Hayner/Swanson, Inc.
Civil Engineers/Land Surveyors
Three Congress Street, Nashua, NH 03062-3399

LETTER OF TRANSMITTAL

To:
Brian Groth, AICP, Town Planner
Town of Hudson Planning Dept.
12 School Street
Hudson, NH

Date: March 17, 2022	Job #5734
Attn:	
Re:	**PROPOSED BUILDING ADDITIONS - SITE PLAN**
	22 Friars Drive
	Hudson, NH

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via_____ the following items:

☐ Shop drawings ☐ Prints ☑ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ Fed Ex Standard Delivery_____

Scope:

COPIES	DATE	NO.	DESCRIPTION
15			11 x17 Plan – Please replace previously submitted plans
1			Resubmittal Letter to Messrs. Groth and Dhima
1			Sidewalk Connection Sketch
1			Set of Supplemental Stormwater Information
1			Waiver Request Letter
			Re-submittal for March 23, 2022 Hudson Planning Board meeting
			Electronic (PDF) Set – Submitted via Email to Brian Groth

James N. Petropulos, P.E.
President/Principal Engineer

(If enclosures are not as noted, please notify us immediately.)

HSI Hayner/Swanson, Inc.
Civil Engineers/Land Surveyors

March 17, 2022
Job# 5734

Mr. Brian Groth, AICP – Town Planner
Mr. Elvis Dhima, P.E. – Town Engineer
TOWN OF HUDSON
12 School Street
Hudson, NH 03051

RE: PROPOSED BUILDING ADDITIONS
22 FRIARS DRIVE
HUDSON, NEW HAMPSHIRE

Dear Messrs. Groth and Dhima:

Pursuant to our recent telephone conversation regarding the above referenced project please note our responses to the additional plan review comments that you both provided during the call.

1. Estimated domestic water and sewage flow estimates were provided to Mr. Dhima, P.E. in a letter dated March 14, 2022, a copy of which is attached herewith.
2. Please find enclosed additional support material (test pit logs, infiltration testing results, sketch plans, riprap outlet protection calculations) that addresses the stormwater design comments provided by Mr. Dhima. This information will be added to our final plans. Additionally, as can be seen on the infiltration testing results, the soils under the proposed subsurface basins have an infiltration rate that exceed the maximum allowed per NHDES regulations. The final plans will include an amended soil layer under each basin in accordance with NHDES standards.
3. Please find attached a sketch plan showing the sidewalk connection from Friars Drive to the on-site sidewalk network that leads to the building entrances. If acceptable we will add this information to our final plan set.
4. Please find enclosed a revised waiver request letter that seeks approval to have 9-foot wide parking spaces in lieu of 10-footers.

We look forward to our Planning Board hearing on March 23, 2022 to discuss these and any other outstanding items for this project. As always, please do not hesitate to contact our office if you have any questions regarding this project or if you need any need additional information.

Respectfully,

James N. Petropulos, P.E.
President/Principal Engineer
Hayner/Swanson, Inc.

HSI Hayner/Swanson, Inc.
Civil Engineers/Land Surveyors

March 16, 2022
Job# 5734

Mr. Elvis, Dhima, P.E., Town Engineer
Town of Hudson
12 School Street
Hudson, NH 03051

RE: PROPOSED BUILDING ADDITIONS
22 FRIARS DRIVE
HUDSON, NEW HAMPSHIRE

Dear Elvis:

Pursuant to the above referenced project we wish to respond to your recent request to provide estimated domestic water usage and average daily sewer flow needs for this facility once the proposed additions have been constructed. It is our understanding, based on discussions with our client, that this manufacturing facility does not discharge any industrial wastewater into the municipal sewerage system and therefore the domestic water usage is for employee consumption and sanitary purposes only. The current and proposed estimated flows, using the New Hampshire Department of Environmental Services (NHDES) unit design flow estimates in gallons per day (GPD) are as follows:

EXISTING FLOW ESTIMATE:
80 employees x 15 GPD/Person = 1,200 GPD

PROPOSED FLOW ESTIMATE:
135 employees x 15 GPD/Person = 2,025 GPD

NET INCREASE: = 825 GPD

As always, please do not hesitate to contact our office if you have any questions regarding this project or if you need any need additional information.

Respectfully,

James N. Petropulos, P.E.
President/Principal Engineer
Hayner/Swanson, Inc.

