

1 Most recently, we've done a series of
2 projects in southwest Connecticut. So that's
3 the Middletown-Norwalk Project we talked a
4 little bit about today, the Bethel-Norwalk
5 Project, the Glenbrook Cables Project, and then
6 the fourth project in that family was actually a
7 replacement of a submarine cable between
8 Connecticut and Long Island. So a lot of
9 underground experience in the last 15 years with
10 the same type of cable technology we're talking
11 about for this Project.

12 Q So if you did a ten-mile project, this is just
13 five times that. The complexity isn't
14 different. The technology isn't different. So
15 whether you're building ten miles or 15 miles,
16 it's the same thing?

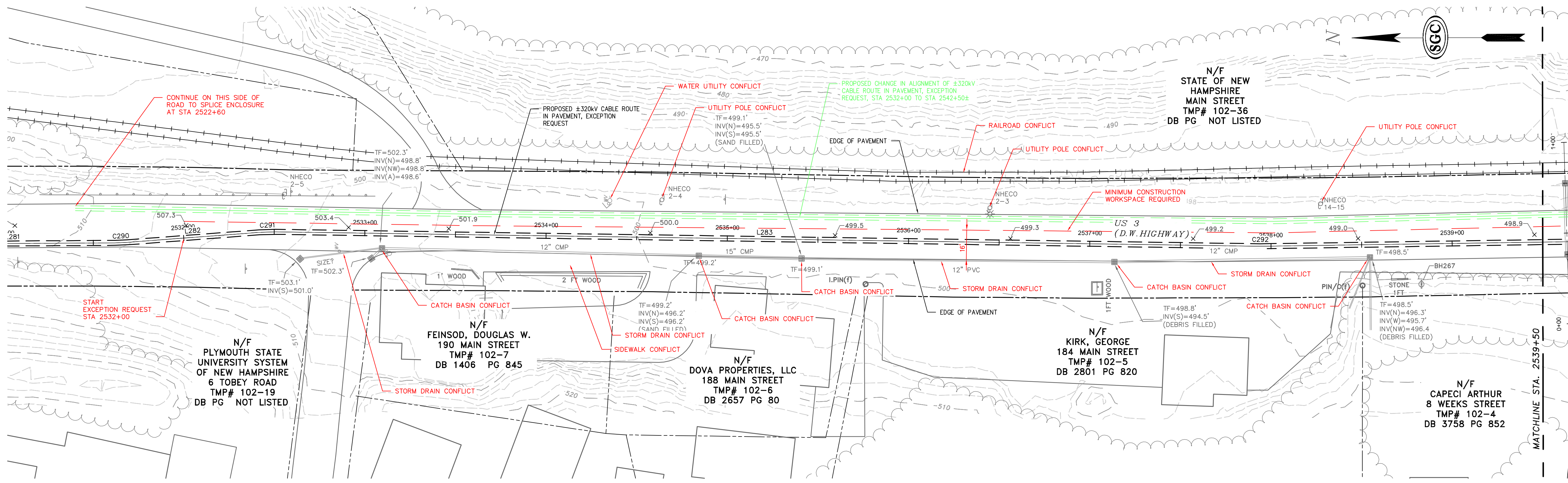
17 A (Bowes) So the two key differences I would say
18 are we're used to doing underground typically in
19 urban or heavily congested areas. We're also
20 used to doing multiple cables. So most of our
21 projects are 6 cables, not two cables, which
22 means the underground excavation has to be wider
23 and deeper. Because it's an urban environment,
24 we're also used to dealing with many more

1 utility obstructions. We could have 100
2 obstructions per mile. It's not uncommon. And
3 that's gas mains, water mains, electric
4 distribution circuits, sewer, culverts, all of
5 those type of activities. So we're used to
6 dealing in very congested areas doing
7 construction of much larger facilities than this
8 Project as proposed.

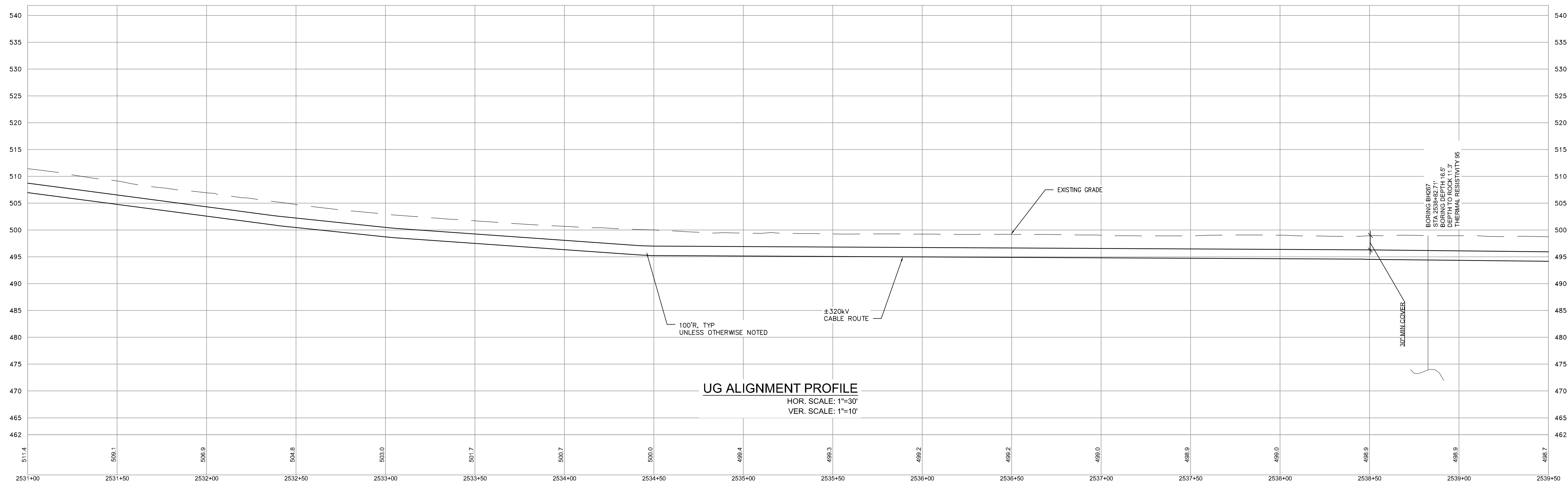
9 The difference with this is it's longer.
10 The linear length is 60. Typically the lines, I
11 think the largest or the longest line we've done
12 to date is around 24 miles in one continuous
13 segment.

14 Q All right. Thank you. So in the blue, the
15 portion that's done by Burns & McDonnell, I
16 believe, and Mr. Fortier's Prefiled Testimony,
17 they're listed down here as the, it's a little
18 out of focus. So the Owner's Engineer will be
19 Northern Pass's representative for engineering,
20 full service engineering company. So this is
21 sort of the job specs that Burns & McDonnell
22 was hired under, correct?

23 A (Bowes) Yes, and to be more specific,
24 Mr. Bradstreet did the overhead design.



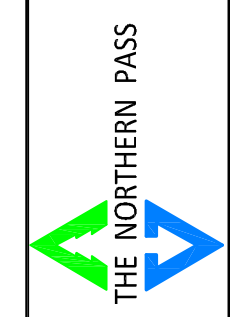
UG ALIGNMENT PLAN
SCALE: 1"=30'



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

PRELIMINARY - NOT FOR CONSTRUCTION

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



Transmission Business

EXCEPTION 7-ALIGNMENT IN PAVEMENT & CROSSING OVER EXISTING UTILITY/DRAINAGE. NPT WBR3-UNDERGROUND ALIGNMENT WBR3 SECTION-STA. 2532+00 TO STA. 2575+20
SCALE: 1"=60'

