

STATE OF VERMONT
AGENCY OF TRANSPORTATION

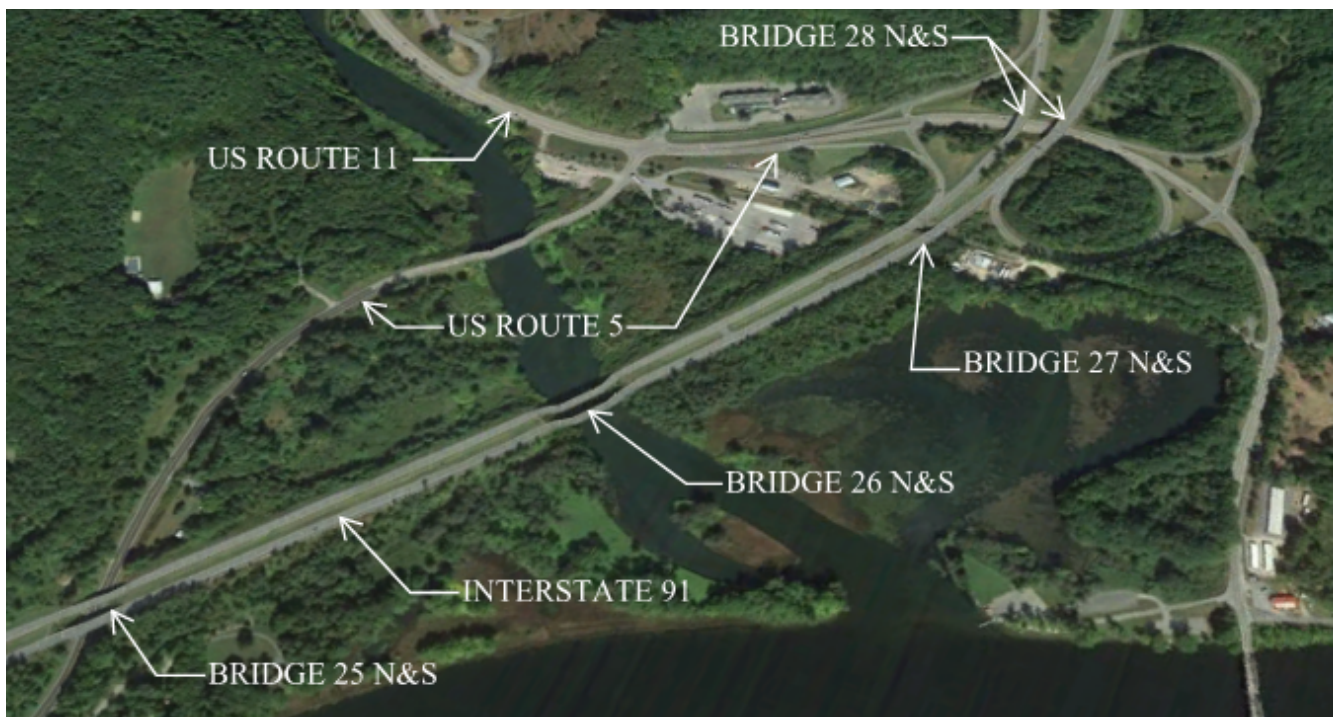
Final Scoping Report

FOR

Springfield IM 091-1(83)

**I-91 Bridges 25 N&S over Route 5, Bridges 27 N&S over the Toonerville Rail Trail
and Related Considerations for Adjacent Bridges 26 N&S and 28 N&S**

November 16, 2023



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I. Project Background and Report Notes

Scoping of Bridges 25 N&S and 27 N&S are being progressed to allow for simultaneous improvements to eight total bridges (four crossings) along Interstate 91 (I-91) in Springfield. All eight bridges, including Bridges 26 N&S and 28 N&S, are located within one mile of each other beginning at the Exit 7 interchange and heading south. Scoping reports for Bridges 26 N&S and Bridges 28 N&S were completed in 2016 and 2020, respectively, by others, and should be referenced for additional discussion and site constraints unique to those bridges. Since bridge improvement projects on each side of Bridges 27 N&S were planned, progressing the scoping efforts and defining a project for Bridges 27 N&S will capitalize on overlapping work zones and maintenance of traffic. Similarly, Bridges 25 N&S were included in this scoping study due to the close proximity to Bridges 26 N&S, allowing for one maintenance of traffic solution to be incorporated through the entire project area.

Although this report focuses on identifying preferred solutions for Bridges 25 N&S and 27 N&S, significant discussion is provided with respect to the overall corridor-wide project due to the influencing constraints and needs at adjacent bridges as well as the need to align maintenance of traffic, construction schedules, and long-term maintenance cycles among all eight bridges. Similarly, the Evaluation Summary Matrix encompasses the entire corridor-wide project to identify a holistic preferred solution.

Complete survey data was not available at the time of this report. Due to this missing information, as well as the numerous maintenance of traffic solutions and their influence on final alignments, proposed layout and profile sheets are not included with this Report.

II. Site Information – Bridge 25

The following site information is specific to Bridge 25 and Bridge 27 can be found in the section that follows. Additional site information for the overall project can be found within the separate scoping reports for Bridges 26 N&S and 28 N&S.

Bridges 25 N&S are located along I-91 approximately 0.8 miles south of the Exit 7 interchange at mile marker 40.9 and cross over Route 5 (Missing Link Road) in the Town of Springfield. The existing conditions were gathered from a combination of a site visit, the Inspection Reports, the Route Log, and Orthophotos. See correspondence in the Appendix for more detailed information.

