

Exception Request No.: 55
Section: WBR3
Town: Thornton
Highway: US 3 (Tier 2)
Station: 1919+43 to 1927+37
Drawing No.: WBR3042-01 and WBR3042-02; WBR3C 152
Survey Report Cross Reference No.: WBR3 C147 to C149
Exception Type: HDD Pits within Pavement
HDD Alignment Passing Under Pavement

Traffic

NHS: No
ADT: 955
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 042 entry and exit pits relative to the existing US 3 pavement limits. HDD 042 extends from approximately STA 1919+43 to 1927+37, and is required to allow installation of the duct below a box culvert. This location involves two separate bores, which are shown crossing below US 3. 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, one of the entry pits and one of the exit pits must be in the paved roadway.

In addition, NPT is requesting an exception from the UAM guidelines to allow the location of the HDD 042 bore paths beneath the US 3 pavement. The HDD bore paths will have no impact on the NHDOT highway structural box.

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 their maximum depth (35 feet) to minimize the risk of interference during drilling, and to accommodate thermal design criteria of the electric cables. The HDD entry and exit points at grade are approximately 10 feet apart, and at least 10 feet from the edge of ROW (for equipment access). (Note: because the typical degree of accuracy with HDD is +/- 5-feet, the bore paths have been designed to maintain minimum separation of approximately 10 feet from each other.)

The following elements are required to construct pits: (i) the center of the 2 entry pits (and the 2 exit pits) must be approximately 10 feet apart at grade; (ii) the 4 foot by 4 foot dimension of each pit; (iii) the need to start the bore at least 10 feet from the ROW edge; and (iv) the need for a level work area for the drill equipment. Consequently, NPT would need approximately 30 feet of level, stable, non-vegetated

clear space from the edge of pavement to the edge of the ROW at the location of the entry pits and approximately 25 feet at exit pits to avoid impacting the paved area entirely.

The alignment of the cable system adjacent to the entry location is on the east side of US 3. The HDD 042 entry location is located on the east side of US 3 due to the availability of work space in this area and to address the NHDOT's comment to avoid road crossings where feasible. (See photograph #1 of entry location in Exhibit A and Sheet WBR3042-01). The west side of US 3 is occupied by wetlands.

There is not sufficient clear space at the HDD 042 entry location to keep both pits off the paved roadway. The distance between the edge of pavement and edge of ROW is approximately 13 feet (less than the required 30 feet), and there are overhead wires in this vicinity which limit the vertical profile of construction equipment.

The HDD 042 exit is located on the east side of US 3. (See photograph #2 of exit location in Exhibit A and Sheet WBR3042-1) Moving the HDD exit to the west side would require additional tree cutting, and an open-trench road crossing (and NHDOT exception approval for such a crossing).

There is not sufficient clear space at the HDD 042 exit location to keep both pits off the paved roadway. The clear space on the east side of US 3 off the paved road is approximately 20 feet (less than the required 25 feet), which is not enough space to keep both entry pits off the paved area. There are also overhead wires in this vicinity which limit the vertical profile of construction equipment.

In summary, given the constraints at this HDD installation, NPT is seeking an exception to allow one of the HDD entry pits and one of the HDD exit pits to be located within the paved area.

Excavation limits and work areas are shown on the attached drawing (WBR3042-02). During construction, one lane will remain open to traffic at all times.

Note: Where the entry and/or exit pits are located in the paved area, the alignment transitions back to the area off the paved roadway over as short an area as possible, consistent with physical constraints at the location, the bending radius of the cable, and the bending radius of the HDD pipe. The precise distance between the location of the pit(s) in the road and the point where the alignment leaves the paved road is location-specific and cannot be stated with technically-accurate specificity until final engineering plans are completed. Under typical conditions, where one entry pit or one exit pit is located within the pavement approximately 5 feet from the edge of the road and there are no physical constraints off the edge of ROW, the transition back to the unpaved area will occur within approximately 50 linear feet of the pit.

HDD Alignment Passing Under Pavement

From Station 1919+43 to 1927+37, one or both of the bore paths are located beneath the pavement, as shown in drawings WBR3C152 attached. The distance between the edge of US 3 pavement and the ROW (plan distance) is approximately 12 to 20 feet on either side of the road. With two (2) bores spaced at 20 feet and an offset of 5 feet from the ROW, it is not possible to avoid drilling beneath the pavement at this location.