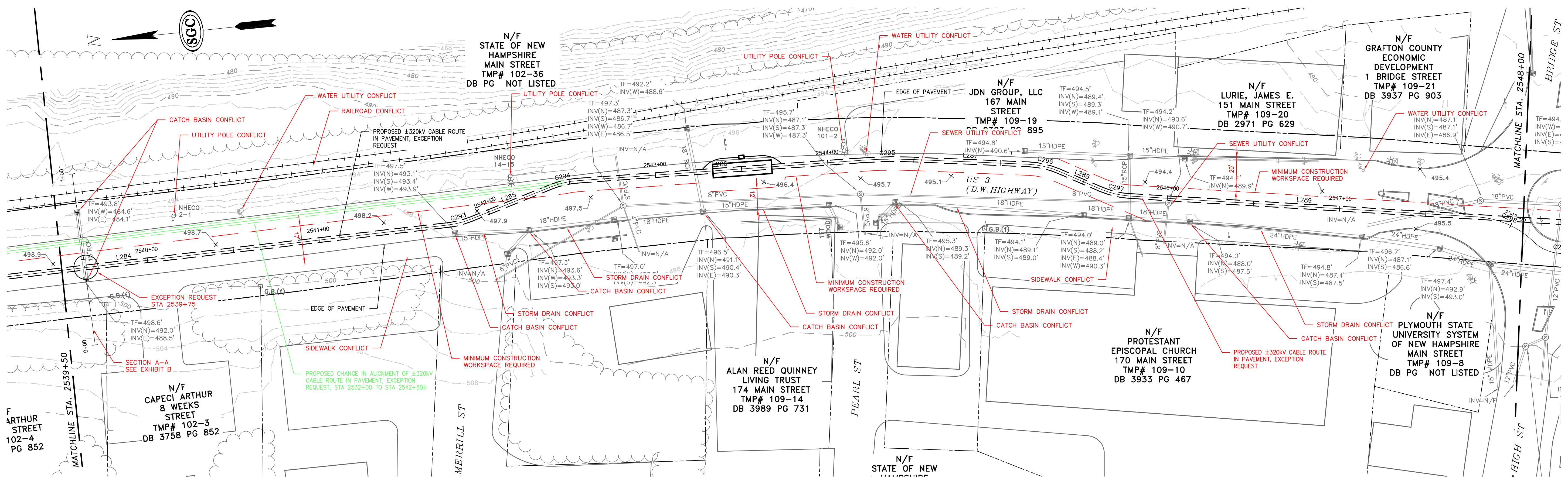
DES: MRR CHKD: TJS
DRW: MRR APR: TMH
TOWN: PLYMOUTH

TRANSMISSION LINE:
WBR3

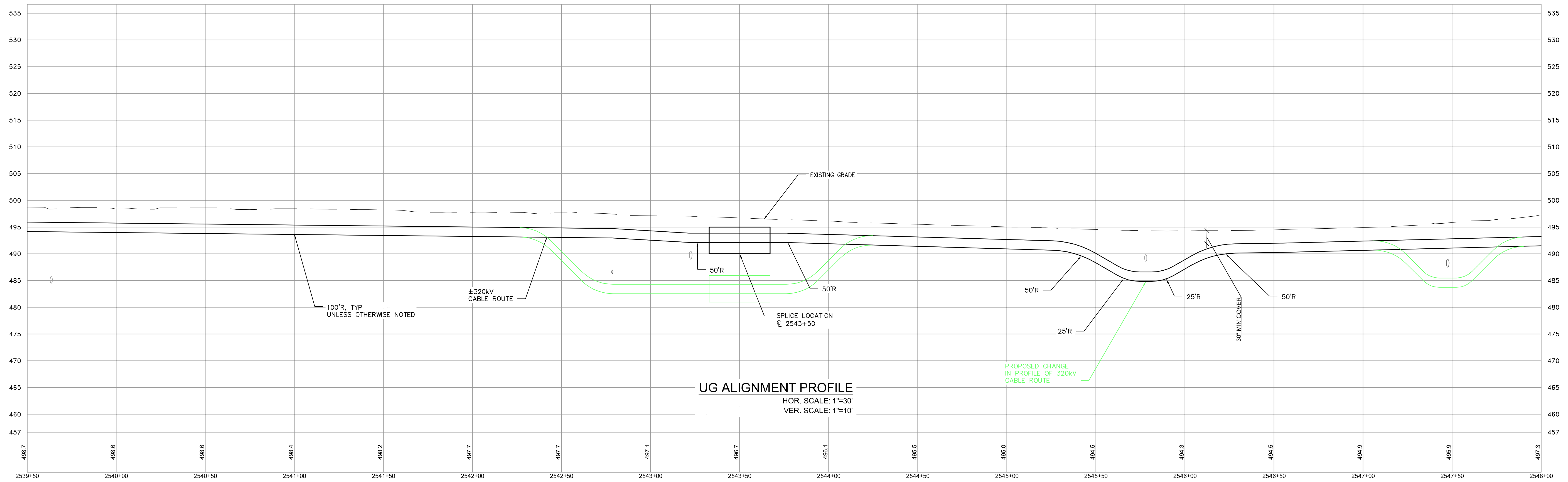
EXHIBIT A.1

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

PRELIMINARY - NOT FOR CONSTRUCTION

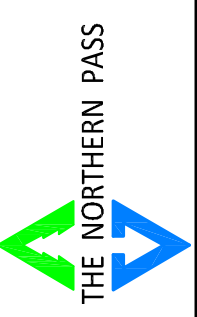


UG ALIGNMENT PLAN
SCALE: 1"=30'



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

NO.	REVISION	DATE	BY	CHK	APPV.
0	EXCEPTION REQUEST	05/25/17	TOD	CHD	



Transmission Business

EXCEPTION 7-ALIGNMENT IN PAVEMENT & CROSSING OVER EXISTING UTILITY/DRAINAGE. NPT WBR3-UNDERGROUND ALIGNMENT WBR3 SECTION- STA. 2532+00 TO STA. 2575+20
SCALE:
DES: MRR CHK: TJB
DRAW: MRR APR: TMH
TOWN: PLYMOUTH
TRANSMISSION LINE:
WBR3

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

EXHIBIT A.2

#4

Exception Request: No. 7
Section: WBR3
Station: 2531+00 to 2575+20
Drawing No.: WBR3 C223 to C229
Survey Report Cross Reference No.: WBR3 C220 to C225
Exception Type: Alignment in Pavement
Splice Enclosure 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 station 2531+00 to 2575+20 of the NPT WBR3 underground alignment section, sheets WBR3 C223 to C229 and the splice enclosure at STA 2561+80. Due to limited ROW space and conflicts with terrain, slope and existing utilities/drainage structures, construction outside the pavement is not possible. NPT does not have the necessary property rights to construct outside the NHDOT ROW. The proposed alignment is located beneath the pavement at a 5-foot offset from existing utilities to avoid future conflicts with repairs or replacement or disruption to the existing utilities.

In addition, the exception request in this area includes multiple crossings above existing utilities and drainage structures, specifically, a 15-inch reinforced concrete pipe (RCP) culvert and a 12-inch clay sewer. The proposed alignment is set within the pavement and over the existing utilities to avoid road closures and increased construction width that will extend the duration of construction and traffic impacts.

Technical Discussion of Justification of Exception

Alignment in Pavement/Splice Enclosure in Pavement

The ductbank alignment in the roadway at this location is constrained by existing utilities and drainage structures on both the eastern and western sides of US 3. Due to limited ROW space, relocating utility and stormwater infrastructure (including catch basins, sewer manholes and water main components) would result in significant traffic impacts from having to reconstruct multiple utilities.

We have reviewed the alignment in this area and have proposed a change in the alignment to eliminate the road crossing at station 2523+48, as shown in Exhibit A. Due to the utility conflicts, the alignment would still be in the pavement but would be able to be constructed much closer to the edge of pavement than on the west side as currently proposed. This change would also eliminate a road crossing.

Finally, there may be some locations where it might initially appear that the alignment could be moved closer to the edge of pavement for short sections and then moved back out to avoid utilities. However, these adjustments over short distances would produce additional cable bends that increase the 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.

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 multiple existing utilities to avoid road closures, unreasonable costs associated with a deeper excavation and increased construction width that will extend the duration of construction and traffic impacts, as further described below.

1. 15-inch RCP Culvert

NPT's exception request includes crossing above an existing 15-inch RCP culvert on US 3, Daniel Webster Highway at STA 2539+75. There is 13 feet of cover over the culvert. The attached Exhibits A and B have been provided for this location to illustrate the constraints associated with installing the ductbank below the existing RCP culvert. See Exhibit B.

2. 12-inch clay sewer main

NPT's exception request includes crossing above an existing 12-inch clay sewer main on US 3, Daniel Webster Highway at STA 2573+75. 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 sewer main. See Exhibit C.

The vertical positioning of the cable trench is constrained by the depth of the existing utilities. (See Exhibits A and C). Crossing under the existing culvert to meet the required 2-foot minimum separation will require a greater separation of the conduits and cable to accommodate thermal design criteria for the electric cables resulting from the additional depth. In addition, in order to maintain the minimum separation between the two conduits and cables, the crossing will require two separate crossings. 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 \$200,000 for each of these two sections for a total of \$400,000. (See Exhibit D.) 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 D). Also, traffic impacts would be increased for a trenchless installation due to the addition of trenchless work areas and the extended duration of installation.

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 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

