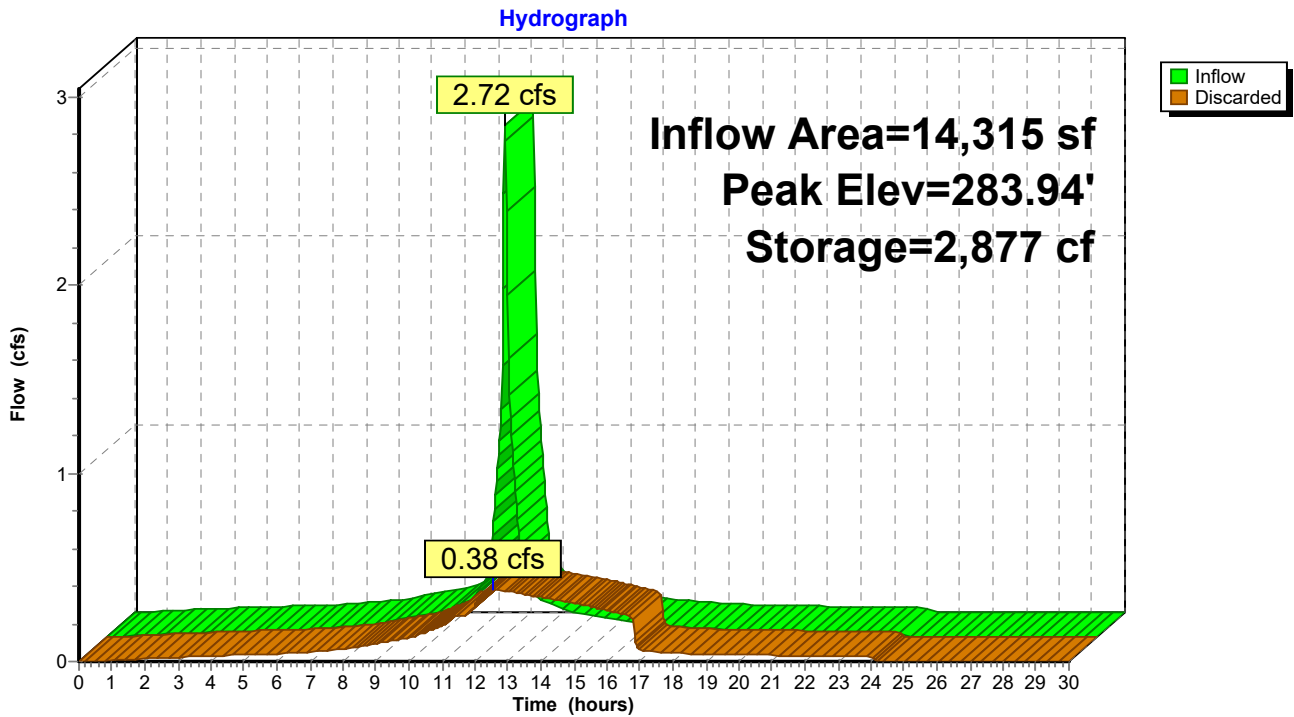
Overall Storage Efficiency = 47.2%

Overall System Size = 22.02' x 56.00' x 5.00'

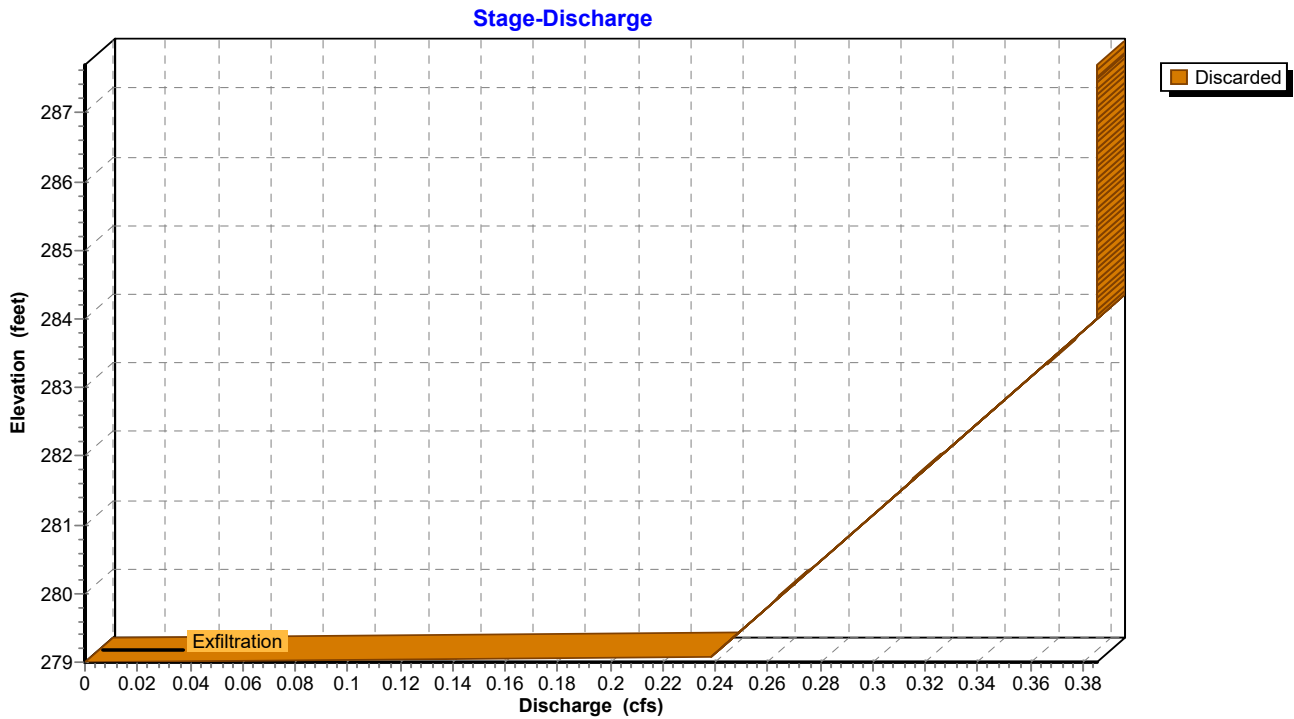
16 Chambers
228.4 cy Field
201.2 cy Stone