cc: Brian Groth, AICP - Town Planner

SIDEWALK SKETCH PLAN

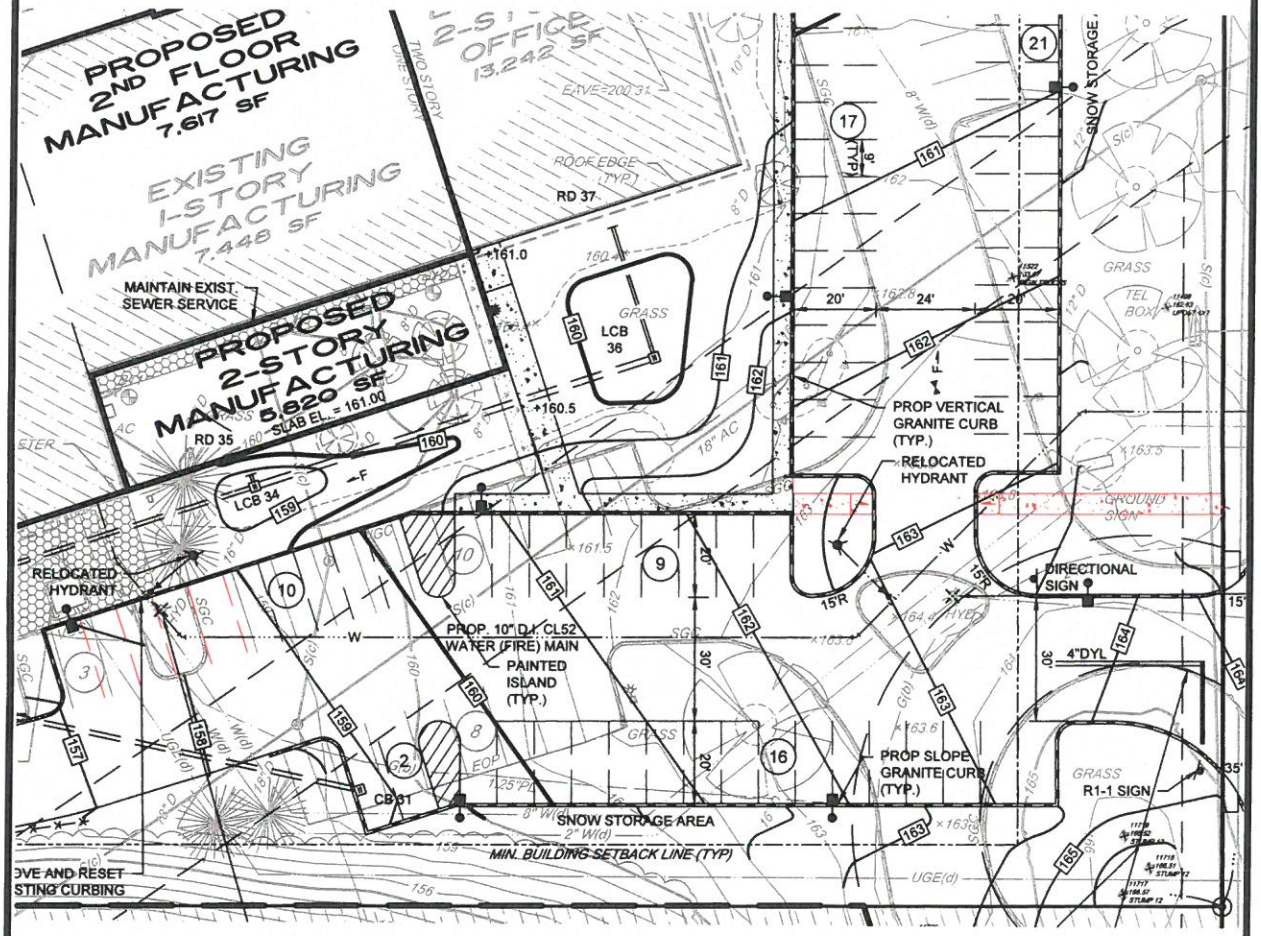
MAP 209, LOT 4

22 FRIARS DRIVE

HUDSON, NH

03/16/22

HSI Hayner/Swanson, Inc.
Civil Engineers/Land Surveyors
3 Congress Street Nashua, NH 03062
131 Middlesex Turnpike Burlington, MA 01803



DWG:5734 SITE BASE PR SK	FIELD BK: -	5734
LOCATION: J:\5000\5734\DWG\5734 SITE 2021		File Number

WAIVER REQUEST MEMORANDUM (Revised 17 March 2022)

WAIVER REQUEST #1:

Site Plan Regulation: Hudson Site Plan Regulation Chapter 275-8 C (2) – Required number of Parking Spaces.

Waiver Request: A waiver is requested from **Chapter 275-8 C (2)** in order to allow 93 parking spaces on a lot where 134 spaces are required per the regulation.

Basis of Waiver:

For Industrial lots, the Hudson Site Plan regulations parking requirement is: *one for each 600 square feet of gross floor space or 0.75 space per employee of the combined employment of the two largest consecutive shifts, whichever is larger*. Currently, Integra Biosciences building measures 32,210 square feet and the site contains 101 parking spaces. The total number of employees at this facility is 80, spread over two shifts that operate 16 hours per day for 5 days per week (Monday thru Friday). The proposed additions, which measure 48,177 square feet and will displace the existing parking lot on the east side of the site. It is being proposed to replace these spaces by expanding the parking areas on the south and west sides of the property along with adding parking behind the proposed warehouse addition. When complete, the post-construction number of employees will be 135, again over two shifts. In calculating the required number of spaces, the larger amount per the Hudson Code is the 1 space per 600 square feet criteria which yields a requirement of 134 spaces. The proposed site plan shows a total of 93 spaces being provided, which meets the needs of Integra.

Integra Biosciences has occupied this site since the 1990's. Based on their past experience with this site and with the "flexible arrival/departure" times they afford their employees, they feel strongly that they have ample parking today and upon completion of the proposed building expansions.

Waiver Request Form Standards

The hardship reason for granting this waiver is that there is no reasonable way to add forty-one (41) more parking spaces on this property in order to comply with the Site Plan Regulation. As stated above, the combination of two shifts using 'flexible arrival and departure' times allows this site to function properly without needing the required number of spaces.

Granting this waiver will not be contrary to the spirit and intent of the Town's Land Use Regulations because the spirit and intent of Chapter 275-8 C (2) is that adequate parking is provided for the intended use. As has been stated above, given the past history of this site and the way this business uses two working shifts, adequate parking is provided.

Chapter 276-7 Waivers

The requirements of Chapter 275-8 C (2) are unnecessary.

The purpose of Chapter 275-8 C (2) is to ensure adequate number of parking spaces are provided for a particular use. Given the above stated reasons, it is Integra's opinion that ample parking is provided for this business operation.

Granting the waiver will not violate the purposes or general standards of the Land Use Regulations.

This waiver will not violate the public safety purposes of Chapter 275-8 C (2), in that the plan represents good planning principles and is balanced with regard to parking, building and open spaces.

Granting the waiver shall result in a general benefit to the Town and surrounding properties.

Granting the waiver will support the Integra Biosciences building addition which will create approximately 55 new jobs, increase annual tax revenue and is the type of development specifically contemplated by the Town's Master Plan. As a result, the waiver will result in a general benefit to the Town.

WAIVER REQUEST #2:

Site Plan Regulation: Hudson Site Plan Regulation Chapter 275-8 C (4) – Required width of parking spaces.

Waiver Request: A waiver is requested from **Chapter 275-8 C (4)** in order to allow 9' x 20' parking spaces where 10' x 20' spaces are required.

Basis of Waiver:

The Hudson Site Plan regulations parking space dimension requirement is: *10 feet by 20 feet, except that the PLANNING BOARD may vote to allow dimensions of 9 feet by 18 feet.* It is fairly standard practice to have 9 foot wide parking spaces for a commercial building. Typically a 10-foot stall is required for retail projects. Currently the Integra parking lot has 9 foot by 20 foot parking stalls and they have been working fine.

