

Exception Request No.: 10
Section: WBR3
Station: 2484+34 to 2489+78±
Drawing No.: WBR3 C218 to C219
Survey Report Cross Reference No.: WBR3 C214 to C215
Exception Type: Alignment in Pavement
Crossing over Existing Utility/Drainage

Summary of Justification for Exception

NPT is requesting an exception from the UAM guidelines for the location of the cable trench in the pavement on US 3, Daniel Webster Highway from STA 2484+34 to 2489+78± of the NPT WBR3 Underground Alignment, sheet WBR3C218-219. The proposed alignment is set within the pavement to avoid conflicts with multiple existing utilities located on both sides of the road and mature trees on west side of the road.

In addition, our exception request in this area includes crossings above multiple utilities, specifically, two crossings above a 12-inch clay sewer and one crossing of an 8-inch PVC sewer, each with 12 feet of cover. The proposed alignment is set within the pavement and over the existing utilities to avoid road closures and increased construction width which will extend the duration of construction and traffic impacts.

Technical Discussion of Justification of Exception

Alignment in Pavement

The proposed alignment is within the roadway because of constraints posed by utilities on both the eastern and western sides of US 3. A list and discussion of each of these constraints is provided below.

1. A 12-inch clay sanitary sewer main runs along the east edge of the road. Installation of the proposed cable trench on the eastern side outside of the paved area would require the relocation of the sewer main. Relocating the sewer will result in additional pavement impacts and will extend construction in this area by two weeks, extending traffic impacts in this business area.
2. Water services and shut-off valves associated with the 6-inch water main are located just inside the pavement on the west side of the road. Installation of the proposed cable trench on the western side outside of the paved area would require the relocation of the water ancillary services and shut-off valves. Relocating these ancillary services on the west side of the road for the water main will result in landscaping, pavement and traffic impacts, due to the location of the water services and shut-offs.
3. An existing overhead distribution line runs along the west side of the ROW. Relocating the utility poles to allow room to move the alignment outside the pavement would require modifications to the structure guying and anchoring, which is located outside of the ROW on private property.
4. A mature landscaping hedge row runs along the west side of the ROW. Relocation of the utility poles would likely require impacts to and/or removal of these trees.

In addition, moving the alignment to the western side of the road would require two additional highway crossings (and NHDOT exception approval for such road crossings).

Excavation limits and work areas are shown on the attached drawings. During construction, one lane will remain open to traffic at all times.

Crossing over Existing Utility/Drainage

The proposed alignment is set within the pavement and over three existing utilities to avoid road closures, unreasonable costs associated with a deeper excavation, and increased construction width which will extend the duration of construction and traffic impacts, as further described below.

1. 12-inch Clay Sewer Main

NPT's exception request includes crossing above an existing 12" clay sewer main on US 3, Daniel Webster Highway at STA 2489+75±. There is 12 feet of cover over the sewer. The attached Exhibits A and B have been provided for this location to illustrate the constraints associated with installing the ductbank below the existing clay sewer main.

2. 8-inch PVC Sewer Main

NPT's exception request includes crossing above an existing 8" PVC sewer main on US 3, Daniel Webster Highway at STA 2487+50±. There is 12 feet of cover over the sewer. The attached Exhibits A and C have been provided for this location to illustrate the constraints associated with installing the ductbank below the existing PVC sewer main.

3. 12-inch Clay Sewer Main

NPT's exception request includes crossing above an existing 12" clay sewer main on US 3, Daniel Webster Highway at STA 2484+50±. There is 12 feet of cover over the sewer. The attached Exhibits A and D have been provided for this location to illustrate the constraints associated with installing the ductbank below the existing clay sewer main.