The proposed bore paths are placed up to 35-feet below the pavement and well below the pavement structural components of the highway and frost depths. Therefore, the design has no impact on the existing NHDOT facilities because it is below the structural box, frost zone, and all utilities.

The depth of installation and trenchless construction method eliminate risk of settlement differential, pavement distress, or frost heaving that could adversely impact winter maintenance activities or the drivability of the roadway. Similarly, pavement matching concerns do not exist because there is no disturbance to the pavement. Moreover, the trenchless design in each of the requested exception locations is below all existing utilities and drainage structures, thereby eliminating potential for any impacts upon future maintenance activities or operations.

Impacts

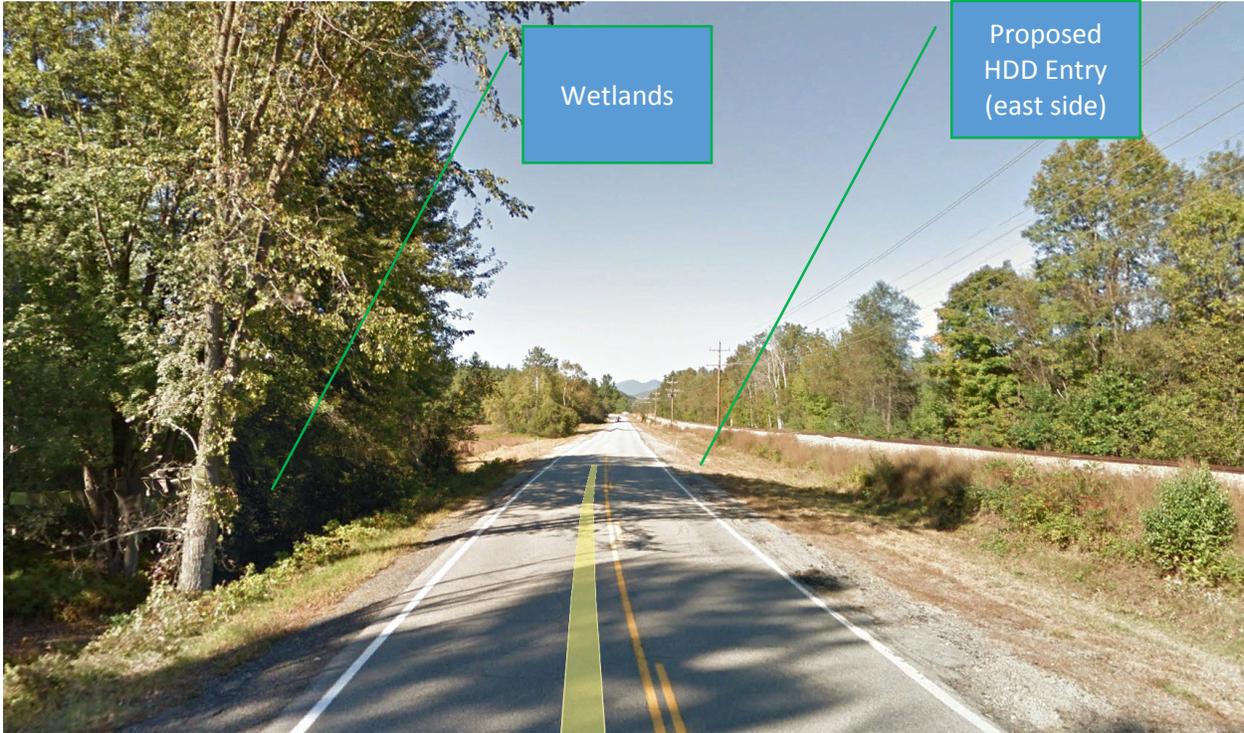
The design, as proposed, will not adversely affect the design, construction, stability, traffic, safety, environmental commitments, maintenance, or operation of US 3. The installation of the ductbank and pavement restoration will be designed and constructed in accordance with conditions outlined in the NHDOT's April 3, 2017 letter to the New Hampshire Site Evaluation Committee. The proposed depth of the installation 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.

As to the portions of the HDD alignment under the NHDOT structural box, the proposed trenchless construction techniques will not impact the structural components of the highway, the frost zone, or other utilities, and therefore the proposed design will not adversely affect the design, construction, stability, traffic, safety, environmental commitments, maintenance, or operation of the highway.