Waiver Request Form Standards

The hardship reason for granting this waiver is that providing 10-foot wide spaces would reduce the number of spaces that could be constructed on this site. Strict enforcement of the parking dimensions would pose a hardship to the applicant since it would mean that the building additions, as envisioned, could not be constructed.

Integra believes that the above request is reasonable and meets the spirit and intent of the Town of Hudson Site Plan Regulations since proposed parking space dimensions meet industry standards.

Chapter 276-7 Waivers

The requirements of Chapter 275-8 C (4) are unnecessary.

As indicated above, Chapter 275-8 C (4) gives the Planning Board the authority to approve 9-foot wide parking spaces, which is an industry standard for commercial uses.

Granting the waiver will not violate the purposes or general standards of the Land Use Regulations.

The general standards of the Hudson Site Plan regulations are to address public safety concerns related to the building and site expansion of this property. The reduction of the proposed parking space width by 1-foot does not create a public safety concern.

Granting the waiver shall result in a general benefit to the Town and surrounding properties.

Granting the waiver will allow Integra to grow their business at their current location.

WAIVER REQUEST #3:

Site Plan Regulation: Hudson Site Plan Regulation Chapter 275-8 C (6) – Required number of Loading Spaces.

Waiver Request: A waiver is requested from **Chapter 275-8 C (6)** in order to allow 5 loading spaces on a lot where 9 spaces are required per this code.

Basis of Waiver:

The Hudson Site Plan regulations loading requirement is: *one for each 5000 square feet of gross floor space plus 1 space for every additional 10,000 square feet of gross floor area.* Currently there are two loading docks to the existing building. It is being proposed to expand this structure in the back part of the site and building thereby displacing the existing loading docks and maneuver area. The proposed addition will include four (4) recessed loading dock doors to service the entire operation on the east side of the building and one (1) new dock door on the west side of the existing warehouse.

Waiver Request Form Standards

The hardship reason for granting this waiver is that providing 9 loading spaces is entirely unnecessary for this use. As stated above, Integra has operated upon this property since the 1990's. They know and understand their loading needs. Strict enforcement of the loading requirement would pose a hardship to the applicant since it would mean that the building addition could not be constructed as envisioned and the business would need to look elsewhere for a facility.

Integra believes that the above request is reasonable and meets the spirit and intent of the Town of Hudson Site Plan Regulations since the number loading docks and their intended location is sufficient for this business.

Chapter 276-7 Waivers

The requirements of Chapter 275-8 C (6) are unnecessary.

As indicated above, the purpose of Chapter 275-8 C (6) is to ensure that the correct number of loading spaces is provided for the intended use. The subject site will be served by five (5) docks as described above.

Granting the waiver will not violate the purposes or general standards of the Land Use Regulations.

The general standards of the Hudson Site Plan regulations are to address public safety concerns related to the building and site expansion of this property. The reduction of 9 loading dock spaces to 5 spaces does not create a public safety concern.

Granting the waiver shall result in a general benefit to the Town and surrounding properties.

Granting the waiver will allow Integra to grow their business at their current location.

WAIVER REQUEST #4:

Driveway Regulation: Driveway Regulation 193-10.G – One driveway per parcel.

Waiver Request: A waiver is requested from **Driveway Regulation 193-10.G** in order to allow 2 driveways for this subject site.

Basis of Waiver:

The Hudson Driveway Regulation is one driveway per parcel. Currently there are two driveway servicing this property, both off a temporary cul-de-sac along Friars Drive. It is being proposed to eliminate the cul-de-sac and access the re-vamped site with 2 driveways; an in/out on the west side of the property and an exit only (right turn only) driveway on the east side.

Waiver Request Form Standards

The hardship reason for granting this waiver is that limiting this property to 1 driveway would eliminate the trucking pattern for this manufacturing facility. Strict enforcement of the driveway requirement would pose a hardship to the applicant since it would mean that the building additions could not be constructed as envisioned and the business would need to look elsewhere for a facility.

Integra believes that the above request is reasonable and meets the spirit and intent of the Town of Hudson Site Plan Regulations since the number driveways is the same as what they currently have used for the past 25 years.

Chapter 276-7 Waivers

The requirements of Driveway Regulation 193-10.G are unnecessary.

It is unreasonable to request a manufacturing facility to operate their business using only 1 driveway in this well-established industrial park.

Granting the waiver will not violate the purposes or general standards of the Land Use Regulations.

The general standards of the Hudson Site Plan regulations are to address public safety concerns related to the building and site expansion of this property. Allowing 2 driveways for this use does not create a public safety concern.

Granting the waiver shall result in a general benefit to the Town and surrounding properties.