The vertical positioning of the cable trench is constrained by the depth of the existing utilities (twelve feet to the top of the utilities). (See Exhibits A and C). Crossing under the existing utilities will require a greater separation of the conduits and cable to accommodate thermal design criteria for the electric cables resulting from the additional depth. This trench width and additional offsets necessary for construction would likely require either complete road closures or result in significant traffic impacts, including extended duration of construction within roadway to allow for sheeting installation and removal and extensive excavation due to the depth and width of the trench. We estimate that these construction alternatives will add one to two weeks to the traffic impacts. Finally, we estimate the increase in cost associated with crossing underneath the utilities would be approximately \$530,000 for these sections. (See Exhibit E.) Road closures are not needed for the proposed installation, which thereby minimizes traffic impacts and attendant safety issues.

We have also evaluated a trenchless option to pass under the three sewer lines. The trenchless installation will be unreasonably costly (a net estimated increase of \$2,069,100 to cross under the sewer lines). (See cost estimate attached in Exhibit E). Also, traffic impacts would be increased for a trenchless installation due to the addition of trenchless work areas and the extended duration of installation.

Finally, installing the cable system beneath the three utilities described above would produce a "porpoising effect" and additional cable bends that increase cable pulling tensions during installation. These increased tensions could damage the cable and the embedded fiber that monitors the safe loading limits of the cable. In addition, the cumulative effect of the additional cable bends limit the

length that the cable can be pulled through the conduit and would result in the need for additional splice enclosures which would further encumber the roadway.

Impacts

Alignment in Pavement

The design, as proposed, will not adversely affect the design, construction, stability, traffic, safety, environmental commitments, maintenance, or operation of the highway. The alignment has been located 5-feet or more off the edge of the existing sewer main, to avoid future conflicts with sewer repairs or replacement and disruption to the existing sanitary system. The installation of the ductbank and pavement restoration will be designed and constructed in accordance with conditions outlined in the NHDOT's April 3, 2017 letter to the New Hampshire Site Evaluation Committee. The installation's proposed depth meets NHDOT's criteria relating to the structural box to minimize any potential conflicts with maintenance and future highway projects. A traffic control plan has been submitted to the NHDOT for this design and complies with the Manual on Uniform Traffic Control Devices.

Crossing Over Existing Utility/Drainage

In connection with future maintenance activities, especially related to the sewer main, NPT will provide any and all required support, including but not limited to, providing crews to assist while work is being conducted in the vicinity of the utilities.