NORTHERN PASS TRANSMISSION (NPT) PROJECT



SHEBS ESTATE BYPASS (SHEB)
UNDERGROUND ALIGNMENT
PERMIT PACKAGE – NH DOT DISTRICT 1

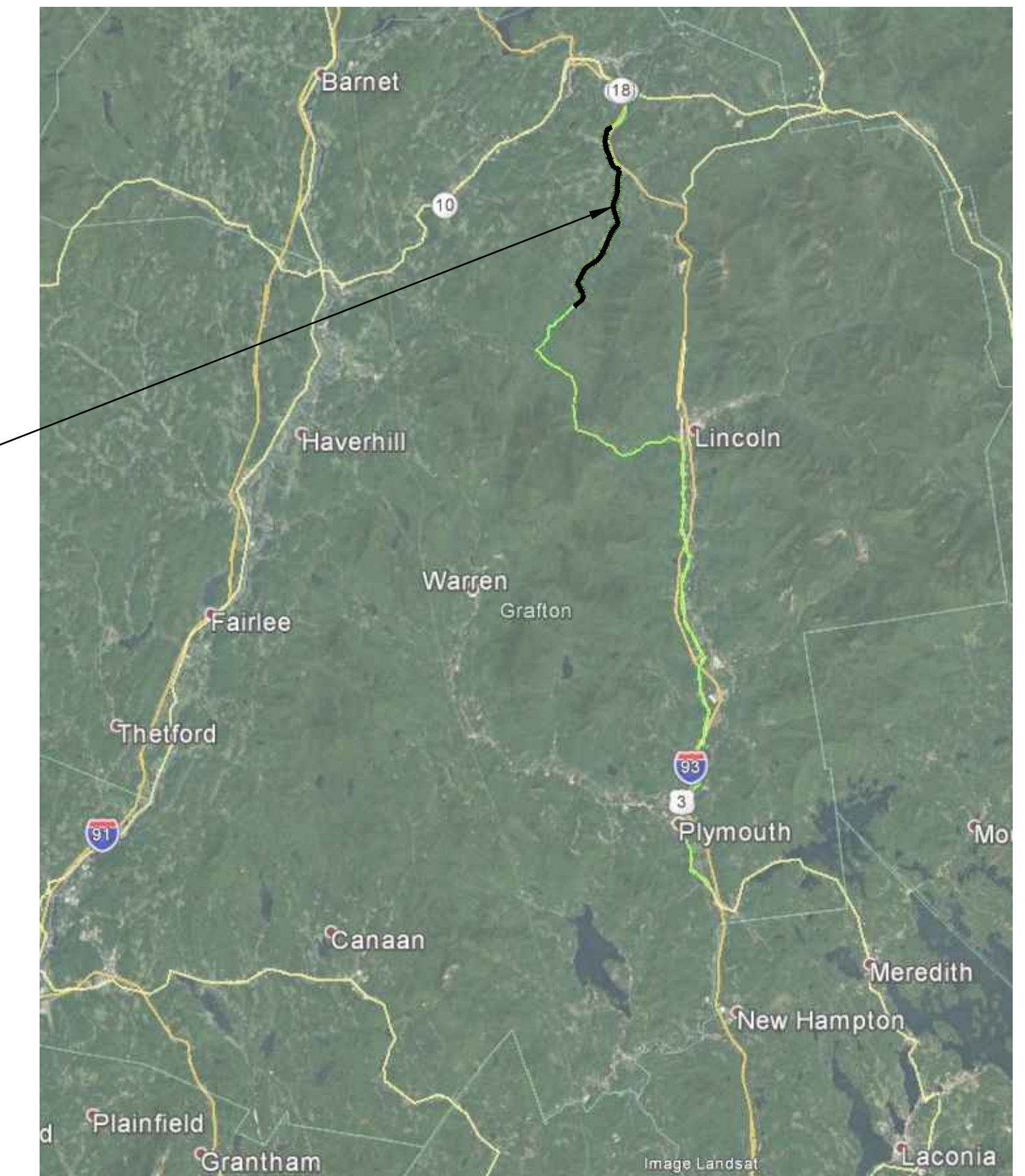
DECEMBER 8, 2016

DRAWING INDEX

GENERAL DRAWINGS

DWG. NO.	DWG. TITLE
SHEBG000	COVER SHEET
SHEBG001	GENERAL NOTES

SHEB
UNDERGROUND
ALIGNMENT



VICINITY MAP
(NOT TO SCALE)

ALIGNMENT DRAWINGS

DWG. NO.	DWG. TITLE
SHEBC100	ALIGNMENT KEY MAP
SHEBC101	UNDERGROUND ALIGNMENT—STA 156+20 TO 165+00
SHEBC102	UNDERGROUND ALIGNMENT—STA 165+00 TO 173+50
SHEBC103	UNDERGROUND ALIGNMENT—STA 173+50 TO 182+00
SHEBC104	UNDERGROUND ALIGNMENT—STA 182+00 TO 190+50
SHEBC105	UNDERGROUND ALIGNMENT—STA 190+50 TO 199+00
SHEBC106	UNDERGROUND ALIGNMENT—STA 199+00 TO 207+50
SHEBC107	UNDERGROUND ALIGNMENT—STA 207+50 TO 216+00
SHEBC108	UNDERGROUND ALIGNMENT—STA 216+00 TO 224+50
SHEBC109	UNDERGROUND ALIGNMENT—STA 224+50 TO 233+00
SHEBC110	UNDERGROUND ALIGNMENT—STA 233+00 TO 241+50
SHEBC111	UNDERGROUND ALIGNMENT—STA 241+50 TO 250+00
SHEBC112	UNDERGROUND ALIGNMENT—STA 250+00 TO 258+50
SHEBC113	UNDERGROUND ALIGNMENT—STA 258+50 TO 267+00
SHEBC114	UNDERGROUND ALIGNMENT—STA 267+00 TO 275+50
SHEBC115	UNDERGROUND ALIGNMENT—STA 275+50 TO 284+00
SHEBC116	UNDERGROUND ALIGNMENT—STA 284+00 TO 292+50
SHEBC117	UNDERGROUND ALIGNMENT—STA 292+50 TO 301+00
SHEBC118	UNDERGROUND ALIGNMENT—STA 301+00 TO 309+50
SHEBC119	UNDERGROUND ALIGNMENT—STA 309+50 TO 318+00
SHEBC120	UNDERGROUND ALIGNMENT—STA 318+00 TO 326+50
SHEBC121	UNDERGROUND ALIGNMENT—STA 326+50 TO 335+00
SHEBC122	UNDERGROUND ALIGNMENT—STA 335+00 TO 343+50
SHEBC123	UNDERGROUND ALIGNMENT—STA 343+50 TO 352+00
SHEBC124	UNDERGROUND ALIGNMENT—STA 352+00 TO 360+50
SHEBC125	UNDERGROUND ALIGNMENT—STA 360+50 TO 369+00
SHEBC126	UNDERGROUND ALIGNMENT—STA 369+00 TO 377+50
SHEBC127	UNDERGROUND ALIGNMENT—STA 377+50 TO 386+00
SHEBC128	UNDERGROUND ALIGNMENT—STA 386+00 TO 394+50
SHEBC129	UNDERGROUND ALIGNMENT—STA 394+50 TO 403+00
SHEBC130	UNDERGROUND ALIGNMENT—STA 403+00 TO 411+50
SHEBC131	UNDERGROUND ALIGNMENT—STA 411+50 TO 420+00
SHEBC132	UNDERGROUND ALIGNMENT—STA 420+00 TO 428+50
SHEBC133	UNDERGROUND ALIGNMENT—STA 428+50 TO 437+00

ALIGNMENT DRAWINGS

DWG. NO.	DWG. TITLE
SHEBC134	UNDERGROUND ALIGNMENT—STA 437+00 TO 445+50
SHEBC135	UNDERGROUND ALIGNMENT—STA 445+50 TO 454+00
SHEBC136	UNDERGROUND ALIGNMENT—STA 454+00 TO 462+50
SHEBC137	UNDERGROUND ALIGNMENT—STA 462+50 TO 471+00
SHEBC138	UNDERGROUND ALIGNMENT—STA 471+00 TO 479+50
SHEBC139	UNDERGROUND ALIGNMENT—STA 479+50 TO 488+00
SHEBC140	UNDERGROUND ALIGNMENT—STA 488+00 TO 496+50
SHEBC141	UNDERGROUND ALIGNMENT—STA 496+50 TO 505+00
SHEBC142	UNDERGROUND ALIGNMENT—STA 505+00 TO 513+50
SHEBC143	UNDERGROUND ALIGNMENT—STA 513+50 TO 522+00
SHEBC144	UNDERGROUND ALIGNMENT—STA 522+00 TO 530+50
SHEBC145	UNDERGROUND ALIGNMENT—STA 530+50 TO 539+00
SHEBC146	UNDERGROUND ALIGNMENT—STA 539+00 TO 547+50
SHEBC147	UNDERGROUND ALIGNMENT—STA 547+50 TO 556+00
SHEBC148	UNDERGROUND ALIGNMENT—STA 556+00 TO 564+50
SHEBC149	UNDERGROUND ALIGNMENT—STA 564+50 TO 573+00
SHEBC150	UNDERGROUND ALIGNMENT—STA 573+00 TO 581+50
SHEBC151	UNDERGROUND ALIGNMENT—STA 581+50 TO 590+00
SHEBC152	UNDERGROUND ALIGNMENT—STA 590+00 TO 598+50
SHEBC153	UNDERGROUND ALIGNMENT—STA 598+50 TO 607+00
SHEBC154	UNDERGROUND ALIGNMENT—STA 607+00 TO 615+50
SHEBC155	UNDERGROUND ALIGNMENT—STA 615+50 TO 624+00
SHEBC156	UNDERGROUND ALIGNMENT—STA 624+00 TO 632+50
SHEBC157	UNDERGROUND ALIGNMENT—STA 632+50 TO 641+00
SHEBC158	UNDERGROUND ALIGNMENT—STA 641+00 TO 649+50
SHEBC159	UNDERGROUND ALIGNMENT—STA 649+50 TO 658+00
SHEBC160	UNDERGROUND ALIGNMENT—STA 658+00 TO 666+50
SHEBC161	UNDERGROUND ALIGNMENT—STA 666+50 TO 675+00
SHEBC162	UNDERGROUND ALIGNMENT—STA 675+00 TO 683+50
SHEBC163	UNDERGROUND ALIGNMENT—STA 683+50 TO 692+00
SHEBC164	UNDERGROUND ALIGNMENT—STA 692+00 TO 700+50
SHEBC165	UNDERGROUND ALIGNMENT—STA 700+50 TO 709+00
SHEBC166	UNDERGROUND ALIGNMENT—STA 709+00 TO 711+65