Roadway Classification	I-91: Principal Arterial – Interstate, National Highway System Route 5: Major Collector
Bridge Type	3 Span Rolled Beam, each
Bridge Lengths	Bridge 25S - 211-ft Bridge 25N – 231-ft
Year Built	1965
Ownership	State of Vermont

Need

Bridges 25 N&S carry I-91 over Route 5. The following is a list of deficiencies of Bridges 25 N&S:

1. While the decks on Bridges 25N and 25S are rated as Satisfactory, they have minor maintenance needs as follows:
 - *Wearing surface:* There are isolated areas of distress and minor cracking along curb lines and near the asphaltic plug joints.
 - *Curbs:* The curbs are concrete with granite facing. The concrete areas of the curbs have small areas of spalling, scaling. The curb ends were recently patched.
 - *Fascia:* The bridge fascias are in fair condition, with scattered areas of spalling, map cracking, and scaling.
 - *Reinforced concrete deck:* The deck has full-depth patched areas, numerous transverse cracks with moderate saturation and efflorescence, and small delamination's scattered throughout. The bottom of the deck was sporadically saturated across the entire width and length, mostly concentrated near the exterior beam lines. Bridge 25S has forms placed in the eastern interior bay over Route 5 to catch possible deck debris.
2. While the superstructures on Bridges 25N and 25S are rated as Satisfactory, they have minor maintenance needs as follows:
 - *Rolled Beams:* The beams have isolated areas of paint failure, predominantly at beam ends and the bottom flange of fascia beams.
 - *Bearings:* Abutment bearings show signs of paint loss, and major rusting and corrosion with scattered missing anchor bolts. Pier bearings show minimal paint loss and rusting.
3. While the substructures on Bridges 25N and 25S are rated as Satisfactory and Fair, respectively, they have minor maintenance needs as follows:
 - *Concrete Backwall:* The backwalls have been significantly patched at all but the northern abutment of Bridge 25S. Unpatched portions of the abutment backwalls continue to show signs of moderate saturation, rust staining, and efflorescence.
 - *Abutment 1 and 2 seat/stem:* The abutments exhibit limited areas of saturation, map cracking, and rust staining.
 - *Wingwalls:* The wingwalls have minor scaling and map cracking with light staining. The tops of the wingwalls appear to have been reconstructed behind the granite curb.
4. The width of Bridges 25N&S is substandard by 8-ft.

Traffic

A traffic study was performed by the Vermont Agency of Transportation in support of the project definition of Bridges 28 N&S, which are considered acceptable for consideration at Bridges 25 N&S. The traffic volumes are projected for the years 2024 and 2044.

Section	AADT		DHV		%T		%D		ADTT		ESALs	
	2024	2044	2024	2044	2024	2044	2024	2044	2024	2044	(2024~2044)	(2024~2044)
NB	8,600	9,400	1,400	1,600	13.8	20.1	100	100	1,500	2,400	10,392,000	23,970,000
SB	4,200	4,700	860	960	13.9	20.3	100	100	830	1,400	5,651,000	13,133,000

The projected 2024 AADT on US Route 5 under Bridges 25 N&S is 1,165 vehicles per day.

Design Criteria

The design standards for this project are the Vermont State Standards (VSS), dated October 22, 1997, A Policy on Geometric Design of Highways and Streets (Green Book), 7th Edition, and the VTrans Structures Design Manual, dated 2018. Minimum standards are based on the traffic volumes and a design speed of 65 mph.

I-91 Design Criteria:

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	AASHTO Section 8.2.4	4' Inside Shoulder 12' Travel Lanes 10' Outside Shoulder	4' Inside Shoulder 12' Travel Lanes 10' Outside Shoulder	
Bridge Lane and Shoulder Widths	AASHTO Section 8.2.8	NB: 3'-12'-12'-3' (30') SB: 3'-12'-12'-3' (30')	NB: 4'-12'-12'-10' (38') SB: 4'-12'-12'-10' (38')	Substandard shoulders
Clear Zone Distance	Roadside Design Guide Table 3-1	30' Without Guardrail	30' Without Guardrail	
Banking	AASHTO Section 8.2.6	NB: N/A SB: N/A	8% (max)	Tangent roadway
Speed	VTrans Roadway Design Manual Section 4-12	65 mph (Posted)	65 MPH (Minimum) 70 MPH (Preferred)	
Horizontal Alignment	AASHTO Table 3-10a	R _{NORTHBOUND} = N/A R _{SOUTHBOUND} = N/A	R _{min} = 1,480' @ 8%	Tangent roadway
Vertical Grade	AASHTO Section 8.2.7	NB: 5.00% (max) SB: 5.00% max)	4% (max) for rolling terrain 5% (max) for mountainous terrain	
K Values for Vertical Curves	AASHTO Tables 3-35 & 3-37	K _{CREST-NB} = N/A K _{SAG-NB} = N/A K _{CREST-SB} = N/A K _{SAG-SB} = N/A	193 crest / 157 sag	Tangent roadway grade.
Vertical Clearance Issues	Vermont State Standards Table 4.8	14'-3"	14'-3" (min)	
Stopping Sight Distance	AASHTO Table 3-1	NB: N/A SB: N/A	645' @ Level	Tangent roadway grade.
Bicycle/Pedestrian Criteria		None	N/A	Bicycles and pedestrians not allowed on I-91
Bridge Railing (and Approach Railing)	Structures Design Manual Section 13.2	2-rail curb mounted box beam	TL-5	Substandard
Structural Capacity	Structures Design Manual Section 3.4.1	Structurally Sufficient (25 N&S)	Design Live Load: HL-93	

Route 5 Design Criteria:

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	Vermont State Standards Table 5.3, 5.8 & HSDEI 15-103	12' Travel Lanes 8' Shoulders	9 to 11' Travel Lanes 3' Shoulders	
Clear Zone Distance	Vermont State Standards Table 5.5	TBD	14' (Fill Slopes) 12' (Cut Slopes)	Existing to be evaluated when survey is available
Banking	Vermont State Standards 5.13	TBD	8% (max)	Existing to be evaluated when survey is available
Speed	Vermont State Standards 5.3	50 mph (Posted)	50 mph	
Horizontal Alignment	AASHTO Table 3-10	1170'	$R_{min} = 758' @ 8\%$	Existing geometry obtained from as-builts
Vertical Grade	Vermont State Standards Table 5.6	3.46%	7% (Rolling Terrain)	Existing geometry obtained from as-builts
K Values for Vertical Curves	Vermont State Standards Table 5.1	145 (Crest) 180' (Sag)	110 (Crest) 90 (Sag)	Existing geometry obtained from as-builts
Vertical Clearance Issues	N/A	N/A	N/A	See I-91 criteria for clearance over Route 5.
Stopping Sight Distance	Vermont State Standards Table 5.1	473'	400' @ Level	Existing geometry obtained from as-builts
Bicycle/Pedestrian Criteria	Vermont State Standards Table 5.7	Bicycles and pedestrians accommodated on 8' shoulder.	3' shoulders for bicycles	

Inspection Report Summary

Bridge	Deck Rating	Superstructure Rating	Substructure Rating	Channel Rating
25N	6	6	6	N/A
25S	6	6	5	N/A

Bridge 25 N:

11/19/2020 – Recent repairs have been made to deck curbs and joints. Deck curbs have been cleaned and patched behind the granite facing. Steel finger joints over abutments have been replaced with asphaltic plug joints with concrete in surrounding areas cleaned and patched. SMP & MAC

5/12/2020 – Finger joints continue to allow leakage to structure below and should be replaced. Heavy concrete deterioration along curblines and fascias should be cleaned and patched. Abutments have areas of scaling / spalling that should be cleaned and patched. Bearings should be repaired, cleaned and reset to allow for proper structure expansion with missing anchor bolts replaced, rust scaling cleaned and repainted and greased bearing areas fixed. SMP & SEP

5/15/2018 – This structure should be considered for a joint replacement project with new joints installed that extend to the fascias. The curbs have scattered areas of spalling with heavy scaling and small voids throughout, concrete repairs are needed. The abutment bearings should be considered for replacement, many swedge bolts have significant section loss or have rotted out. JW/MC

5/12/2016 – This structure needs to have concrete repairs made to the curbs in the surrounding areas of the joints. There is some heavy spalling with exposed reinforcing and these open areas are affecting the substructures below. The finger plate joint at abutment 1 should be considered for replacement with a Vermont joint and new scuppers installed. JW/AC

Bridge 25 S:

11/19/2020 – Recent repairs have been made to deck curbs and joints. Deck curbs have been cleaned and patched behind the granite facing. Steel finger joints over abutments have been replaced with asphaltic plug joints with concrete in surrounding areas cleaned and patched. SMP & MAC

5/12/2020 – Finger joint continues to allow leakage to structure below and should be replaced over abutment #1 and asphaltic plug joint over abutment #2 has heavy transverse cracking and should also be replaced. Abutments have areas of heavy scaling and should be cleaned and patched with worst being on the western side of abutment #2. Bearing #5 over abutment #1 has base plate sliding out of place and should be set back. Curbs should be sealed at both joint areas to prevent further leakage to structure below. SMP & SEP

5/15/2018 – This structure should be considered for a joint replacement project with new joints installed that extend to the fascias. The abutment bearings should be considered for replacement, many swedge bolts have significant section loss or have rotted out. The west end of abutment 2 needs to have concrete repairs made, continued spalling has undermined the fascia beam bearing. JW/MC

5/12/2016 – This structure needs to have concrete repairs made to the curbs in the surrounding areas of the joints. There is some heavy spalling with exposed reinforcing and the open areas are affecting the substructures below. The finger plate joint at abutment 1 should be considered for replacement with a Vermont joint and new scuppers installed. JW/AC

Hydraulics

Bridge 25 N&S is a dry crossing, so hydraulics is not applicable.

Utilities

Aerial Utilities: Approximately 500-ft to the south of the bridges there is an aerial crossing. The poles likely won't require relocation to accommodate the project.

Underground Utilities: Underground utilities do not appear present at the site.

Municipal Utilities: Municipal utilities do not appear present at the site.

Right of Way

The approximate existing Right-of-Way is shown on the Existing Conditions Layout sheet but does not include the immediate vicinity of Bridge 25 or points south of Bridge 25.

Right-of-Way acquisitions are not expected for any work associated with this project.

Resources

The resources at this project are shown on the Existing Condition Layout sheets. The following are excerpts from the respective appendices at the end of the document.

Archaeological:

There are no archaeologically sensitive areas immediately adjacent to Bridges 25 N&S.

Historic:

Proposed work associated with Bridges 25 N&S and associated crossover locations to the south are exempt from Section 106 review, as long as confined to the existing Right of Way.

Natural Resources:

Wetlands/Watercourses

No wetlands or watercourses will be affected due to the work at Bridges 25 N&S.

Wildlife Habitat

Bridges 25 N&S do not have and are not adjacent to any high or medium priority forest blocks. Wildlife connectivity and aquatic organism passage are unlikely to be a concern at this project.

Rare, Threatened and Endangered Species

The only listed species in the project area is the federally threatened and state endangered northern long-eared bat. A habitat assessment and acoustic survey may be necessary to determine reduced time-of-year restrictions.

The footprint of the entire corridor project includes the federally and state endangered aquatic organism dwarf wedge mussel (*Alasmidonta heterodon*) and may include the botanical species Northeastern bulrush (*Scirpus ancistrochaetus*).