Supporting Documentation

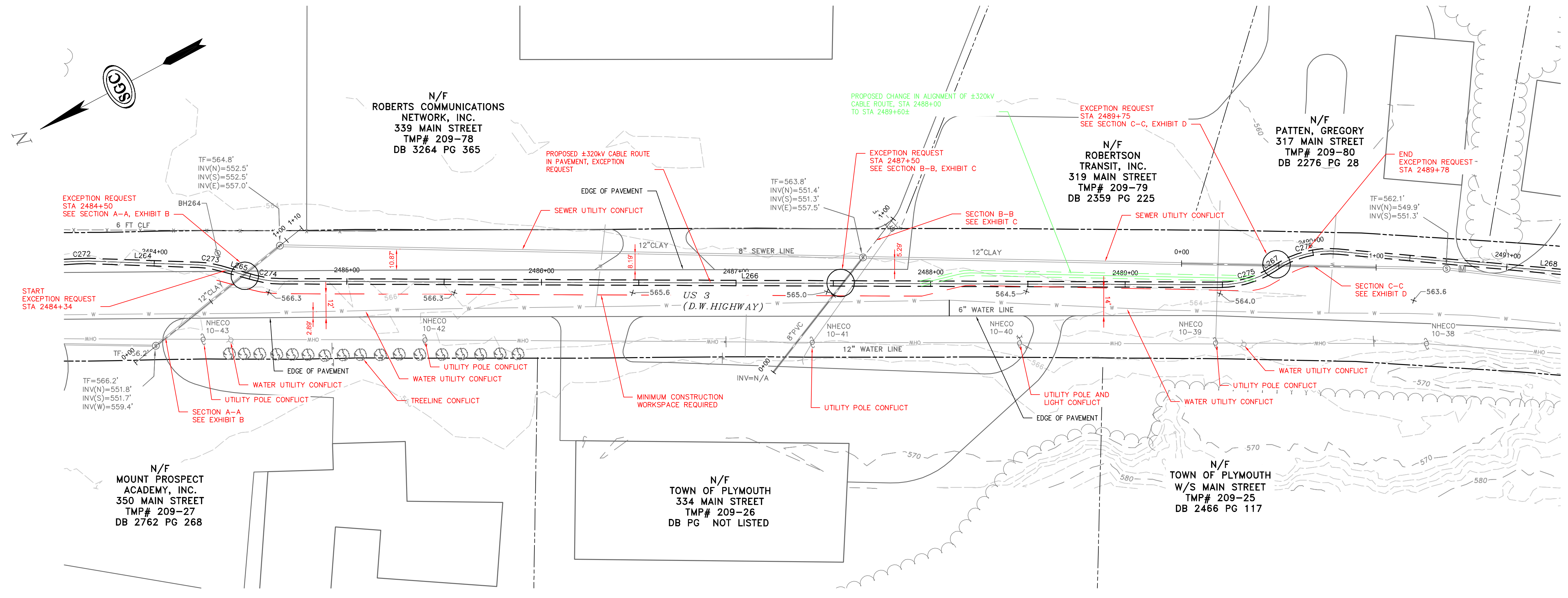
Alignment in Pavement

See attached Exhibit A showing a plan and profile view of the proposed installation.

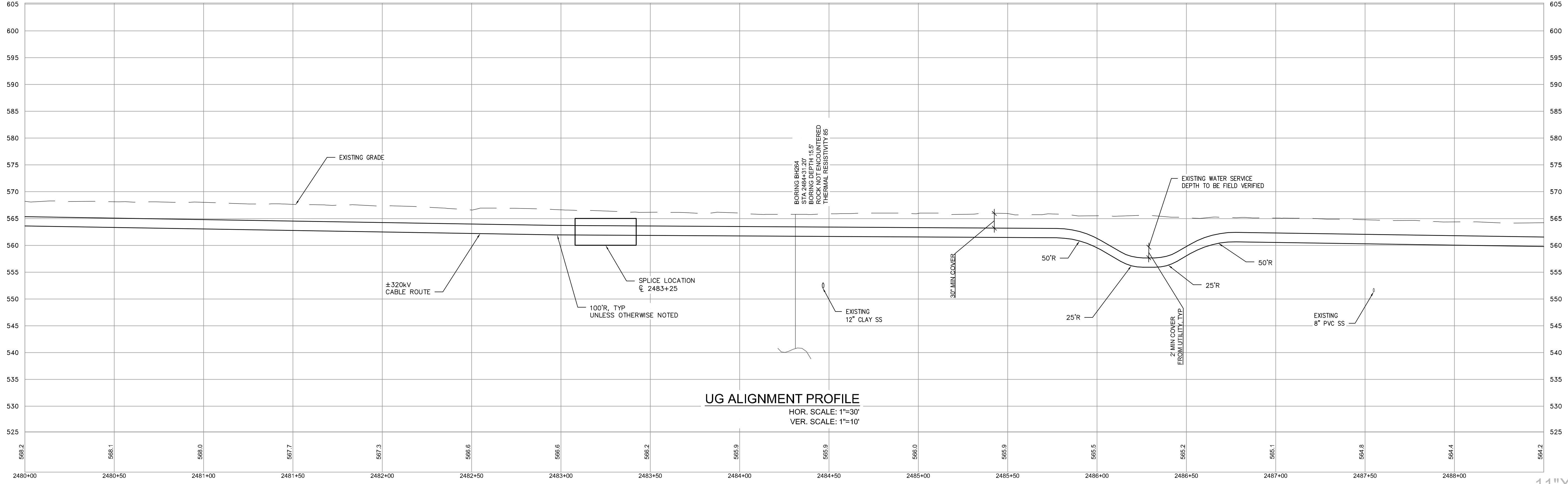
Crossing Over Utilities/Drainage

See attached Exhibits B, C and D showing section views and cost estimates in Exhibit E.