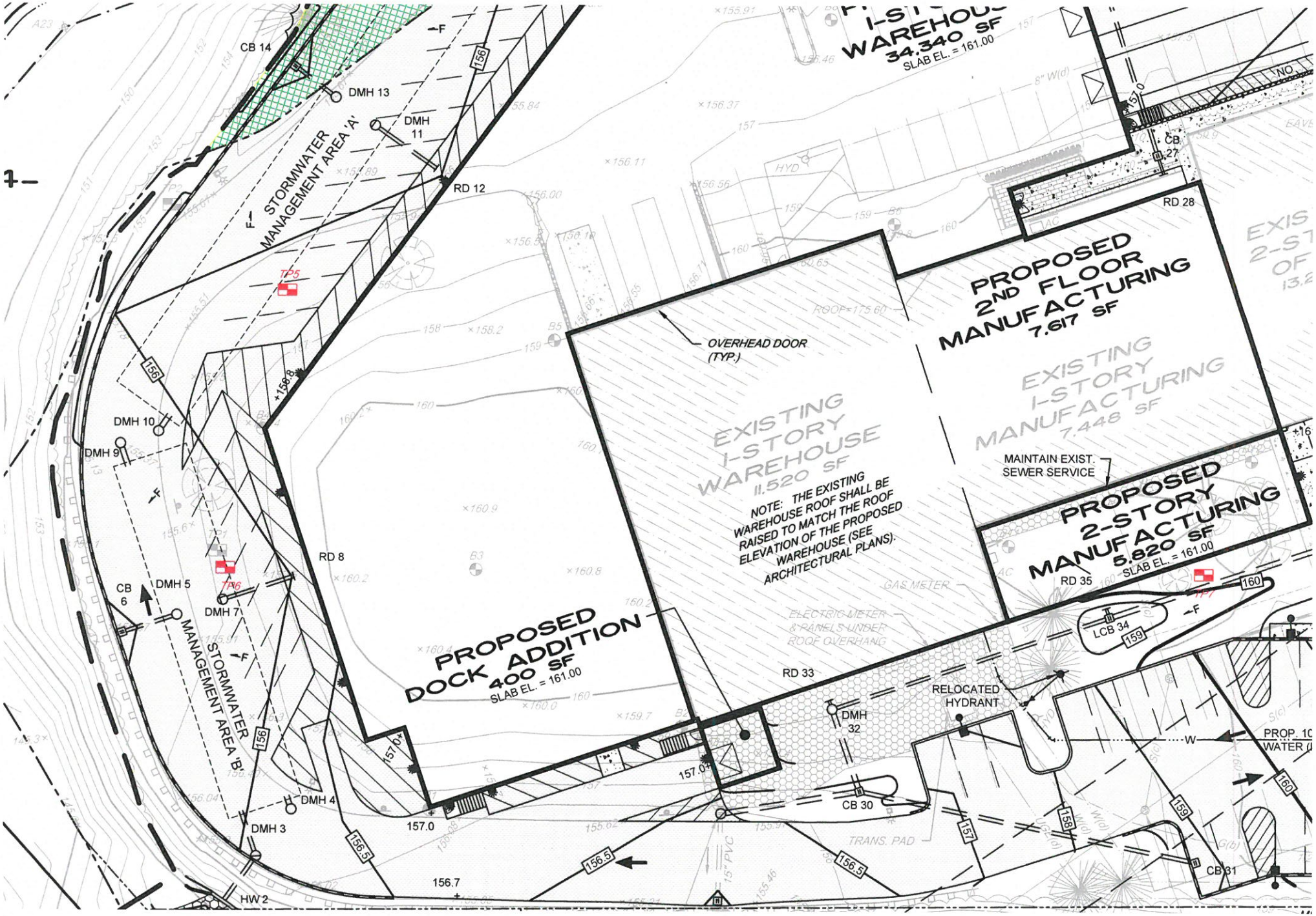
Granting the waiver will allow Integra to grow their business at their current location.

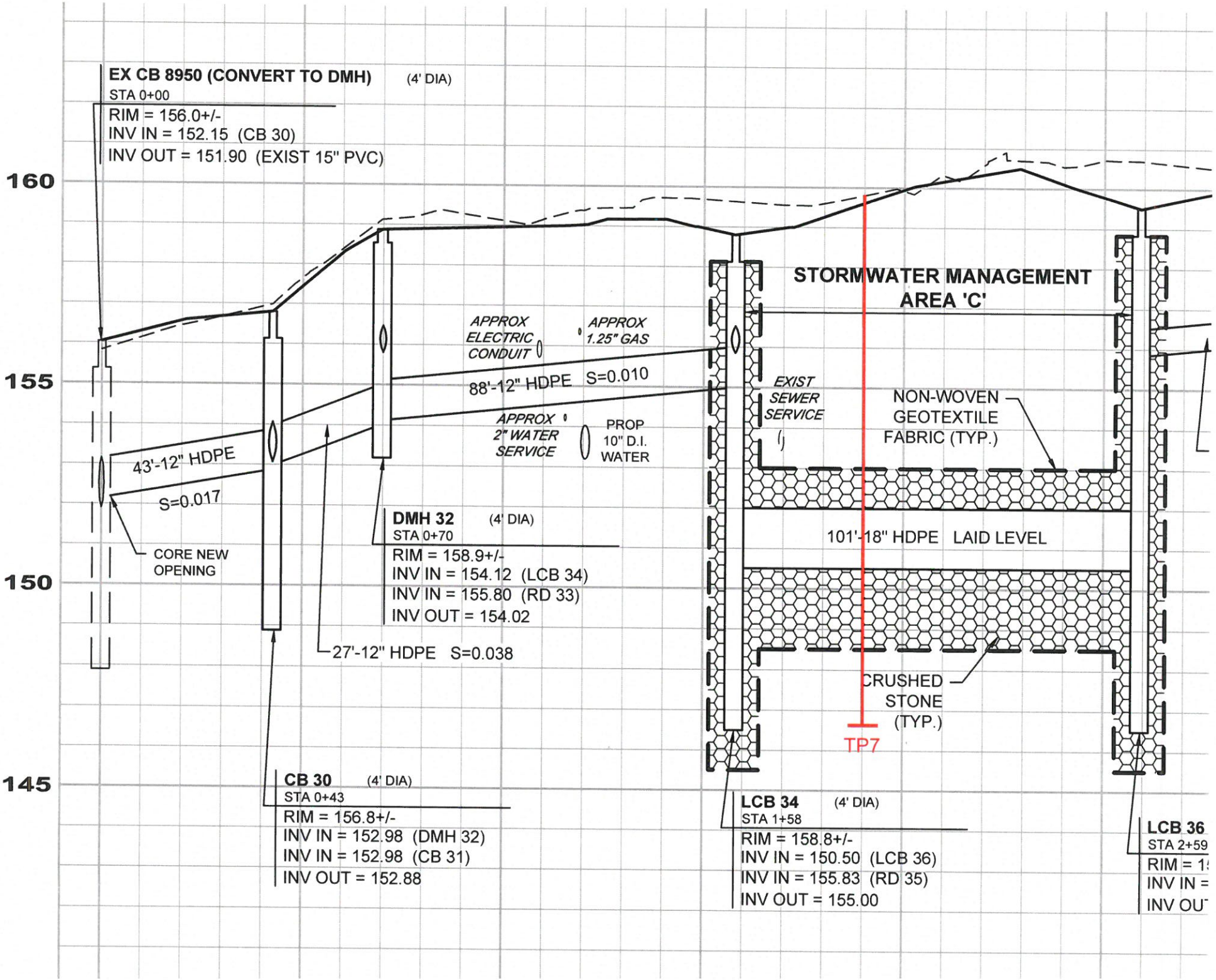
Conclusion:

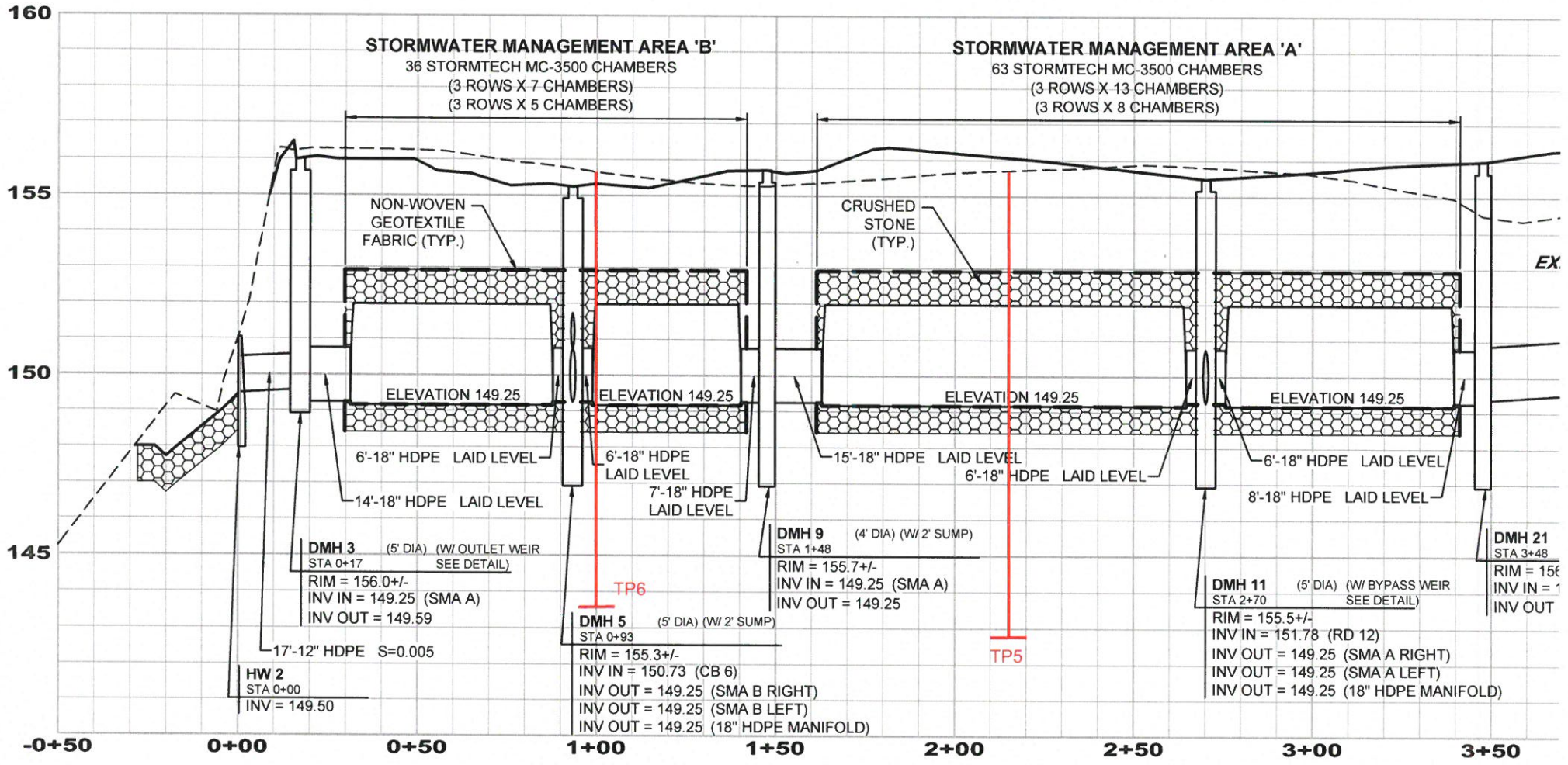
When the Site Plan regulations are applied to this particular property, they impose unreasonable requirements with no benefit to the public. The property is a manufacturing site with few visitors. The applicant knows their parking, loading and access demands. Because the site plan calculations require two alternative calculations, there is an unnecessarily large parking requirement by one calculation. The existing site is currently overparked. The same argument can be made for the required number of loading spaces.

Strict application of these rules does not benefit the public. However, requiring strict compliance may prevent the proposed additions. Rules are established to address all possible scenarios. Here, the use is known. Strict application of the rules is not necessary to accomplish reasonable planning goals. Even after the addition, the site will be safe, accessible and aesthetically consistent with other properties in the park. To require strict compliance would not advance any planning principles. Rather it would go against good planning for industrial parks – i.e. enabling reasonable expansion and use of existing infrastructure in a way that is consistent with the existing area.

This proposed site plan balances the needs of the community to enable growth and expansion in a safe and reasonable manner without imposing requirements that have no benefit under the circumstances.


PROPOSED
2ND FLOOR
MANUFACTURING
7,617 SF
EXISTING
1-STORY
MANUFACTURING
7,448 SF
EXISTING
1-STORY
WAREHOUSE
11,520 SF
PROPOSED
2-STORY
MANUFACTURING
5,820 SF
SLAB EL. = 161.00
PROPOSED
DOCK ADDITION
400 SF
SLAB EL. = 161.00
OVERHEAD DOOR
(TYP.)
NOTE: THE EXISTING WAREHOUSE ROOF SHALL BE RAISED TO MATCH THE ROOF ELEVATION OF THE PROPOSED WAREHOUSE (SEE ARCHITECTURAL PLANS).
MAINTAIN EXIST. SEWER SERVICE
STORMWATER MANAGEMENT AREA 'A'
STORMWATER MANAGEMENT AREA 'B'
RELOCATED HYDRANT
CB 14
DMH 13
DMH 11
RD 12
RD 28
CB 27
DMH 10
DMH 9
RD 8
CB 6
DMH 5
DMH 7
RD 35
LCB 34
RD 33
DMH 32
CB 30
DMH 4
DMH 3
HW 2
CB 31
TRANS. PAD
GAS METER
ELECTRIC METER & PANELS UNDER ROOF OVERHANG
TP5
TP6
TP7
156
157
158
159
160
156.5
157.0
156.7