Monarch butterfly (*Danaus plexippus*) may also occur in the project area, but they are currently undergoing a review for federal listing and no critical habitat has been designated for them.

Agricultural Soils

Prime Agricultural soils occur in the Project area, which includes Ninigret fine sandy loam, 0 to 8 percent slopes (9B). No agricultural operations are practiced in the Project vicinity.

Hazardous Waste:

The hazardous waste sites located in the project area are shown on the map to the right. There are no hazardous waste sites in close proximity to the Bridge 25 N&S project area. The full Hazardous Waste site map can be seen in the Appendix.



Stormwater:

This project site is not within a designated groundwater public water supply source protection area. The project site is not located within a stormwater (SW) impaired (303(d) list) watershed.

There are no existing stormwater permits near the site area that will be impacted by the project. No formal stormwater treatment is located within the ROW.

It is anticipated that an Operational Stormwater permit will be required for this project.

III. Site Information – Bridge 27

The following site information is specific to Bridge 27.

Bridges 27 N&S are located along I-91 immediately south of the Exit 7 interchange at mile marker 41.5 and cross over the Toonerville Rail Trail in the Town of Springfield. The existing conditions were gathered from a combination of a site visit, the Inspection Report, the Route Log and Orthophotos. See correspondence in the Appendix for more detailed information.

Roadway Classification	I-91: Principal Arterial – Interstate, National Highway System
Bridge Type	Single Span Rolled Beam, each
Bridge Lengths	74-ft, each
Year Built	1965
Ownership	State of Vermont

Need

Bridges 27 N&S carry I-91 over the Toonerville Rail Trail. The following is a list of deficiencies of Bridges 27 N&S:

1. While the decks on Bridges 27N and 27S are rated as Satisfactory, they have minor maintenance needs as follows:
 - *Wearing surface:* There are isolated areas of distress and minor cracking along curb lines and near the asphaltic plug joints.
 - *Curbs:* The curbs are concrete with granite facing. The concrete areas of the curbs have large areas of spalling with deep voids, scaling, and exposed reinforcing. The curb ends surrounding the bridge joints have large spalled-out openings that allow runoff to fall onto the substructures, beam ends, and metal bin walls below.
 - *Fascia:* The bridge fascias are in fair condition, with scattered areas of spalling, map cracking, and scaling.
 - *Reinforced concrete deck:* The deck has full-depth patched areas, numerous transverse cracks with moderate saturation and efflorescence, and small delamination's scattered throughout. The bottom of the deck was sporadically saturated across the entire width and length.

2. While the superstructures on Bridges 27N and 27S are rated as Good, they have minor maintenance needs as follows:
 - *Rolled Beams*: The beams have isolated areas of paint failure, predominantly at beam ends and the bottom flange of fascia beams.
 - *Bearings*: Several bearings show signs of paint loss, and minor rusting.
3. While the substructures on Bridges 27N and 27S are rated as Good, they have minor maintenance needs as follows:
 - *Integral Concrete Backwall*: The integral backwalls (curtainwalls) exhibit sporadic cracking, staining, and delamination's. Accumulated granular material suggests backfill fines are infiltrating between the backwall and bridge seat.
 - *Abutment 1 and 2 seat/stem*: The abutments exhibit limited areas of saturation, map cracking, and rust staining.
 - *Wingwalls*: The wingwalls have minor scaling and map cracking with light staining. The tops of the wingwalls appear to have been reconstructed.
4. The metal bin walls along the trail, providing earth cover for the abutment foundation piles, have widespread corrosion, minor failure throughout, and substantial failure beneath the I-91 median.
5. The width of Bridge 27S is substandard by 8-ft (western shoulder is substandard).
6. The existing bridge geometry limits horizontal and vertical alignment improvements at Bridge 28 N&S and makes maintenance of traffic difficult.

Traffic

A traffic study was performed by the Vermont Agency of Transportation in support of the project definition of Bridges 28 N&S, which are considered acceptable for consideration at Bridges 27 N&S. The traffic volumes are projected for the years 2024 and 2044.

Section	AADT		DHV		%T		%D		ADTT		ESALs	
	2024	2044	2024	2044	2024	2044	2024	2044	2024	2044	(2024~2044)	(2024~2044)
NB	8,600	9,400	1,400	1,600	13.8	20.1	100	100	1,500	2,400	10,392,000	23,970,000
SB	4,200	4,700	860	960	13.9	20.3	100	100	830	1,400	5,651,000	13,133,000

Pedestrian traffic volumes along the Toonerville Rail Trail are not available and are not planned for collection.