PRELIMINARY - NOT FOR CONSTRUCTION

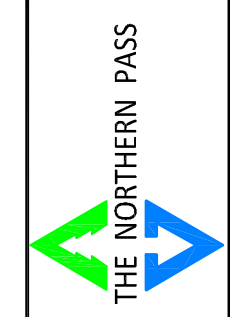


UG ALIGNMENT PLAN
SCALE: 1"=30'



UG ALIGNMENT PROFILE
HOR. SCALE: 1"=30'
VER. SCALE: 1"=10'

| NO. | REVISION | DATE | DRWN | CHKD | APPRV. |
|-----|-------------------|----------|------|------|--------|
| 0 | EXCEPTION REQUEST | 05/05/17 | | | |



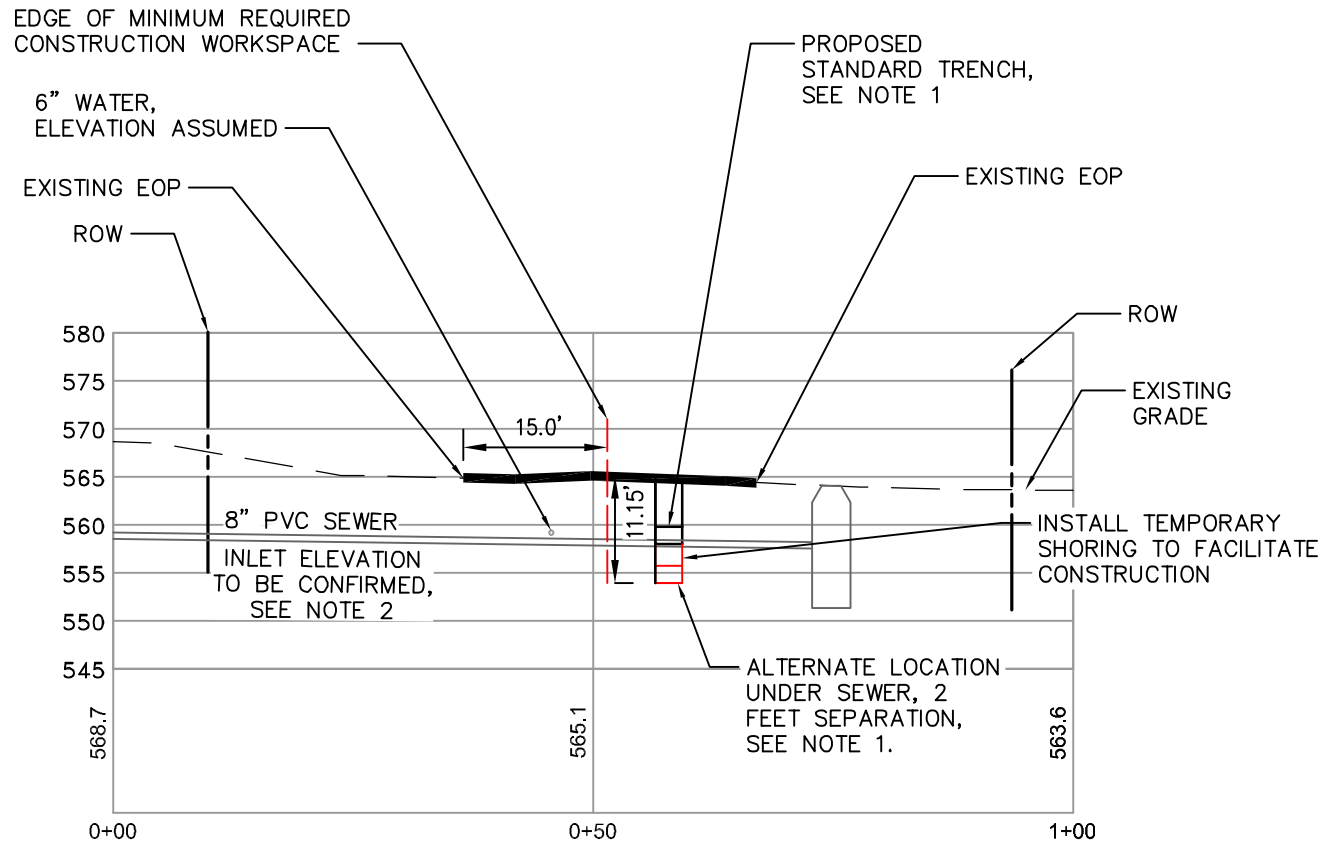
Transmission Business

EXCEPTION 10-ALIGNMENT IN PAVEMENT & CROSSING OVER EXISTING UTILITY/DRAINAGE: NPT WBR3-UNDERGROUND ALIGNMENT WBR3 SECTION-STA. 2484+34 TO STA. 2489+78
SCALE:
DES: MRR CHK: TJD
DRW: MRR APR: TMH
TOWN: PLYMOUTH

TRANSMISSION LINE:
WBR3

11"X17" PLOT
PLAN SCALE: 1"=60'

EXHIBIT A



SECTION B-B
SCALE: 1"=20'

NOTES:

1. TRENCH WIDTH SHOWN TO BE MAINTAINED USING TRENCH JACKS AND TEMPORARY SHEETING.
2. DEPENDENT UPON CONFIRMATION OF INVERT, EXCEPTION MAY NOT BE REQUIRED.

JOB NO.: 1384001

TITLE:
EXCEPTION 10-ALIGNMENT IN PAVEMENT &
CROSSING OVER EXISTING UTILITY/DRAINAGE
NPT-WBR3 UNDERGROUND ALIGNMENT
WBR3 SECTION-STA 2484+34 TO 2589+78±
TOWN: PLYMOUTH

PREPARED FOR:
NH DOT
7 HAZEN DRIVE
CONCORD, NH

REVISIONS:

| NO. | DATE | EXCEPTION REQUEST |
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EXHIBIT NO.: C

DATE: 04/2017

DRAWN: MRR

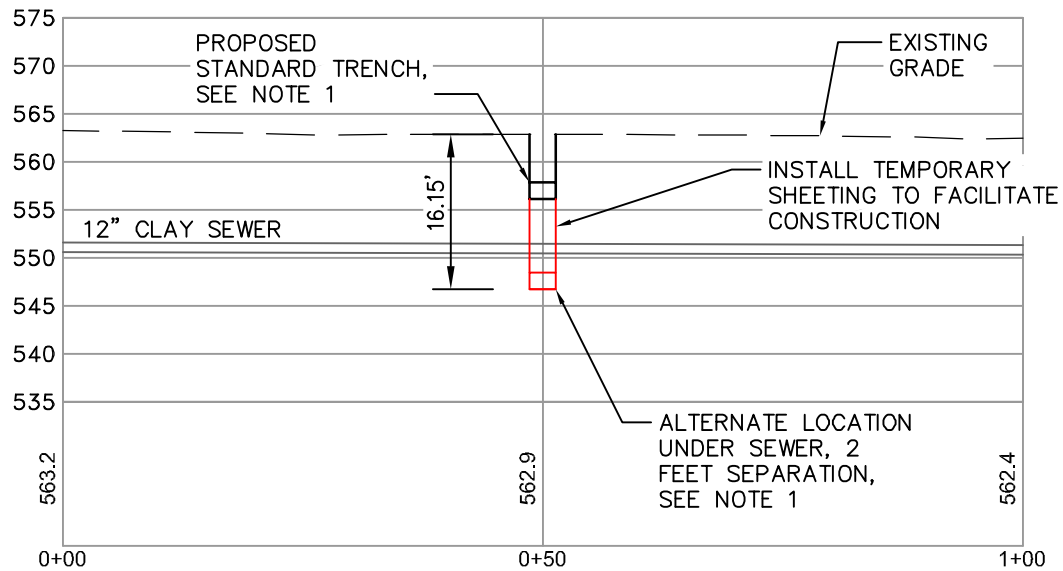
SCALE: 1" = 20'



SGC ENGINEERING, LLC
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- NOTES:
1. TRENCH WIDTH SHOWN TO BE MAINTAINED USING TRENCH JACKS AND TEMPORARY SHEETING.