TRENCHLESS DRAWINGS

DWG. NO.	DWG. TITLE
SHEB010-1	TRENCHLESS CROSSINGS
SHEB010-2	TRENCHLESS CROSSINGS
SHEB011-1	TRENCHLESS CROSSINGS
SHEB011-2	TRENCHLESS CROSSINGS
SHEB012-1	TRENCHLESS CROSSINGS
SHEB012-2	TRENCHLESS CROSSINGS
SHEB013-1	TRENCHLESS CROSSINGS
SHEB013-2	TRENCHLESS CROSSINGS
SHEB014-1	TRENCHLESS CROSSINGS
SHEB014-2	TRENCHLESS CROSSINGS
SHEB015-1	TRENCHLESS CROSSINGS
SHEB015-2	TRENCHLESS CROSSINGS
SHEB015-3	TRENCHLESS CROSSINGS
SHEB016-1	TRENCHLESS CROSSINGS
SHEB016-2	TRENCHLESS CROSSINGS
SHEB017-1	TRENCHLESS CROSSINGS
SHEB017-2	TRENCHLESS CROSSINGS
SHEB018-1	TRENCHLESS CROSSINGS
SHEB018-2	TRENCHLESS CROSSINGS
SHEB019-1	TRENCHLESS CROSSINGS
SHEB019-2	TRENCHLESS CROSSINGS
SHEB019-3	TRENCHLESS CROSSINGS
SHEB020-1	TRENCHLESS CROSSINGS
SHEB020-2	TRENCHLESS CROSSINGS
SHEB020-3	TRENCHLESS CROSSINGS
SHEB021-1	TRENCHLESS CROSSINGS
SHEB021-2	TRENCHLESS CROSSINGS
SHEB022-1	TRENCHLESS CROSSINGS
SHEB022-2	TRENCHLESS CROSSINGS
SHEB022-3	TRENCHLESS CROSSINGS
SHEBG001	TRENCHLESS CROSSINGS

TRAFFIC CONTROL PLAN DRAWINGS

DWG. NO.	DWG. TITLE
SHEBTCP-1	TRAFFIC CONTROL TYPICALS
SHEBTCP-2	TRAFFIC CONTROL TYPICALS
SHEBTCP-3	TRAFFIC CONTROL TYPICALS
SHEBTCP-4	TRAFFIC CONTROL TYPICALS
SHEBTCP-5	TRAFFIC CONTROL TYPICALS
SHEBTCP-6	TRAFFIC CONTROL TYPICALS
SHEBTCP-7	TRAFFIC CONTROL TYPICALS
SHEBTCP-8	TRAFFIC CONTROL TYPICALS

TRENCHLESS DRAWINGS

DWG. NO.	DWG. TITLE
SHEBTRG001	TRENCHLESS CROSSINGS
SHEBTR038-1	TRENCHLESS CROSSING 038
SHEBTR038-2	TRENCHLESS CROSSING 038
SHEBTR039-1	TRENCHLESS CROSSING 039
SHEBTR039-2	TRENCHLESS CROSSING 039
SHEBTR039-3	TRENCHLESS CROSSING 039

DETAIL DRAWINGS

DWG. NO.	DWG. TITLE
SHEBC501	ALIGNMENT TABLES
SHEBC502	CABLE TRENCH DETAILS
SHEBC503	CABLE SPLICE PIT DETAILS
SHEBC504	TRENCH AND UTILITY DETAILS
SHEBC505	EROSION CONTROL DETAILS-1
SHEBC506	EROSION CONTROL DETAILS-2



GENERAL CONTRACTOR
PAR ELECTRICAL CONTRACTORS, INC.
70 FULLER ROAD
CHICOPEE, MA 01020



CIVIL ENGINEER
SGC ENGINEERING, LLC.
501 COUNTY ROAD
WESTBROOK, ME 04092



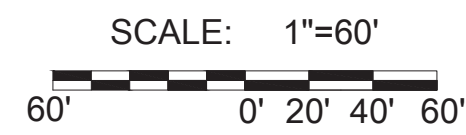
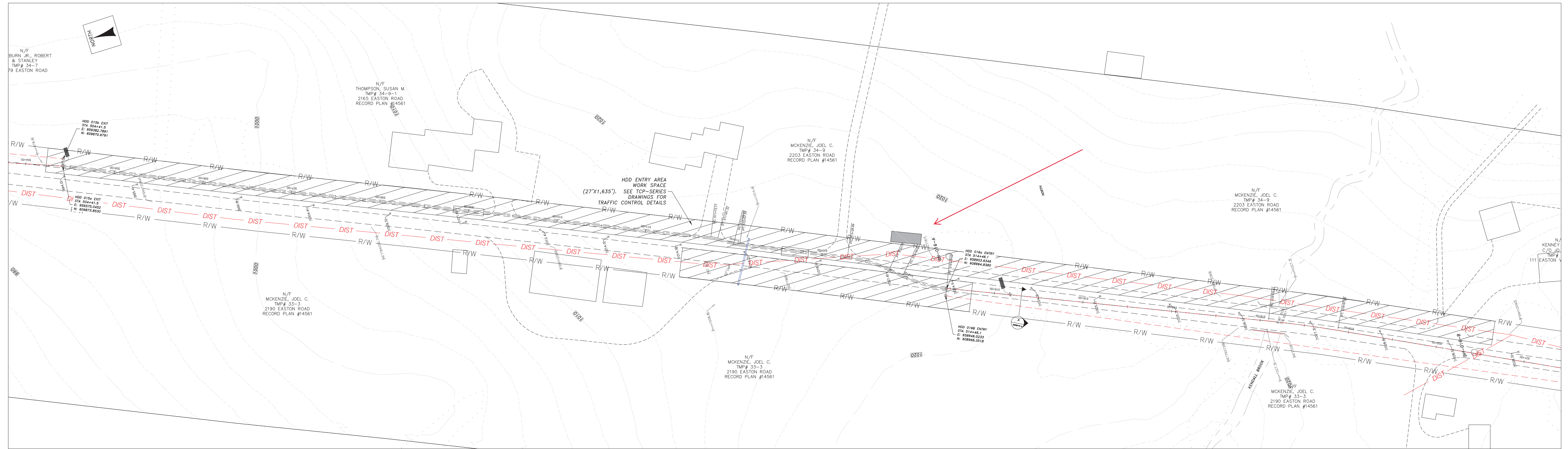
TRAFFIC ENGINEER
LOUIS BERGER
100 COMMERCIAL STREET,
2ND FLOOR NORTH
MANCHESTER, NH 03101



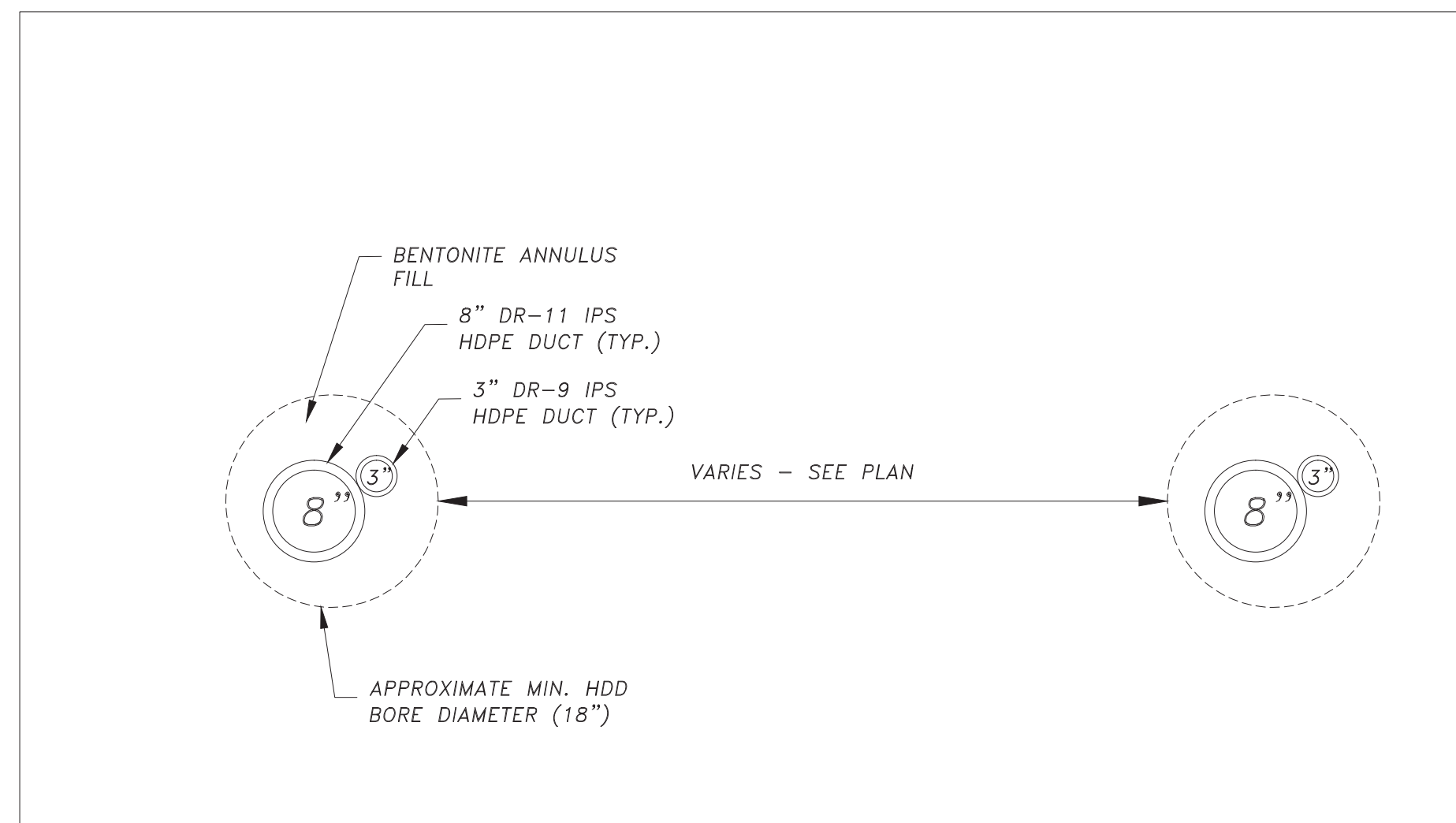
CIVIL ENGINEER – TRENCHLESS
BRIERLEY ASSOCIATES
167 SOUTH RIVER ROAD, #8
BEDFORD, NH 03110