Design Criteria

The design standards for this project are the Vermont State Standards (VSS), dated October 22, 1997, A Policy on Geometric Design of Highways and Streets (Green Book), 7th Edition, the VTrans Structures Design Manual, dated 2018, and the AASHTO Guide for the Development of Bicycle Facilities. Minimum standards are based on the traffic volumes and a design speed of 65 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	AASHTO Section 8.2.4	4' Inside Shoulder 12' Travel Lanes 10' Outside Shoulder	4' Inside Shoulder 12' Travel Lanes 10' Outside Shoulder	
Bridge Lane and Shoulder Widths	AASHTO Section 8.2.8	NB: 4'-12'-12'-10' (38') SB: 4'-12'-12'-12'-2' (42')	NB: 4'-12'-12'-10' (38') SB: 4'-12'-12'-12'-10' (50')	Substandard SB outside shoulder
Clear Zone Distance	Roadside Design Guide Table 3-1	30' Without Guardrail	30' Without Guardrail	
Banking	AASHTO Section 8.2.6	NB: 5.8% SB: 8.0%	8% (max)	Existing cross slopes vary widely due to Lidar survey. Cross slopes to be reevaluated with ground survey.
Speed	VTrans Roadway Design Manual Section 4-12	65 mph (Posted)	65 MPH (Minimum) 70 MPH (Preferred)	
Horizontal Alignment	AASHTO Table 3-10a	$R_{NORTHBOUND} = 2,865'$ $R_{SOUTHBOUND} = 1,910'$	$R_{min} = 1,480' @ 8\%$	
Vertical Grade	AASHTO Section 8.2.7 & AASHTO Bike Guide	NB: 3.67% (max) SB: 3.67% max)	4% (max) for rolling terrain 5% (max) on shared use path	
K Values for Vertical Curves	AASHTO Tables 3-35 & 3-37	$K_{CREST-NB} = 210$ $K_{SAG-NB} = 144$ $K_{CREST-SB} = 256$ $K_{SAG-SB} = 144$	193 crest / 157 sag	NB Crest meets for 65 mph but not 70 mph.
Vertical Clearance Issues	AASHTO Bike Guide	20'-6"	10'-0" (min)	10' is the minimum vertical clearance for bikes, however 14' is a consideration for constructability with a sidewalk size paving operation. Ventilation during paving operations also needs to be considered.
Stopping Sight Distance	AASHTO Table 3-1	NB: 673' SB: 744'	645' @ Level	NB meets for 65 mph but not 70 mph (730').
Bicycle/Pedestrian Clear Zone Criteria	AASHTO Bike Guide	>2' Horizontal Clearance	2' Horizontal Clearance	
Bridge Railing (and Approach Railing)	Structures Design Manual Section 13.2	2-rail curb mounted box beam	TL-5	Substandard
Structural Capacity	Structures Design Manual Section 3.4.1	Structurally Sufficient (27 N&S)	Design Live Load: HL-93	

Inspection Report Summary

Bridge	Deck Rating	Superstructure Rating	Substructure Rating	Channel Rating
27N	6	7	7	N/A
27S	6	7	7	N/A

Bridge 27 N:

5/13/2020 – Asphaltic plug joints over both abutments have minor transverse cracking along edges and should be considered for replacement to prevent leakage to structure below. Eastern concrete curb has areas of concrete scaling and should be cleaned and patched. Debris should be cleaned off abutment bridge seats. General cleaning of the paint is needed along the lower flanges at beam ends and bearings should be cleaned and repainted. ~SMP & SEP

5/17/2018 – The curbs have scattered large areas of spalling along the granite facing w/ heavy scaling and deep voids. The curb ends over the abutments have spalled out leaving sections of the granite facing unsupported, concrete repairs are needed. The failed section of the retaining wall below the west fascia needs to be repaired before further erosion occurs. ~JW/MC

5/13/2016 – This structure is in good to satisfactory condition. The curb joint areas over the abutments need concrete repairs. Spalling continues and large voids allow runoff to fall onto the superstructure and substructure below. ~JW/AC

5/15/2014 – Structure is in good condition. However the curbs should be cleaned and patched. ~FRE/TJB

Bridge 27 S:

5/13/2020 – Structure is in fairly good condition having minor deterioration. Older sections of rail and damaged rail should be replaced. Asphaltic plug joints over both abutments have minor transverse cracking along edges and should be considered for replacement to prevent leakage to structure below. Concrete curbing has areas of concrete scaling and should be cleaned and patched. Debris should be cleaned off abutment bridge seats. General cleaning of the paint is needed along the lower flanges at beam ends and bearings should be cleaned and repainted. ~SMP & SEP

5/17/2018 – Scattered small spalls with scaling and small voids along the granite facing. The curb ends over the abutments have spalled out leaving sections of the granite facing unsupported, concrete repairs are needed. The failed section of the retaining wall below the west fascia of the north bound bridge needs to be repaired before further erosion occurs. ~JW/MC

5/13/2016 – This structure is in good to satisfactory condition. The curb joint areas over the abutments need concrete repairs. Spalling continues and large voids allow runoff to fall onto the superstructure and substructure below. ~JW/AC

5/15/2014 – Structure is in good condition. However the curbs should be cleaned and patched. ~FRE/TJB

Hydraulics

Bridge 27 N&S is a dry crossing, so hydraulics is not applicable.

Utilities

Aerial Utilities: Approximately 50-ft to the north of the bridges there is an aerial crossing for a power service, with poles located near the toe of the roadway embankment each side of the interstate. The poles likely require relocation to accommodate the project.

Underground Utilities: A buried duct bank is located beneath the Toonerville Rail Trail between the metal bin walls. Utilities present include FirstLight, Comcast, Vtel and Lumen. The utilities may require relocation or pipe sleeving for ease of future replacement.

Municipal Utilities: No known water or sewer lines exist within the project limits.

Right of Way

The existing approximate Right-of-Way is shown on the Existing Conditions Layout sheet.

Right-of-Way acquisitions are not expected for any work associated with this project.

Resources

The resources at this project are shown on the Existing Condition Layout sheets. The following are excerpts from the respective appendices at the end of the document.

Archaeological:

There are no archaeologically sensitive areas immediately adjacent to Bridges 27 N&S.

Historic:

Work to Interstate 91 bridges at the locations above will most likely be considered Exempt from Section 106 review under the Advisory Council on Historic Preservation's Exemption Regarding Historic Preservation Review Process for Effects to the Interstate Highway System, listed in the Federal Register, Vol. 70; No. 46; 2005.

This pedestrian path (Toonerville Rail Trail) is a Section 4(f) property and all project related impacts to its design, use, and/or function should be avoided. If feasible and safe, this path should remain open during construction.

Natural Resources:

Wetlands/Watercourses

There are wetlands likely present at the southeast quadrant of Bridges 27 N&S.