EX CB 8950 (CONVERT TO DMH) (4' DIA)
STA 0+00
RIM = 156.0+/-
INV IN = 152.15 (CB 30)
INV OUT = 151.90 (EXIST 15" PVC)
160
155
150
145
APPROX ELECTRIC CONDUIT
APPROX 1.25" GAS
88'-12" HDPE S=0.010
APPROX 2" WATER SERVICE
PROP 10" D.I. WATER
43'-12" HDPE
S=0.017
CORE NEW OPENING
DMH 32 (4' DIA)
STA 0+70
RIM = 158.9+/-
INV IN = 154.12 (LCB 34)
INV IN = 155.80 (RD 33)
INV OUT = 154.02
27'-12" HDPE S=0.038
CB 30 (4' DIA)
STA 0+43
RIM = 156.8+/-
INV IN = 152.98 (DMH 32)
INV IN = 152.98 (CB 31)
INV OUT = 152.88
STORMWATER MANAGEMENT AREA 'C'
EXIST SEWER SERVICE
NON-WOVEN GEOTEXTILE FABRIC (TYP.)
101'-18" HDPE LAID LEVEL
CRUSHED STONE (TYP.)
TP7
LCB 34 (4' DIA)
STA 1+58
RIM = 158.8+/-
INV IN = 150.50 (LCB 36)
INV IN = 155.83 (RD 35)
INV OUT = 155.00
LCB 36
STA 2+59
RIM = 1
INV IN =
INV OU


160
155
150
145
STORMWATER MANAGEMENT AREA 'B'
36 STORMTECH MC-3500 CHAMBERS
(3 ROWS X 7 CHAMBERS)
(3 ROWS X 5 CHAMBERS)
STORMWATER MANAGEMENT AREA 'A'
63 STORMTECH MC-3500 CHAMBERS
(3 ROWS X 13 CHAMBERS)
(3 ROWS X 8 CHAMBERS)
NON-WOVEN GEOTEXTILE FABRIC (TYP.)
CRUSHED STONE (TYP.)
EX
ELEVATION 149.25
ELEVATION 149.25
ELEVATION 149.25
ELEVATION 149.25
6'-18" HDPE LAID LEVEL
14'-18" HDPE LAID LEVEL
6'-18" HDPE LAID LEVEL
7'-18" HDPE LAID LEVEL
15'-18" HDPE LAID LEVEL
6'-18" HDPE LAID LEVEL
6'-18" HDPE LAID LEVEL
8'-18" HDPE LAID LEVEL
DMH 3 (5' DIA) (W/ OUTLET WEIR
STA 0+17 SEE DETAIL)
RIM = 156.0+/-
INV IN = 149.25 (SMA A)
INV OUT = 149.59
17'-12" HDPE S=0.005
HW 2
STA 0+00
INV = 149.50
TP6
DMH 5 (5' DIA) (W/ 2' SUMP)
STA 0+93
RIM = 155.3+/-
INV IN = 150.73 (CB 6)
INV OUT = 149.25 (SMA B RIGHT)
INV OUT = 149.25 (SMA B LEFT)
INV OUT = 149.25 (18" HDPE MANIFOLD)
DMH 9 (4' DIA) (W/ 2' SUMP)
STA 1+48
RIM = 155.7+/-
INV IN = 149.25 (SMA A)
INV OUT = 149.25
TP5
DMH 11 (5' DIA) (W/ BYPASS WEIR
STA 2+70 SEE DETAIL)
RIM = 155.5+/-
INV IN = 151.78 (RD 12)
INV OUT = 149.25 (SMA A RIGHT)
INV OUT = 149.25 (SMA A LEFT)
INV OUT = 149.25 (18" HDPE MANIFOLD)
DMH 21
STA 3+48
RIM = 156
INV IN = 1
INV OUT
-0+50
0+00
0+50
1+00
1+50
2+00
2+50
3+00
3+50

HSI Hayner/Swanson, Inc.
Civil Engineering & Land Surveying

HSI #5734
MAP 209 LOT 4
INTEGRA BIOSCIENCES CORP.
22 FRIARS DRIVE
HUDSON, NH

TEST PITS: FOR DRAINAGE
WEATHER: 40° OVERCAST
EQUIPMENT: KUBOTA KX161-3 MINI EXCAVATOR
LOGGED BY: PAUL CARIDEO, NHDES PERMIT #68

TEST PIT # 5 DATE: 3/17/22

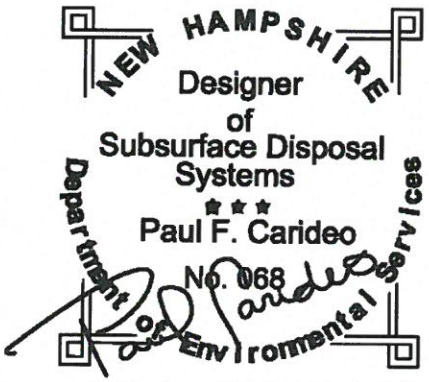
0-12" 10YR 3/3, DARK BROWN, SANDY LOAM FILL, FINE GRANULAR, VERY FRIABLE WITH NO ROOTS
8-20" 10YR 5/4, YELLOWISH BROWN, LOAMY SAND, FINE GRANULAR, VERY FRIABLE
20-46" 10YR 5/8, YELLOWISH BROWN, MEDIUM SAND, SINGLE GRAIN, LOOSE
46-80" 10YR 5/4, YELLOWISH BROWN, MEDIUM SAND, SINGLE GRAIN, LOOSE
80-156" 10YR 6/3, LIGHT YELLOWISH BROWN, GRAVELLY SAND, 15% ROUNDED COBBLES, 10% GRAVEL, SINGLE GRAIN, LOOSE WITH 7.5YR 5/8, STRONG BROWN, COMMON, DISTINCT REDOXIMORPHIC FEATURES AT 148"+

ESHWT: 148" OWT: NONE ROOTS: NONE LEDGE: NONE

TEST PIT # 6 DATE: 3/17/22 (SAME LOCATION AS TP #1)