Pond 5P: STORM TECHS

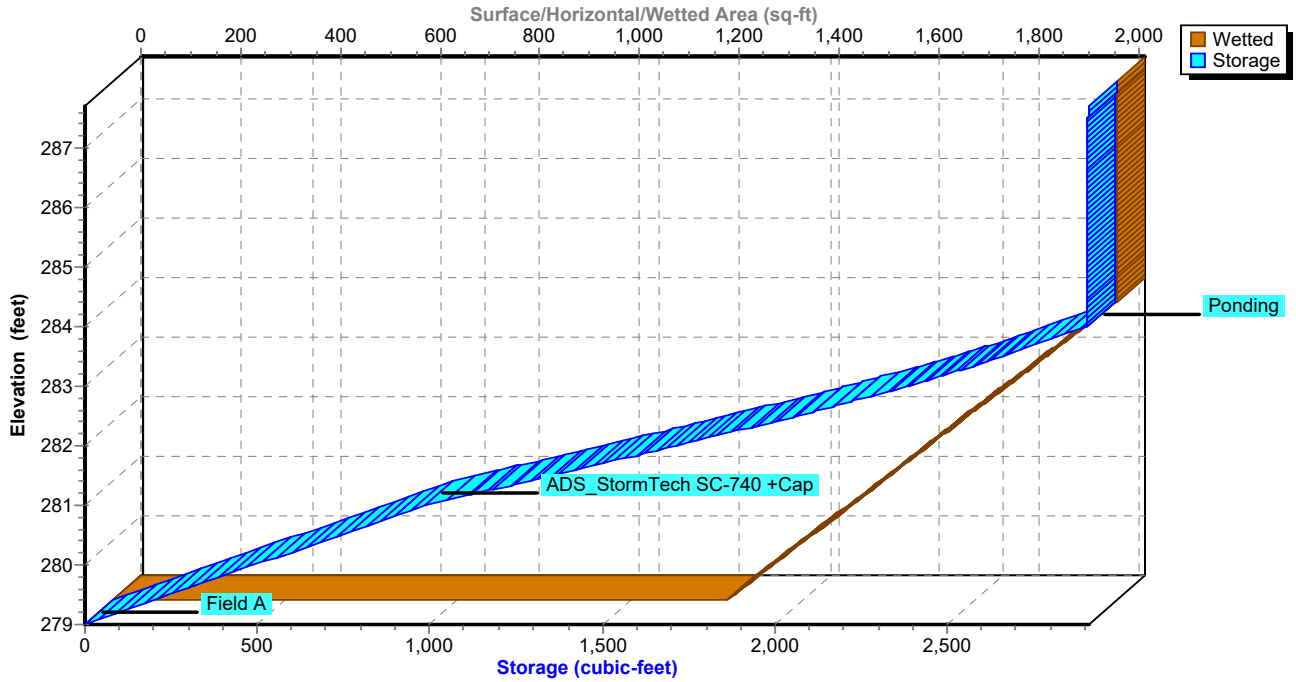


Pond 5P: STORM TECHS



Pond 5P: STORM TECHS

Stage-Area-Storage



PROPOSED REV C

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Type III 24-hr 100-Year Rainfall=8.18"