Both Spencer Brook (adjacent to Bridges 28 N&S) and the Black River (beneath Bridges 26 N&S) are two watercourses that are regulated by the U.S. Army Corps of Engineers (COE) and the Ordinary High Water (OHW) mark is the regulatory boundary. A COE General Permit (GP) will be required for impacts below OHW.

Wildlife Habitat

There is very limited wildlife habitat at this location. Wildlife connectivity and aquatic organism passage are unlikely to be a concern at this Project.

Rare, Threatened and Endangered Species

The only listed species in the project area is the federally threatened and state endangered northern long-eared bat. A habitat assessment and acoustic survey may be necessary to determine reduced time-of-year restrictions.

The footprint of the entire corridor project includes the federally and state endangered aquatic organism dwarf wedge mussel (*Alasmidonta heterodon*) and may include the botanical species Northeastern bulrush (*Scirpus ancistrochaetus*).

Monarch butterfly (*Danaus plexippus*) may also occur in the project area, but they are currently undergoing a review for federal listing and no critical habitat has been designated for them.

Agricultural Soils

Prime Agricultural soils occur in the Project area, which includes Ninigret fine sandy loam, 0 to 8 percent slopes (9B). No agricultural operations are practiced in the Project vicinity.

Hazardous Waste:

The hazardous waste sites located in the project area are shown on the map to the right. There are several hazardous waste sites in close proximity to the project area; however, these sites do not appear to be within the Bridge 27 N&S project limits. The full Hazardous Waste site map can be seen in the Appendix. The influence and accommodation of hazardous waste sites, on this project, should be evaluated if significant changes to the trail profile are implemented and work limits extend approximately 400-ft, or more, west of the existing metal bin walls.



Stormwater:

This project site is not within a designated groundwater public water supply source protection area. The project site is not located within a stormwater (SW) impaired (303(d) list) watershed.

There are no existing stormwater permits near the site area that will be impacted by the project. No formal stormwater treatment is located within the ROW

It is anticipated that an Operational Stormwater permit will be required for this project.

Town Municipalities

The project site is located just east of a satellite maintenance garage. In coordination with the garage, it has been noted that a new facility is being planned, this will require further coordination to ensure no negative impacts to either project.

IV. Safety

Crashes

Crashes from the last 5-year period are shown to the right, encompassing the Bridges 25, 26, 27 and 28 project limits. Each black dot on the map represents a crash.



Interstate 91: There have been 41 crashes located in the project area along Interstate 91 in Springfield within the last 5-year period (2016-2020).

US Route 5: There have been 43 crashes located along US Route 5 and at the I-91 ramps at exit 7 in Springfield within the last 5-year period (2016-2020).

The following High Crash Locations are located within the project area:

High Crash Location Segments:

Route	HCL Year	Town	Mileage	# of Crashes	# of Fatal Crashes	# of Injury Crashes
I-91	2010-2014	Springfield	41.5 - 41.8	11	0	2
I-91	2012-2016	Springfield	40.9 - 41.2	21	0	0
Route 5	2012-2016	Springfield	2.187-2.487	20	0	5
Route 5	2012-2016	Springfield	2.487-2.787	11	0	2

The VTrans Traffic Safety Engineer evaluated the Bridges 27 & 28 project site with the following findings:

High Crash Segment, I-91, MM 41.5 – 41.8: This section of I-91 includes Bridges 27 N&S, 28 N&S, as well as the I-91 NB on and off ramps and the I-91 SB on ramp at exit 7.

Crashes from 2010 through 2018 were reviewed by the VTrans Highway Safety Engineer with the following findings:

“The project area was identified as a high crash location between mile points 41.5 and 41.8 in the 2010-2014 HCL report. The project was not identified as a high crash location in subsequent HCL reports (2012-2016 and draft 2014-2018).

A review of crashes since 2010 indicates that most of the crashes happened in the southbound direction.

From the data available, it appears that the area of the bridge [28S], in the southbound direction, is prone or was prone to black ice and being slippery. The following two statements from crash narratives from two different years are indicative of this: “Interstate 91 was clear and dry in either direction about a mile from the scene”; “The bridge in this area had more slush ice than other areas on the interstate”.

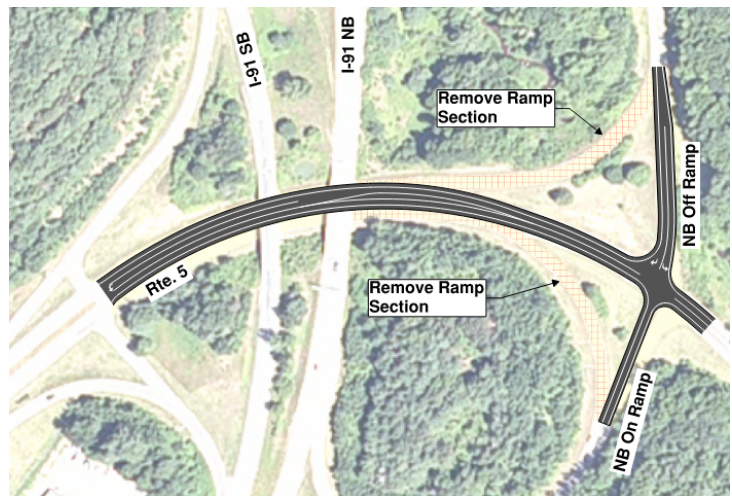
I followed up with the District to see if they had more information about this issue. The District indicated that the bridge has had inherent joint issues and that the plows have to be raised a little so they do not catch the steel joint. They indicated that this tends to leave some residue on the bridge deck at times which could cause ice and did mention that they put salt to all of the bridges at a higher rate.