**PRELIMINARY - NOT
FOR CONSTRUCTION**

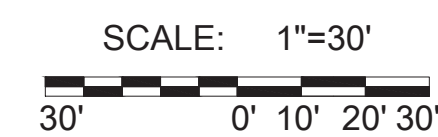
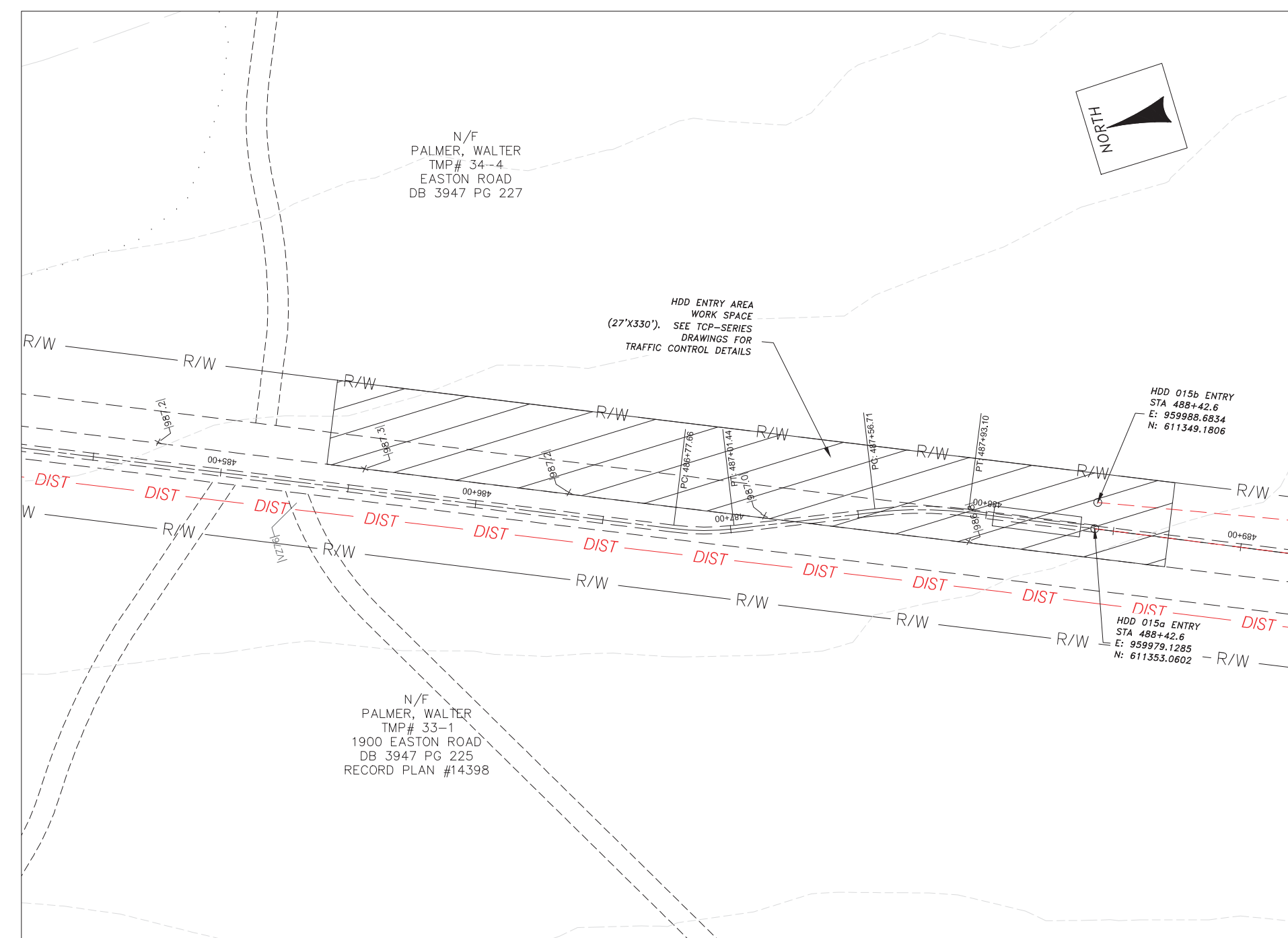
#5: Original SHEB ROW shown as 4 rods at McKenzie's, Franconia
 ROW shown hitting small structure



HDD 015 EXIT AREA WORK SPACE



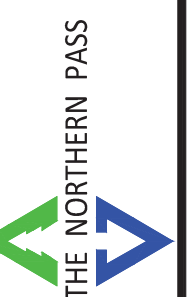
DETAIL A - HDD 015 DUCT BUNDLE
 SCALE: N.T.S.



HDD 015 ENTRY AREA WORK SPACE

PRELIMINARY - NOT
 FOR CONSTRUCTION

NO.	REVISION	DATE	BY	CHKD	APPR



Transmission
 Business

NPT
 UNDERGROUND ALIGNMENT
 TRENCHLESS CROSSINGS
 SCALE: 1" = 30'

DES:	CHK:
DRAW:	APP:
TOWN:	EASTON
TRANSMISSION LINE:	SHEB
SHEET:	SHEB015-3

#6

Exception Request No.: 117

Section: SHEB

Town: Franconia/Easton

Highway: Route 116 (Easton Rd) (Tier 3)

Station: 514+30± to 523+97±

Drawing No.: SHEB016-1, SHEB016-2, SHEB016-3; SHEB C143 to C144

Survey Report Reference No.: SHEB C140 TO C142

Exception Type: Alignment in Pavement

HDD Pits Within Pavement

HDD Alignment Passing Under Pavement

Traffic Information

NHS: No

ADT: 960

Traffic Control Type: Alt 1-way

Traffic Control Duration: Traffic control duration for the proposed installation is estimated to be approximately 3-5 weeks.

Summary of Justification for Exception

NPT is requesting an exception from the UAM guidelines regarding the location of the HDD 016 entry pits relative to the existing Route 116 pavement limits. HDD 016 extends from approximately STA 514+46 to 523+97, and is required to allow installation of the ducts below a box culvert containing Kendall Brook. This location involves two separate bores. Each HDD installation requires two entry pits and two exit pits. Given the dimensions of the pits, the need to maintain separation between the two bores and separation from the edge of ROW, and the limited space available off the paved roadway at this location, the proposed location of one of the entry pits is in the paved roadway.

In addition, NPT is requesting an exception from the UAM guidelines to allow the location of the HDD 016 bore paths beneath the pavement. The HDD bore paths will have no impact on the NHDOT highway culvert.

Finally, NPT is requesting an exception from the UAM guidelines for the location of the cable trench in the pavement from approximately STA 514+30 to the entrance pits for HDD 016.

Note: As reflected in the drawings in Exhibit B, the exit pits and the proposed alignment of the ductbank south of the entry pits are now on the east side of NH 116, as opposed to the western side location shown in the original permit drawings. By making this change, NPT has eliminated the need for a road crossing at this location.