Supporting Documentation

See photographs in Exhibit A. See attached drawing WBR3042-1 showing the proposed HDD design geometry in plan and profile, and WBR3042-02 for workspace limits. Also included for reference is a duct bank drawing (WBR3C152) showing the areas to the immediate north and south of the HDD installation.

Exception Request No.: 55
Exhibit A

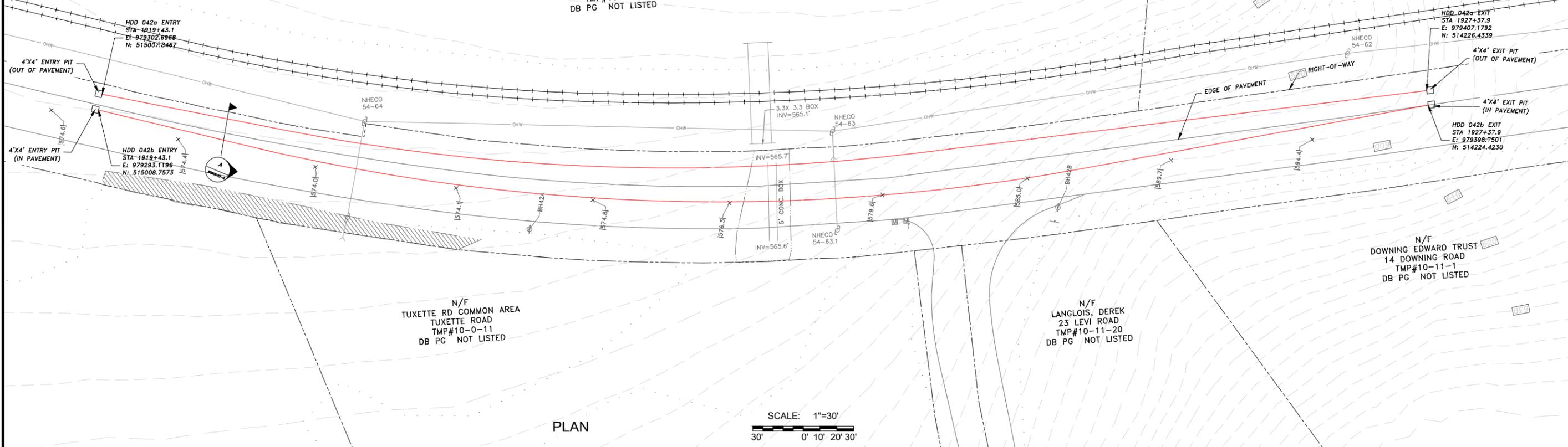


Photograph #1 – HDD 042 entry area, facing north.



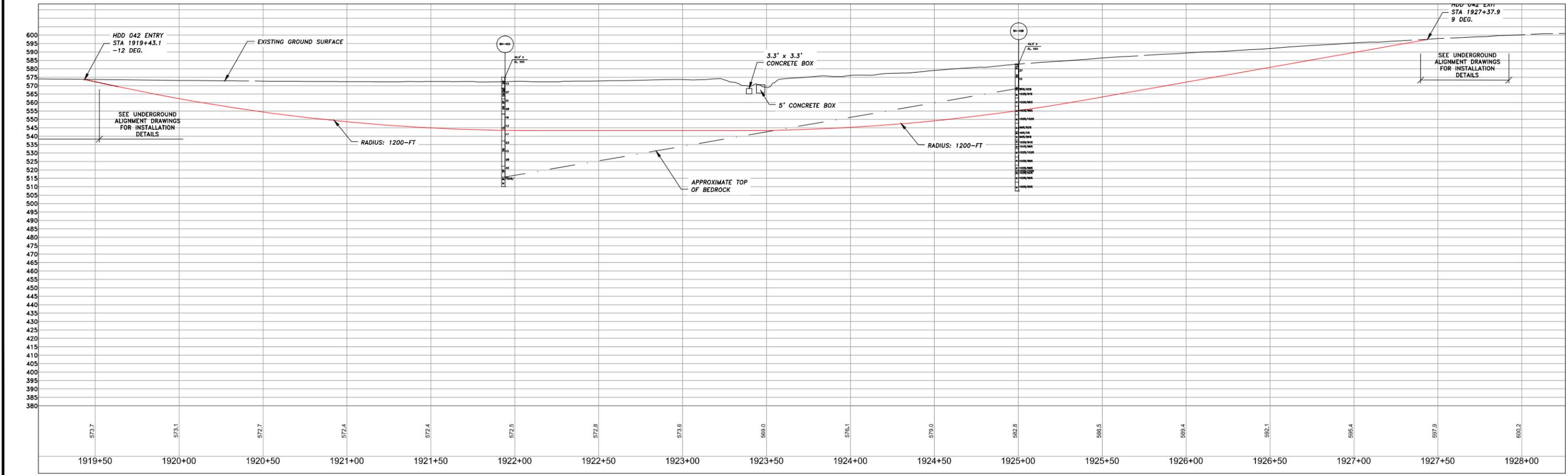
Photograph #2 – HDD 042 exit area, facing north.