0-14" 10YR 3/3, DARK BROWN, SANDY LOAM FILL, FINE GRANULAR, VERY FRIABLE WITH FEW ROOTS
14-96" 10YR 5/4, YELLOWISH BROWN, MEDIUM SAND, SINGLE GRAIN, LOOSE WITH FEW ROOTS TO 38"
96-150" 10YR 6/3, LIGHT YELLOWISH BROWN, GRAVELLY SAND, 15% ROUNDED COBBLES, 10% GRAVEL, SINGLE GRAIN AND LOOSE

ESHWT: NONE OBSERVED OWT: NONE ROOTS: 38" LEDGE: NONE



3 Congress St. Nashua, NH 03062 · (603) 883-2057
131 Middlesex Turnpike, Burlington, MA 01830 · (781) 203-1501
www.hayner-swanson.com

HSI Hayner/Swanson, Inc.
Civil Engineering & Land Surveying

TEST PIT # 7 DATE: 3/17/22

0-7" 10YR 3/3, DARK BROWN, SANDY LOAM FILL, GRANULAR, VERY FRIABLE WITH MANY ROOTS
7-63" 10YR 7/4, VERY PALE BROWN, MEDIUM SAND FILL, SINGLE GRAIN, LOOSE WITH FEW ROOTS TO 24"
63-66" 10YR 3/2, VERY DARK GRAYISH BROWN, FINE SANDY LOAM, MASSIVE AND FIRM
66-72" 10YR 5/4, YELLOWISH BROWN, MEDIUM SAND, SINGLE GRAIN AND LOOSE
42-76" 2.5Y 6/4, LIGHT YELLOWISH BROWN, GRAVELLY SAND, 15% ROUNDED COBBLES, 10% GRAVEL, SINGLE GRAIN AND LOOSE
76-156" 2.5Y 6/4, LIGHT YELLOWISH BROWN, GRAVELLY SAND, 25% ROUNDED COBBLES, 10% GRAVEL, SINGLE GRAIN AND LOOSE

ESHWT: NONE OBSERVED OWT: NONE ROOTS: 24" LEDGE: NONE

NEW HAMPSHIRE Designer of Subsurface Disposal Systems Paul F. Carideo No. 068 Department of Environmental Services

3 Congress St. Nashua, NH 03062 · (603) 883-2057
131 Middlesex Turnpike, Burlington, MA 01830 · (781) 203-1501
www.hayner-swanson.com

HSI

Hayner/Swanson, Inc.
Civil Engineering Land Surveying

Amoozemeter Data Sheet

User(s):	Paul Carideo		
Date:	3/17/2022	Permeameter #:	5
Location:	Hudson, NH	Air Temperature (F) initial:	40+/-
Soil Survey Area/Special Project:	Integra Biosciences Corp.	Air Temperature (F) final:	40+

Series or Map Unit Component:	Windsor	[1]Soil Moisture Content (%):	Dry
Horizon Tested:	C	[1] *If not known, give a relative soil moisture content. i.e. dry, moist, or wet.*	
Total Depth of Test:	94"		

Set-up Calculation	
Hole Depth (cm):	88.0
Distance from Bottom of Bubble Tube to soil surface (cm):	10
Desired Water Depth in Hole (cm):	-15
CHT Tube setting (cm):	**83**

H =	[2] Actual water level in hole (cm)		15.0
[2] *You want this value to be very close to 15 cm. (Record to nearest millimeter.)*		Initial:	15.3
		Final:	14.9
r =	[3]Auger Hole Radius (cm)		2.5

Outflow Chamber (s) used:	105.0	(=20.0 cm^2) Set on 1 (Large Tank only)
[Associated Conversion Factor:]		(=105.0 cm^2) Set on 2 (Both Tanks)

[4]Drop in Water	Outflow Chamber	Clock Time	Elapsed Time (between readings)		Outflow (Q)	Hydraulic Conductivity (Ksat)	
(cm)	(C.F.)	(hr:min)	(min) :	(min/60)	(cm^3/hr)	(cm/hr)	(in/hr)
Ex 4.9	105	10:15			392	0.4139	0.1629
Start		12:00	xxx	xxxx	xxxx	xxxxx	xxxxxx
2.75	105.0		0.25	0.004	69300.0	80.62042	31.74032
2.60	105.0		0.25	0.004	65520.0	76.22294	30.00903
2.55	105.0		0.25	0.004	64260.0	74.75712	29.43194
2.50	105.0	12:01	0.25	0.004	63000.0	73.29129	28.85484
2.45	105.0		0.25	0.004	61740.0	71.82547	28.27774
2.45	105.0		0.25	0.004	61740.0	71.82547	28.27774
2.40	105.0		0.25	0.004	60480.0	70.35964	27.70065
2.40	105.0	12:02	0.25	0.004	60480.0	70.35964	27.70065
				*4	Mean K:	71.09255	27.98919
					St. Dev:	0.8463	0.3332
					Hydraulic Conductivity		High

Yellow fields are required and need to be filled in by the recorder.
Tan fields are calculated. Do not change!
Red fields are your mean, standard deviation and Hydraulic Conductivity Class
[3] *Lt green - if non standard Amoozemeter kit auger used change*
[4] *Only use stabilized or steady state readings (personal judgment required).*

3 Congress St. Nashua, NH 03062 · (603) 883-2057
131 Middlesex Turnpike, Burlington, MA 01830 · (781) 203-1501
www.hayner-swanson.com

HSI

Hayner/Swanson, Inc.
Civil Engineering Land Surveying

Amoozemeter Data Sheet

User(s):	Paul Carideo		
Date:	3/17/2022	Permeameter #:	6
Location:	Hudson, NH	Air Temperature (F) initial:	40+/-
Soil Survey Area/Special Project:	Integra Biosciences Corp.	Air Temperature (F) final:	40+/-

Series or Map Unit Component:	Windsor	[1]Soil Moisture Content (%):	Dry
Horizon Tested:	C	[1] *If not known, give a relative soil moisture content. i.e. dry, moist, or wet.*	
Total Depth of Test:	96"		

Set-up Calculation	
Hole Depth (cm):	92.0
Distance from Bottom of Bubble Tube to soil surface (cm) = D:	10
Desired Water Depth in Hole (cm):	-15
CHT Tube setting (cm) = d:	**87**