Technical Discussion of Justification of Exception

HDD Pit Within Pavement

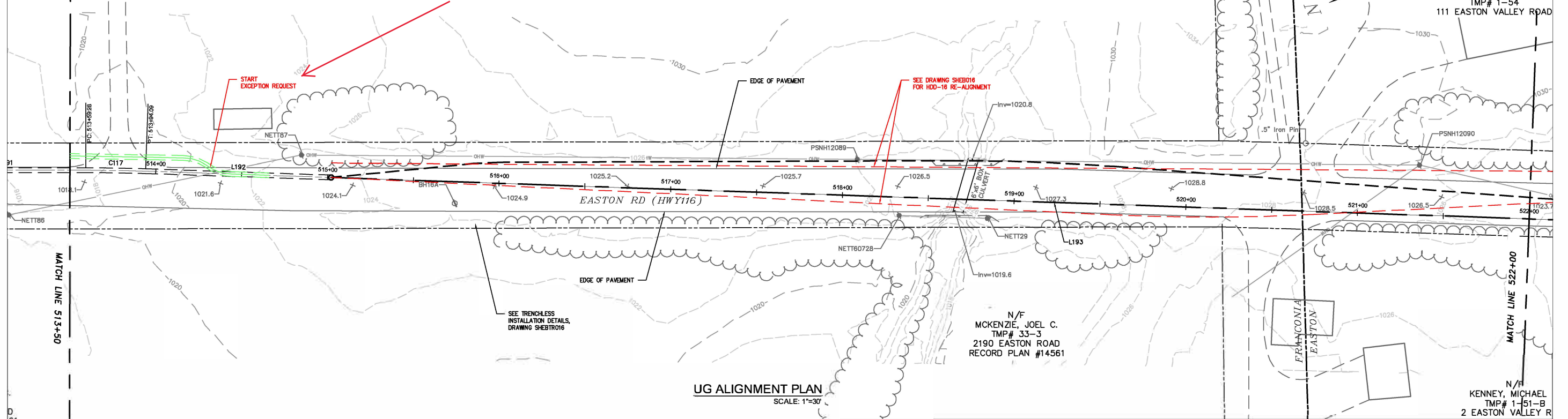
Each of the bores requires an entry pit and an exit pit (4 pits total). These pits will be approximately 4 feet x 4 feet in plan dimension (each). The HDD bores must be separated by approximately 20 feet at

Exception Request #117: ROW shown as 3 rods. ROW line away from small structure.

N/F
MCKENZIE, JOEL C.
TMP# 34-9
203 EASTON ROAD
RECORD PLAN #14561

N/F
MCKENZIE, JOEL C.
TMP# 34-9
2203 EASTON ROAD
RECORD PLAN #14561

N/F
KENNEY GROUP
C/O JO MILLER
TMP# 1-54
111 EASTON VALLEY ROAD



[Bowes~Bradstreet~Farrington~Johnson~Kayser~Scott]

1 the Northern Pass line where trees and shrubs
2 need to be removed in order to install the
3 line, correct?

4 A. (Scott) Within the right-of-way, yes.

5 Q. Yes. Okay. And am I correct that the DOT
6 wants the Project to be off the road as much as
7 possible?

8 A. (Scott) Correct.

9 Q. So, wherever you can be off the road, and still
10 within the right-of-way, is where -- is the
11 goal for the open trench, correct?

12 A. (Scott) There's a variation on that. That's
13 definitely what the DOT is requesting.
14 However, we are putting in requests for
15 variance where we know that we would be killing
16 trees.

17 Q. Yes. That's a hardship request?

18 A. (Scott) Yes.

19 Q. But there are a number of places where you do
20 need to take down trees, correct? You don't
21 have much of a choice?

22 A. (Johnson) I wouldn't say it's prevalent across
23 the installation. For the most part, we will
24 be doing our even off the road, in the ditch



THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION



Victoria F. Sheehan
Commissioner

William Cass, P.E.
Assistant Commissioner

Bureau of Highway Design
Room 200
Tel. (603) 271-2171
Fax (603) 271-7025

December 2, 2016

Ms. Stephanie Labbe
Project Manager
PAR Electrical Contractors, Inc.
60 Fuller Rd
Chicopee MA 01020

Dear Ms. Labbe:

The Department has reviewed the Sample Submission and Request for Exception to the NHDOT Utility Accommodation Manual (UAM). The following comments are to be incorporated into future submissions:

General Plan Comments:

1. On sheet WMNFG001, general note 3 specifies a "30" minimum unless otherwise shown". The note should include the minimum depth of 48 inches under the ditch line and 18 inches below the roadbed structural box if under pavement. It must be noted that if the proposed facility is under two surface conditions, the greater of the two depth requirements will take precedence.
2. Be aware that the roadbed structural box does not end at the edge of pavement but extends horizontally to the edge of the slope. Please see Appendix B of the UAM for typical sections.
3. Minimum depth of cover requirements are measured to the nearest part of the proposed facility; i.e. protective slab, top of splice vault, etc.
4. On sheet WMNFG001, general note 9 is incorrect as the minimum depth requirement is measured to the top of the proposed facility. Per the UAM, the minimum depth would be 30 inches to the top of the splice vault. However this is dependent on the surface condition. For example, if the splice vault is located under the ditch line, then the minimum depth to the vault would be 48 inches.
5. On sheet WMNFG001, general note 10 should read, "No open trenches and excavations will be allowed. Trenches shall be filled in at the completion of work each day."
6. A general note should be included to indicate that the Contractor, at their expense, is responsible to protect the Right of Way (ROW) and property monuments and any restoration due to the result of the Contractor's work. A detail for mailbox replacements needs to be included.

7. A general note should be included to identify that if any highway sign is removed; it shall be replaced within 48 hours of removal.
8. The symbol used on the plans for the trenchless construction does not match the symbol identified for trenchless installation on sheet WMNFG001.
9. All sheets need to reflect the State routes either by, NH ____, US ____, or I ____. Examples: NH 112, US 3, I-393 with the road name secondary.
10. The Town box in the Title block of the plans should indicate the specific Town the plan sheet is in and not the Towns within the plan set.
11. All culverts shall be shown on the plans and profiles. The sample submission is missing some crossings.
12. Verify all water and sewer mains and services and other underground facilities are shown on the plans.
13. Ensure culverts and other facility crossings are shown at the correct stationing on the profile.
14. All ROW types need to be labelled on each sheet. State ROW types include regular ROW, Controlled Access ROW (CAROW) and Limited Access ROW (LAROW). The plans should also differentiate between municipal ROW and state ROW.
15. Anticipated tree cutting/taking should be shown on the plans as the proposed facilities appear to potentially disturb existing trees.
16. The proposed underground transmission facility should cross below existing water/sewer facilities and culverts to reduce the risk of future relocation due to maintenance/improvements to those existing facilities.
17. The plans and profiles need to show the bridge foundation information. It is anticipated that bridge plans will be provided by December 1, 2016.
18. Crossings near bridges should be adjusted to outside the bridge abutments wherever possible.
19. Temporary wetland impact is not adequate justification for installing the transmission lines under the pavement. Example: 1492+00-1494+00.
20. Detail 1 should be reflecting an 18 inch minimum depth to the protective layer below the roadbed structural box. The Typical details (Details 1, 2 & 4) should be showing the "Traceable Safety Ribbon" below the structural box so it is not impacted during any NHDOT maintenance operation or project.
21. Typical details for construction under roadbeds with the structural box or applicable concrete sections and gravel shoulder should be included to represent to the Contractor the appropriate requirements.
22. The Department has concerns over the splice vaults "floating" in areas that have high groundwater elevations. Details 5 and 6 do not include any anchoring to prevent "floating". Is the top and bottom anticipated to have holes to prevent the structure from "floating"?
23. Details 5 and 6 also need to reflect the minimum 30 inches to the top of the vault cover outside the roadbed, 48 inches below ditch lines and 18 inches under the structural box when under the roadbed.

24. Detail 7 needs to show the structural pavement design required for the Contractor to meet or exceed.
25. Detail 8 note 1 needs to include that the box and cover needs to meet or exceed H20 loading. Vaults need to be designed by a structural engineer licensed in the State of NH.
26. A detail for stone check dams for ditch lines should be included. Clay collars and drainage off slopes when using fluidized backfill should be shown as well.
27. Labels need to be on the existing utilities to identify the facility on the Horizontal Directional Drill (HDD) plan sheets. Line styles as used in the plans are appropriate in the HDD plan sheets.
28. The Trenchless Crossing sheets show the anticipated work area but lack the detail to identify how the layout space will be protected overnight. An approximate construction time frame would help to identify how long each area will be affected by these construction operations.
29. The Traffic Control Typical sheets have symbols overwriting letters. This makes it difficult to review. Revise traffic control plan to meet current MUTCD requirements.

Location Specific Comments:

1. On sheet WMNFC181, the underground electric facility is proposed under a roadside ditch and per UAM is required to have a minimum depth of 48 inches. The plans are currently showing 30 inches.
2. The plans show the Town of Woodstock water main outside the right-of-way. Is this an accurate location?
3. On sheet WMNFC184 is showing the minimum separation from the existing sewer to be a minimum of 2 feet. The proposed facility travels over the existing sewer and the measurement is shown from the top of the proposed facility to the top of the sewer facility. The measurement should be shown from the bottom of the transmission to the top of the sewer facility.
4. On sheet WMNF184 the label pointing to the ROW line at approximately Station 1426+00 indicates that the Contractor is to verify the ROW limits and install the facility "within the determined ROW limits." The ROW needs to be verified during the design stage so the Contractor knows the construction limits.
5. What is the minimum distance the underground transmission facility can be from buildings? The Department has concerns with the distance between the transmission facility and the Town of Woodstock's building at approximately station 1454+50. Address is 17 Lost River Road.
6. On sheet WMNFC195 the transmission facility is shown in the profile going under an existing water facility but the plan is not showing this crossing. Is it a service or is it a main as stated on the profile?
7. Confirm the alignment of Parker Ledge Road as Google Earth imagery appears to contradict what is shown at station 1486+00.
8. Is the transition between directional drill and open cut possible at Sta. 1444+50. The proposed alignment would likely be restricted by conduit curve by deflection.
9. There is a discrepancy of the name of the crossing (Gordon Pond Brook or Lost River) between the plan set and the bridge plans for the river crossing at station 1473+50. Also the HDD plans

do not show the water crossing names. These should be labeled with the river or stream name not simply "river" or "stream".