Printed 7/13/2020

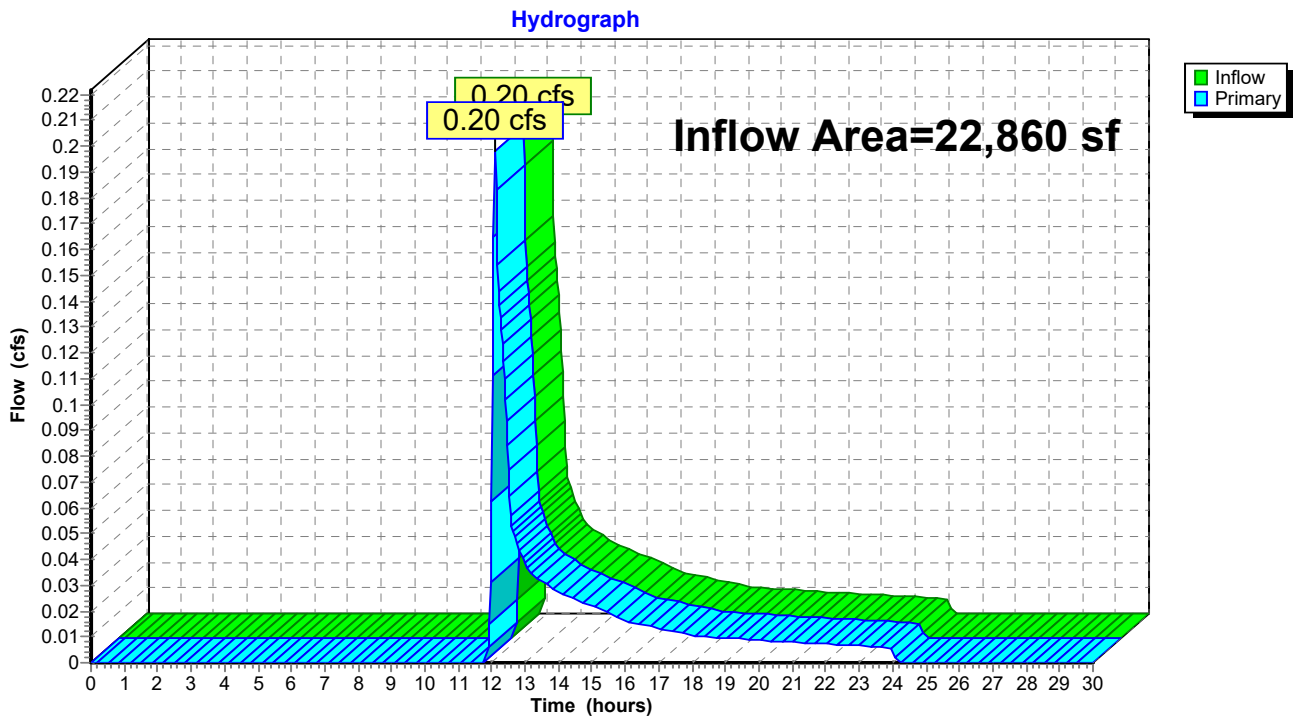
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Summary for Link 2L: PROPOSED RUNOFF

Inflow Area = 22,860 sf, 62.62% Impervious, Inflow Depth = 0.46" for 100-Year event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 878 cf
Primary = 0.20 cfs @ 12.10 hrs, Volume= 878 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 2L: PROPOSED RUNOFF

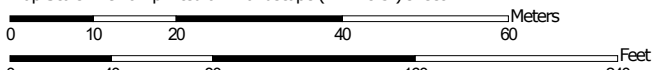


Appendix B – Soils Information

Custom Soil Resource Report Soil Map



Map Scale: 1:910 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
 Survey Area Data: Version 14, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 14, 2010—Apr 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land, 0 to 15 percent slopes	1.0	29.9%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	2.3	70.1%
Totals for Area of Interest		3.3	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

Custom Soil Resource Report

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Norfolk and Suffolk Counties, Massachusetts

602—Urban land, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: vkyj
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Rock outcrops

Percent of map unit: 1 percent
Hydric soil rating: Unranked

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyr9
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash terraces, outwash plains, kames, eskers, moraines
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Custom Soil Resource Report

Across-slope shape: Convex

Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam

Bw1 - 10 to 22 inches: fine sandy loam

Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand

2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 2 percent

Salinity, maximum in profile: Nonsaline (0.0 to 1.4 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 1.0

Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: A

Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: Unranked

Minor Components

Hinckley

Percent of map unit: 5 percent

Landform: Outwash plains, eskers, kames, deltas

Landform position (two-dimensional): Summit, shoulder, backslope

Custom Soil Resource Report

Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise

Down-slope shape: Convex

Across-slope shape: Linear, convex

Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent

Landform: Outwash plains, terraces, deltas

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Windsor

Percent of map unit: 5 percent

Landform: Outwash terraces, deltas, outwash plains, dunes

Landform position (three-dimensional): Tread, riser

Down-slope shape: Linear, convex

Across-slope shape: Linear, convex

Hydric soil rating: No

Appendix C – TSS Calculations

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

TSS Removal Calculation Worksheet

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Proprietary Treatment Practice	0.52	0.75	0.39	0.36
	0.00	0.36	0.00	0.36
	0.00	0.36	0.00	0.36
	0.00	0.36	0.00	0.36

Total TSS Removal =

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Infiltration Basin	0.80	1.00	0.80	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20

Total TSS Removal =

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

TSS Removal Calculation Worksheet

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Proprietary Treatment Practice	0.52	0.75	0.39	0.36
Infiltration Trench	0.80	0.36	0.29	0.07
	0.00	0.07	0.00	0.07
	0.00	0.07	0.00	0.07

Total TSS Removal =

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