Because there are several crashes listed at mile point 41 that do not have information (since they are considered non-reportable) but that may well have happened in the area of the bridge, we contacted the VSP Westminster barracks to obtain more details. While some of the more recent “non-reportable” crashes have involved vehicles that slide off, the data is inconclusive as to whether these happened at the bridge.

Based on the above discussion, there has been an issue with the bridge icing (potentially because of issues with the steel joint and the need for the plows to be lifted slightly), and this caused crashes in the past. It is not clear if this type of crash is still happening. The District mentioned that they are putting more salt on the bridges. In light of this, I do not have any suggestions to reduce the frequency of crashes.”

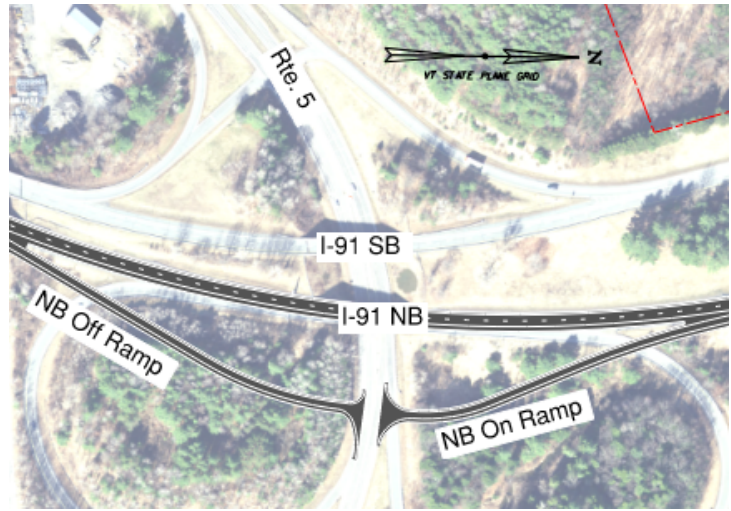
Exit 7 Improvement Opportunities

Just north of Bridges 27N & 27S is the Exit 7 interchange which encompasses Bridges 28 N & S. This interchange has multiple freeway movements including weaves, merge, and diverge areas that increase the potential for driver conflict and therefore results in safety concerns. With the replacement of Bridges 28 N&S, as recommended in the 2020 Bridges 28 Scoping Report, there is the opportunity to remove some of these conflict points by removing the slip lanes to and from Route 5. This scenario results in t-intersections with



the ramps and Route 5, allowing for a narrower Route 5 and ultimately resulting in shorter Bridges 28N and 28S. In addition, the elimination of slip lanes and teeing of the intersection allows for relocation of the Toonerville Rail Trail along Route 5 by providing safer and fewer crossings at the ramps. The new intersections would operate at an acceptable level of service upon opening while also improving safety. Signal warrants are not anticipated to be met and, even under stop conditions during the peak hour, queuing on the ramp is anticipated to be minimal. Additional benefits of removing the slip lanes and narrowing Route 5 are the overall amount of pavement is reduced, stormwater impacts are lessened, and future maintenance costs are reduced. With these numerous benefits, we recommend removing the slip lanes and narrowing Route 5 as the baseline condition and therefore have assumed this for all maintenance of traffic strategies discussed later.

Another opportunity to reduce weave and merge conflicts and improve safety is to remove the northbound clover leaf ramps and replace with diamond interchange ramps. The incorporation of diamond ramps removes the weaving area between the on ramp and off ramp traffic on I-91 northbound resulting in a bridge 12' narrower than the existing. This is not anticipated to reduce the level of service on the mainline or ramps and the newly configured intersection is anticipated to perform acceptably.



A few of the maintenance of traffic alternatives discussed below incorporate the diamond interchange option. Additional benefits to removing the clover leaf ramps are reduced impervious areas by removing existing pavement along the clover ramps and removing two 11' x 11' concrete box culverts, one 430' long and the other 235' long, currently carrying Spencer Brook (Culverts 28-1G and 28-1C).

The existing geometry for the southbound ramps does not meet current design standards. The existing southbound on ramp acceleration length is 465-ft while the minimum standard, based on the ramp radius, is 810-ft when considering grade adjustment. Some of the maintenance of traffic alternatives that were evaluated include: removing the southbound on ramp slip lane, flattening the horizontal curvature to allow for a higher ramp speed, and extending the acceleration lane to meet minimum design standards.

V. Maintenance of Traffic

Maintenance of traffic (MOT) at Bridges 25 N&S and 26 N&S follow the recommendation in the Bridges 26 Scoping report (the use of median crossovers) and do not directly influence the MOT solution at Bridges 27 N&S. The MOT at Bridges 27 N&S is directly influenced by the MOT at Bridges 28 N&S therefore they were reviewed together.

The Bridges 28 Scoping Report investigated and dismissed the MOT solution of an offsite detour coupled with accelerated bridge construction, therefore that solution was not revisited for this Scoping Report. Although several short-term (overnight or weekend) ramp closures may be necessary to complete this project, an overarching goal of the project is to maintain all traffic on site; therefore, no MOT alternative was considered that implemented long-term ramp closures.

As explained later in the report, permanent removal of Bridges 27 is considered and recommended. Permanent removal of the bridges would require relocation of the Toonerville Rail Trail to Route 5 to maintain trail connectivity. Complete discussion can be found in the Structural Evaluations Section - Bridges 27 N&S: I-91 over the Toonerville Rail Trail. Although complete removal of Bridges 27 is recommended later in this report, MOT evaluations discussed in this section make reference to alternate feasible solutions at Bridges 27 such as rehabilitation and replacement for completeness in identifying work that can occur under the respective MOT solution.