SECTION C-C
SCALE: 1"=20'

JOB NO.: 1384001

TITLE:
EXCEPTION 10-ALIGNMENT IN PAVEMENT &
CROSSING OVER EXISTING UTILITY/DRAINAGE
NPT-WBR3 UNDERGROUND ALIGNMENT
WBR3 SECTION-STA 2484+34 TO 2589+78±
TOWN: PLYMOUTH

PREPARED FOR:
NH DOT
7 HAZEN DRIVE
CONCORD, NH

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14 School Street, Suite 203-A Bristol, VT 05443 Tel: 802-736-9298
Galinda Tower 1, Suite 2473 2700 Post Oak Boulevard Houston, TX 77056

EXHIBIT NO.: D

DATE: 04/2017

DRAWN: MRR

SCALE: 1" = 20'

Exhibit E - Exception 10 Cost Estimate

Additional Cost for Trenching Under 12" Sewer

| | | | | |
|-------------------------------|----------|-------|------------|----------------------|
| Length | 200' | | | |
| Max Depth | 17.66 | | | |
| Min Depth | 6.7' | | | |
| | Quantity | Units | Unit Price | Total |
| Trench Cost for Deeper Trench | 200 | LF | \$1,150.00 | \$230,000.00 |
| Deduct for Base Trench Cost | 200 | LF | \$150.00 | <u>(\$30,000.00)</u> |
| Net Additional Cost | | | | \$200,000.00 |

Additional Cost for Trenching Under 8" Sewer

| | | | | |
|-------------------------------|----------|-------|------------|----------------------|
| Length | 200' | | | |
| Max Depth | 11.15 | | | |
| Min Depth | 6.7' | | | |
| | Quantity | Units | Unit Price | Total |
| Trench Cost for Deeper Trench | 200 | LF | \$800.00 | \$160,000.00 |
| Deduct for Base Trench Cost | 200 | LF | \$150.00 | <u>(\$30,000.00)</u> |
| Net Additional Cost | | | | \$130,000.00 |

Additional Cost for Trenching Under 12" Sewer

| | | | | |
|-------------------------------|----------|-------|------------|----------------------|
| Length | 200' | | | |
| Max Depth | 16.15' | | | |
| Min Depth | 6.7' | | | |
| | Quantity | Units | Unit Price | Total |
| Trench Cost for Deeper Trench | 200 | LF | \$1,150.00 | \$230,000.00 |
| Deduct for Base Trench Cost | 200 | LF | \$150.00 | <u>(\$30,000.00)</u> |
| Net Additional Cost | | | | \$200,000.00 |

Notes applicable to all trenching scenarios above

1. Cost assumes rock excavation not required.
2. Costs based on contractual unit pricing for the project.
3. 200 foot minimum length required for the trenching installation is required to accommodate the gradual slope necessary to accommodate the minimum bend.
4. Total estimated increase in trenching cost is \$530,000. (Sum of \$200,000 + \$130,000 + \$200,000)

Additional Cost to HDD Under Existing Sewer

| | | | | |
|--------------------------------|----------|-------|------------|-----------------------|
| Length | 900' | | | |
| Max Depth | 27.5' | | | |
| Min Depth | 6.7' | | | |
| | Quantity | Units | Unit Price | Total |
| HDD (2-8" Bores) | 900 | LF | \$2,490.00 | \$2,241,000.00 |
| Deduct for Base Trench Cost | 900 | LF | \$150.00 | <u>(\$135,000.00)</u> |
| Deduct for Surface Restoration | 900 | LF | \$41.00 | <u>(\$36,900.00)</u> |
| Net Additional Cost | | | | \$2,069,100.00 |

1. Cost assumes rock excavation not required.
2. Costs based on contractual unit pricing for the project.
3. 900 foot minimum length required for HDD installation to accommodate minimum bending requirements.