H =	[2] Actual water level in hole (cm):		15.0
[2] *You want this value to be very close to 15 cm. (Record to nearest millimeter.)*		Initial:	15.2
		Final:	15.0
r =	[3]Auger Hole Radius (cm) Standard kit (6 cm) diam. auger		2.5

Outflow Chamber (s) used: [Associated **C**onversion **F**actor:]	105.0	(=20.0 cm^2) Set on 1 (Large Tank only) (=105.0 cm^2) Set on 2 (Both Tanks)

[4]Drop in Water	Outflow Chamber	Clock Time	Elapsed Time (between readings)		Outflow (Q)	Hydraulic Conductivity (Ksat)	
(cm)	(C.F.)	(hr:min)	(min)	: (min/60)	(cm^3/hr)	(cm/hr)	(in/hr)
Ex 4.9	105	10:15			392	0.4139	0.1629
Start		9:30	xxx	xxxx	xxxx	xxxxx	xxxxxx
1.81	105.0		0.25	0.004	45612.0	53.06290	20.89090
1.79	105.0		0.25	0.004	45108.0	52.47657	20.66007
1.73	105.0		0.25	0.004	43596.0	50.71757	19.96755
1.70	105.0	9:31	0.25	0.004	42840.0	49.83808	19.62129
1.68	105.0		0.25	0.004	42336.0	49.25175	19.39045
1.65	105.0		0.25	0.004	41580.0	48.37225	19.04419
1.65	105.0		0.25	0.004	41580.0	48.37225	19.04419
1.63	105.0	9:32	0.25	0.004	41076.0	47.78592	18.81336
*5					Mean K:	48.72405	19.18270
					St. Dev:	0.8135	0.3203
					Hydraulic Conductivity		Very High

Yellow fields are required and need to be filled in by the recorder.
Tan fields are calculated. Do not change!
Red fields are your mean, standard deviation and Hydraulic Conductivity Class
[3] *Lt green - if non standard Amoozemeter kit auger used change*
[4] *Only use stabilized or steady state readings (personal judgment required).*

3 Congress St. Nashua, NH 03062 · (603) 883-2057
131 Middlesex Turnpike, Burlington, MA 01830 · (781) 203-1501
www.hayner-swanson.com

HSI

Hayner/Swanson, Inc.
Civil Engineering Land Surveying

Amoozemeter Data Sheet

User(s):	Paul Carideo		
Date:	3/17/2022	Permeameter #:	7
Location:	Hudson, NH	Air Temperature (F) initial:	40+/-
Soil Survey Area/Special Project:	Integra Biosciences Corp.	Air Temperature (F) final:	40+

Series or Map Unit Component:	Windsor	[1]Soil Moisture Content (%):	Dry
Horizon Tested:	C	[1] *If not known, give a relative soil moisture content. i.e. dry, moist, or wet.*	
Total Depth of Test:	96"		

Set-up Calculation	
Hole Depth (cm):	90.0
Tube to soil surface (cm):	10
Desired Water Depth in Hole (cm):	-15
CHT Tube setting (cm):	**85**

H =	[2] Actual water level in hole (cm)		15.0
[2] *You want this value to be very close to 15 cm.*		Initial:	15.1
		Final:	15.1
r =	[3]Auger Hole Radius (cm)		2.5

Outflow Chamber (s) used:	105.0	(=20.0 cm^2) Set on 1 (Large Tank only)
[Associated **C**onversion **F**actor:]		(=105.0 cm^2) Set on 2 (Both Tanks)

[4]Drop in Water	Outflow Chamber	Clock Time	Elapsed Time (between readings)		Outflow (Q)	Hydraulic Conductivity (Ksat)	
(cm)	(C.F.)	(hr:min)	(min)	: (min/60)	(cm^3/hr)	(cm/hr)	(in/hr)
Ex 4.9	105	10:15			392	0.4139	0.1629
Start		10:15	xxx	xxxx	xxxx	xxxxx	xxxxxx
2.60	105.0		0.25	0.004	65520.0	76.22294	30.00903
2.60	105.0		0.25	0.004	65520.0	76.22294	30.00903
2.55	105.0		0.25	0.004	64260.0	74.75712	29.43194
2.55	105.0	10:16	0.25	0.004	64260.0	74.75712	29.43194
2.55	105.0		0.25	0.004	64260.0	74.33944	29.26750
2.55	105.0		0.25	0.004	64260.0	74.33944	29.26750
2.50	105.0		0.25	0.004	63000.0	72.28318	28.45794
2.50	105.0	10:17	0.25	0.004	63000.0	72.28318	28.45794
				*4	Mean K:	74.54828	29.34972
					St. Dev:	0.2411	0.0949
					Hydraulic Conductivity		High

Yellow *fields are required and need to be filled in by the recorder.*
Tan *fields are calculated. Do not change!*
Red *fields are your mean, standard deviation and Hydraulic Conductivity Class*
[3] Lt green *- if non standard Amoozemeter kit auger used change*
[4] *Only use stabilized or steady state readings (personal judgment required).*

3 Congress St. Nashua, NH 03062 · (603) 883-2057
131 Middlesex Turnpike, Burlington, MA 01830 · (781) 203-1501
www.hayner-swanson.com

Outlet Protection		
Reference: NH Stormwater Manual: Volume 2 Revision 1.0		
Job #:	5734	
Project:	22 Friars Building Addition	
Design by:	EMB	
Date:	3.16.22	
Structure:	EX OUTLET	
Invert:	151.32	
A. Conditions:		
Pipe D_o =	1.25	ft
Q_{25}=	2.72	cfs
Q_F =	10.16	cfs
Q_{25}/Q_F =	34	%
d/D =	40	%
Tw =	0.50	ft
	Tw < Do/2	
B. Design Parameters		
Apron Length =	12	ft
Apron Width at Culvert Outlet =	4	ft
Apron Width at End of Apron =	16	ft
Median Stone =	1	in
Maximum Size of Stone =	2	in
Minimum Depth of Stone =	3	in

Existing Riprap Apron: Length = 13' +/- Width = 56' +/-

The existing riprap apron exceeds minimum design parameter shown above.

HSI is not aware of any erosion or sedimentation issues at this outlet. Post construction peak rates of runoff to this outlet are less than the pre-development rates.