N/F
STATE OF NEW HAMPSHIRE
US ROUTE 3
TMP#10-7-2
DB PG NOT LISTED



PLAN

SCALE: 1"=30'
30' 0' 10' 20' 30'



PROFILE

SCALE: 1"=30'
30' 0' 10' 20' 30'

PRELIMINARY - NOT
FOR CONSTRUCTION

| NO. | DATE | BY | CHKD | APPROV. |
|-----|------|----|------|---------|
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BRIERLEY ASSOCIATES
Civil Engineering

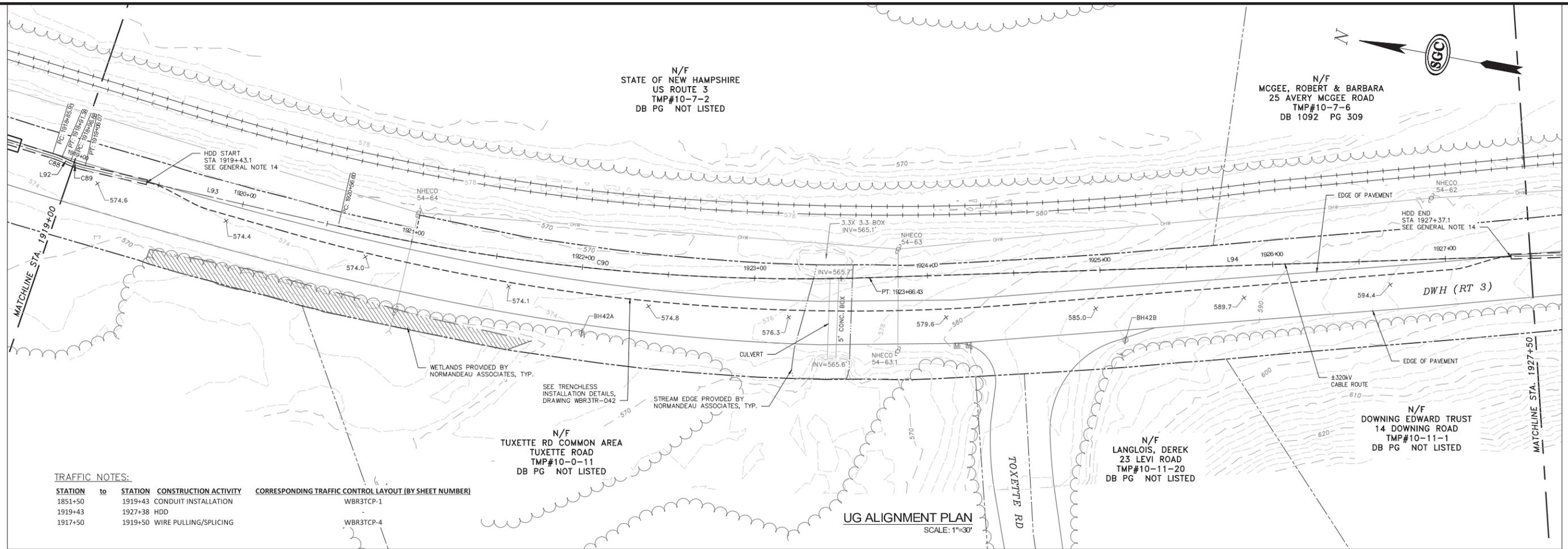
PAR
Professional Engineering

THE NORTHERN PASS
Transmission Business

NPT
UNDERGROUND ALIGNMENT
TRENCHLESS CROSSINGS
SCALE: 1" = 30'
DATE: 10/7/2016

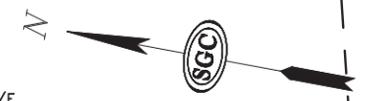
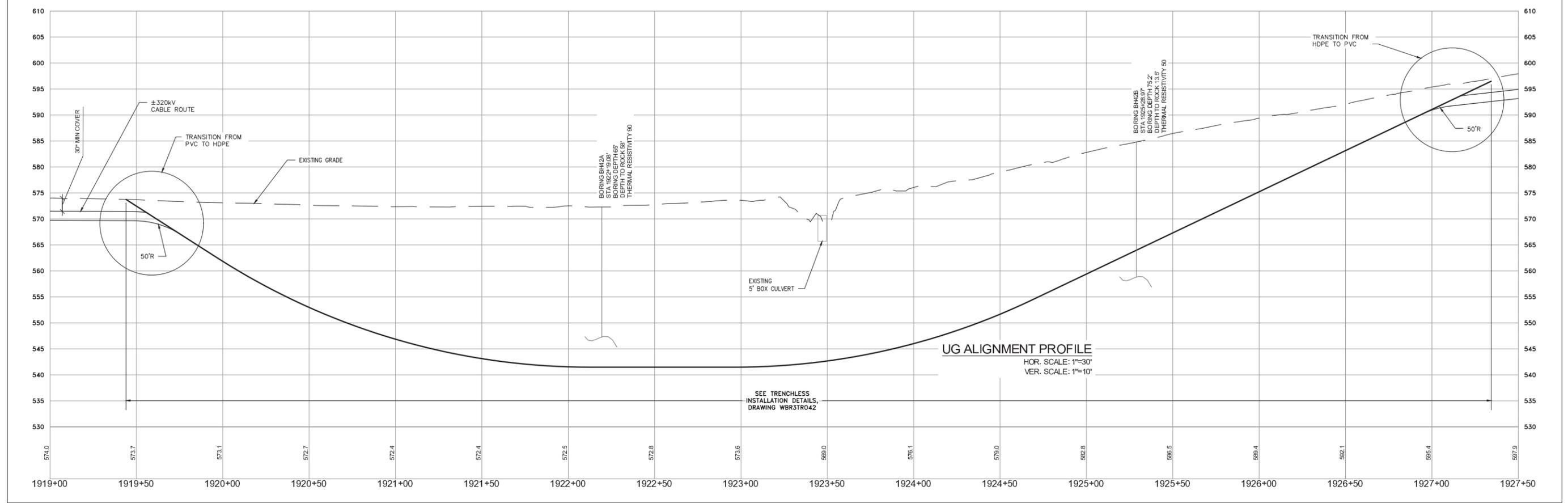
DES: CHK:
DRW: APR:
TOWN:
TRANSMISSION LINE:
WBR3
SHEET
WBR3042-1

PRELIMINARY - NOT FOR CONSTRUCTION



TRAFFIC NOTES:

| STATION | to | STATION | CONSTRUCTION ACTIVITY | CORRESPONDING TRAFFIC CONTROL LAYOUT (BY SHEET NUMBER) |
|---------|----|---------|-----------------------|--|
| 1851+50 | | 1919+43 | CONDUIT INSTALLATION | WBR3TCP-1 |
| 1919+43 | | 1927+38 | HDD | WBR3TCP-4 |
| 1917+50 | | 1919+50 | WIRE PULLING/SPlicing | WBR3TCP-4 |



| NO. | REVISION | DATE | BY | CHKD | APPRV. |
|-----|-------------------|----------|-----|------|--------|
| A | ISSUED FOR REVIEW | 11/28/16 | TDD | TMH | TMH |
| B | ISSUED FOR REVIEW | 10/28/16 | TDD | TMH | TMH |



Transmission Business

NPT
WBR3-UNDERGROUND ALIGNMENT
STA 1919+00 TO 1927+50
SCALE: H: 1"=30', V: 1"=10'
DATE: 10/26/2016
DES: TDD
CHK: TMH
APP: TMH
TOWN: THORNTON

TRANSMISSION LINE:
WBR3

WBR3C152