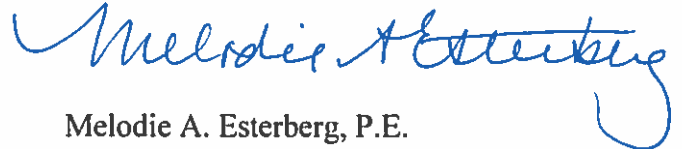
The Department has reviewed the Sample Request for Exceptions letter and provides the following comments to be incorporated into future submissions:

1. Exception requests for the alignment under the pavement need to provide the beginning and ending station, whether the left or right side of the roadway and reason for the request for each segment.
2. Exception requests for not crossing the roadway normal or at a right angle to the alignment of the roadway also need to provide the beginning and ending station, whether the left or right side of the roadway and reason for the request for each segment.
3. The exception request for the use of Schedule 40 PVC-EPC under the pavement is incorrect with respect to "additional cover beyond the minimum 18 inches required under the pavement". The requirement is a minimum 18 inches below the roadbed structural box which includes the pavement and structural materials (gravel and sand) under the pavement.

The location of each exception request segment is necessary as the Department will review and determine whether to grant the exception on an individual basis. No decisions have been made regarding the use of Fluidized Thermal Backfill at this time. This will be reviewed pending performance of the test sections over the winter.

If you have any questions regarding these comments, please do not hesitate to contact me.

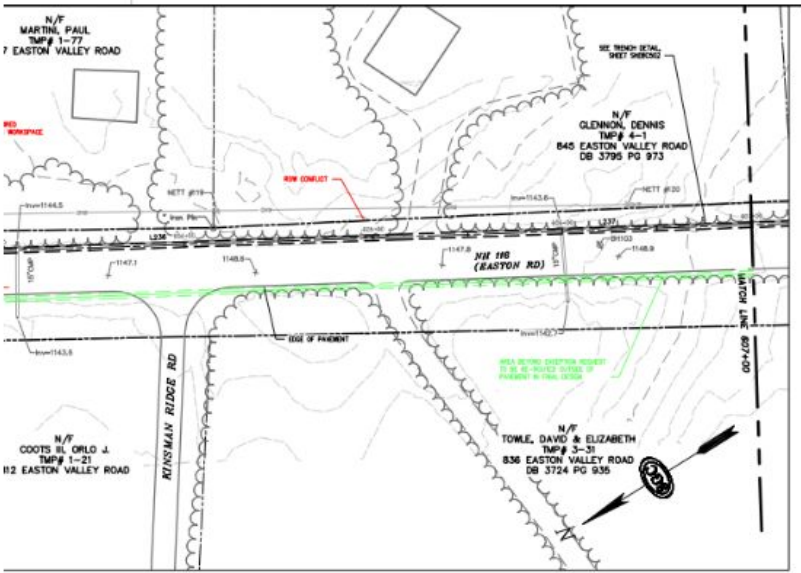
Sincerely,



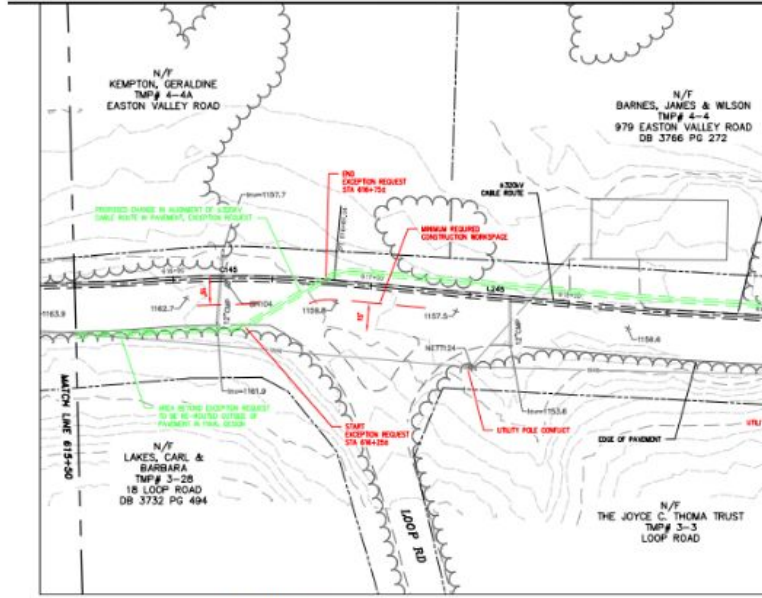
Melodie A. Esterberg, P.E.
Chief of Design Services

MAE/LDS/mcp

CC: D. Rodrigue
A. Hanscom
P. Beaulieu
J. Fortier



ER #124



ER #123

----- 1/2 mile -----

Trench on other side of road

Route changes undocumented in Exception Requests.

#8.

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).

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

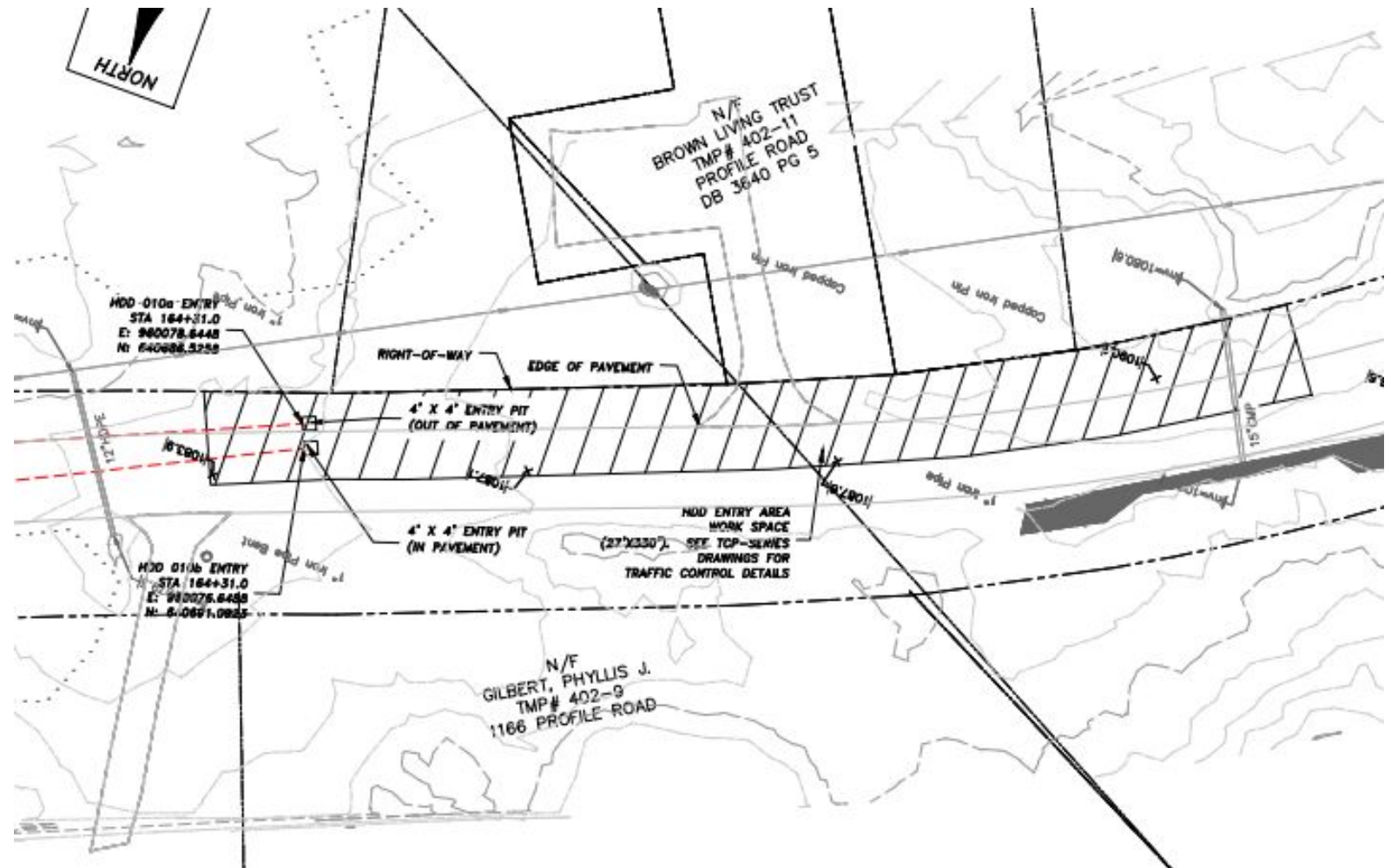
1. Cost assumes rock excavation not required.
2. Costs based on contractual unit pricing for the project.
3. 200 foot minimum length required for the trenching installation is required to accommodate the gradual slope necessary to accommodate the minimum bend.
4. Total estimated increase in trenching 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	(\$135,000.00)	
Deduct for Surface Restoration	900	LF	\$41.00	(\$36,900.00)	
Net Additional Cost				\$2,069,100.00	

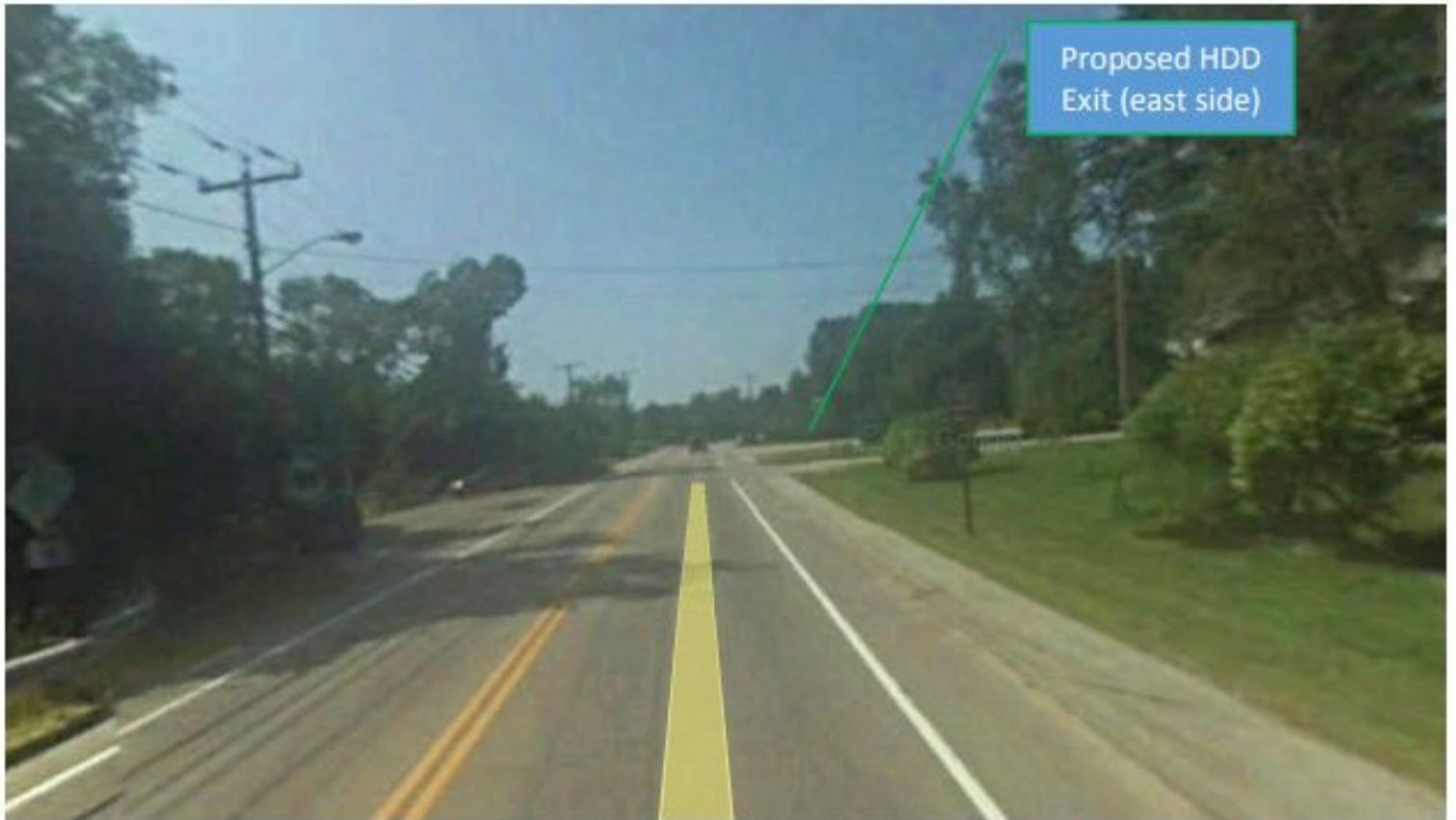
1. Cost assumes rock excavation not required.
2. Costs based on contractual unit pricing for the project.
3. 900 foot minimum length required for HDD installation to accommodate minimum bending requirements.

#10.



Exception Request #101, Bethlehem. ROW shown as 4 rods = 66'

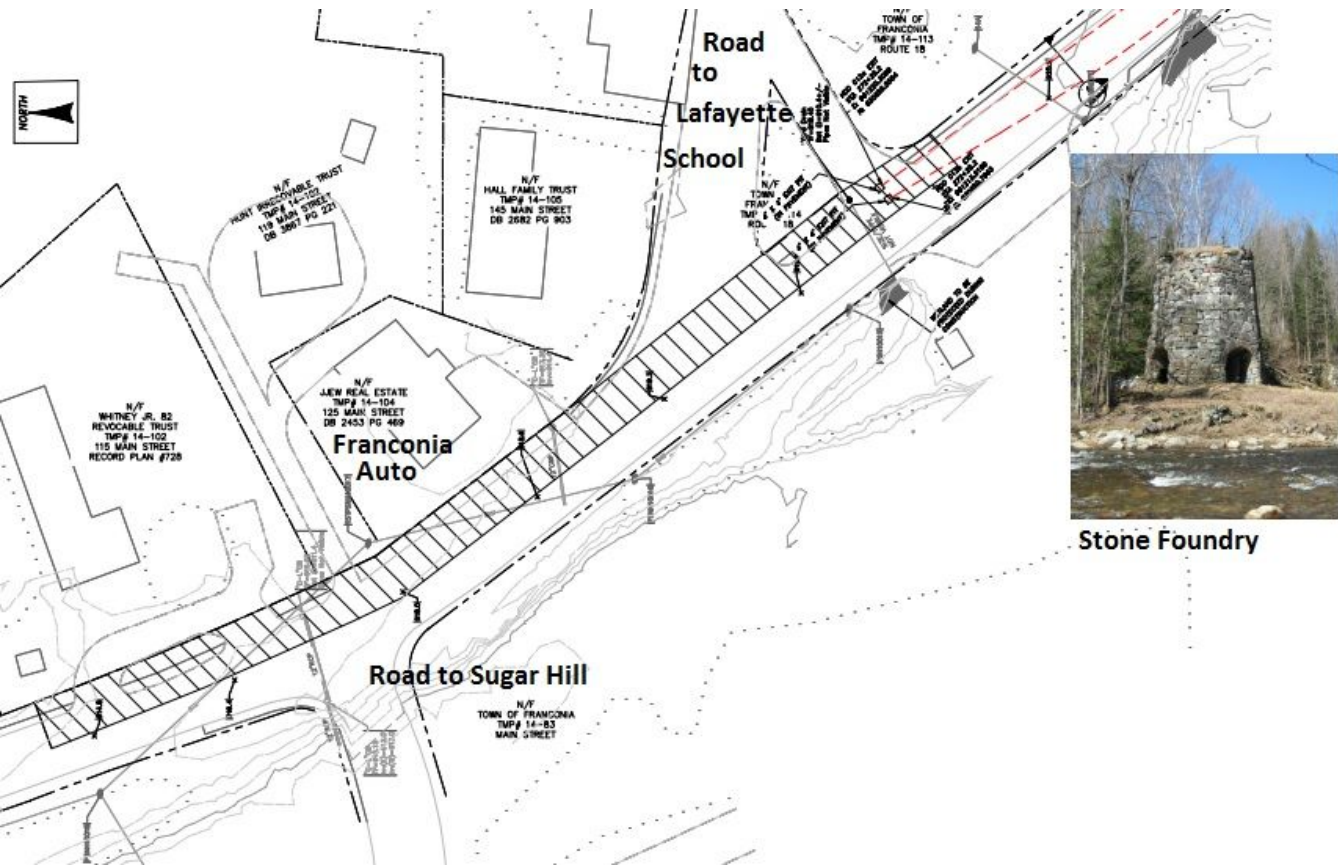
How would this work be done in a 2 rod ROW, per 1871 layout?



Photograph #2 – HDD 012 exit area, facing north.

HDD exit at entrance to Lafayette School, Franconia. Kindergarten through Grade 6
Opposite side of the road is parking lot for viewing the historic Stone Foundry.

#11



HDD workzone, Exception Request #104, Main St. Franconia.

Blocking access to Lafayette, School, road to Sugar Hill, Franconia Auto, Lucy Hall's house, local clinic and close to sensitive historic resource.

#12

ROUTE

(CONTINUED FROM PAGE A5)

signage directing customers to temporary parking, outreach to customers through newspapers and other media, and a special "hotline" and online communications for quick response to problems, should they arise.

We have made a pledge to hire New Hampshire workers first. Workers who, as much as any small business owner along the route, want to see this state succeed. Those workers will need to fill up their gas tanks, grab a meal, wash their clothes, spend the night,

and make other purchases while on the job. These are purchases that will be made in towns along and around the route, and economic data shows spending associated with Northern Pass will boost New Hampshire's economy, not diminish it.

Northern Pass has sent letters and updates to landowners and businesses along the route, asking for feedback and inviting anyone with questions or concerns to give us a call. We are a New Hampshire company with many long-time New Hampshire residents working to bring

more clean energy to the region. We want to see New Hampshire businesses grow and succeed, and are dedicated to working with local officials, meeting with businesses and communicating to residents and tourists alike that their favorite destinations are open for business.

Any business owner who would like to talk to a Northern Pass representative may do so by calling 1-800-286-7305.

Martin Murray is a spokesman for Northern Pass Transmission. He is based in Manchester.

#14

"Those workers will need to... wash their clothes, spend the night."

Martin Murray sees a role for locals in Northern Pass

Littleton Courier, 9/26/17.