Four broad MOT categories were investigated, and each category had multiple alternatives. The alternatives investigated are intended to capture practical combinations of MOT solutions that exist at Bridges 27 and 28 and provide the opportunity to combine desired aspects of different alternatives into one preferred solution. An alternatives matrix, included at the end of the report, is also provided to compare the various aspects of the different alternatives. The MOT categories investigated are:

- Temporary bridge(s)
- Phased Construction
- Off Alignment Construction
- Median Crossovers

Layouts of the following Maintenance of Traffic alternatives can be found in the Appendix.

Category 1: Temporary Bridges

Several different temporary bridge configurations and maintenance of traffic alternatives were evaluated at Bridges 27 and 28 and are summarized below:

Alternative 1A:

This alternative consists of maintaining traffic on two temporary bridges adjacent to each other in the median of Bridges 28 while construction of both Bridge 28 N&S can occur simultaneously. This option takes advantage of the wide median at Bridges 28, which is 85-ft at its narrowest, to accommodate a total of three lanes of traffic. The I-91 SB temporary bridge would be one lane wide, and the I-91 NB temporary bridge would be two lanes wide to accommodate the NB on and off ramps. Traffic south of Bridges 28 will be maintained on Bridges 25, 26, and 27 during the different construction stages. This alternative can be constructed in two main stages, not including the construction of the temporary bridges and approaches, which would have minimal impact on traffic.

Stage 1 consists of crossing northbound traffic to the southbound roadway south of Bridges 25 N&S to construct Bridges 25N, 26N, and 27N. Traffic would then travel from the SB roadway to the temporary bridges, allowing both Bridges 28 N&S to be constructed simultaneously, before crossing back onto their respective bounds. Stage 2 consists of maintaining traffic on the temporary bridges, while construction at Bridges 28 continues. Traffic utilizes the northbound roadway south of Bridges 28 so Bridges 25S, 26S, and 27S can be constructed. The southbound on ramp will need to be temporarily relocated to accommodate construction at Bridge 27S and keep the southbound ramp open. Ramp traffic will then utilize a median crossover to join all traffic on the northbound roadway.

Alternative 1B:

This alternative allows for rehabilitation and removal, but not replacement, of Bridges 27 N&S. The traffic control consists of a two-lane temporary bridge in the median of Bridges 28 and a one lane temporary bridge in the median of Bridges 27. This temporary bridge configuration allows all northbound bridges, 25N, 26N, 27N, & 28N to be constructed concurrently followed by all southbound bridges constructed concurrently. Similar to Alternative 1A, the temporary bridge in the median of bridges 28 would need to be two lanes in order to maintain the northbound on and off ramps in a lane separate from the northbound through traffic. This alternative can be constructed in two main stages, not including the construction of the temporary bridges and approaches, which would have minimal impact on traffic.

Stage 1 consists of crossing northbound traffic to the southbound roadway south of Bridges 25 N&S to construct Bridge 25N & 26N. Northbound traffic would then cross over to the temporary bridges in the median of Bridges 27 & 28 to allow for preservation of Bridge 27N and construction of Bridge 28N to occur before crossing back onto the northbound roadway. Southbound traffic would remain on the southbound roadway during Stage 1. Stage 2 consists of maintaining the southbound traffic on the two temporary bridges and then crossing to the northbound roadway north of Bridges 26 so all southbound bridges can be constructed.

Alternative 1C:

The location of the temporary bridges in this alternative is the same as Alternative 1A with two temporary bridges adjacent to each other in the median of Bridges 28. The differentiator of this alternative is Bridge 27 is replaced by a buried structure or permanently removed and filled in with an earth embankment, allowing traffic to temporarily, utilize the median in Stage 2. This alternative can be constructed in two main stages, not including the construction of the temporary bridges and approaches which would have minimal impact on traffic.

Stage 1 consists of crossing southbound traffic to the northbound roadway to construct Bridge 25S & 26S. Southbound traffic would remain on the northbound roadway through Bridge 27 while Bridge 27S would be partially demolished and a portion of the embankment would be constructed within the median and a portion of the southbound roadway. The southbound on ramp would utilize the portion of Bridge 27S that remains. Both northbound and southbound traffic would then cross over to the temporary bridges, allowing Bridge 28 N&S to be constructed before crossing back into their respective bounds. Stage 2 construction includes crossing northbound traffic onto the southbound bridge south of Bridge 25 to allow for Bridges 25N & 26N to be constructed. At Bridge 27, northbound and southbound traffic would be maintained in the median on the embankment constructed in Stage 1 while remaining work on Bridges 27 N&S advances. Northbound and southbound traffic remains on the temporary bridges in the median of Bridges 28 while construction is completed on Bridges 28 N&S.

Advantages of Category 1 - Temporary Bridge Alternatives:

- Most alternatives are constructed in two stages which minimizes impacts to traffic.
- No impacts to Spencer Brook.
- Most options allow for preservation of Bridge 27. With preservation of Bridge 27, a temporary southbound on ramp does not need to be constructed.

Disadvantages of Category 1 - Temporary Bridge Alternatives:

- Curvature and superelevation transitions of the temporary approaches are difficult to achieve and perhaps not safely practical with the close proximity to Bridges 27 & 28.
- Reconstruction of the approach roadways to the temporary bridges between stages is required due to superelevation requirements. Maintaining traffic during this work will be difficult and may require an off-site detour for approximately one week.
- Opportunity to improve horizontal and vertical geometry is minimal.
- Difficult to safely maintain ramp traffic entering and exiting I-91 at Exit 7.
- Significant temporary roadway and bridge costs.

Category 2: Phased Construction

Phased construction at Bridges 27 and/or 28 was considered as an option for maintaining traffic through the corridor. With phased construction, I-91 NB and SB would be reduced to one lane of traffic in each direction allowing for partial demolition of the existing bridge(s). New bridges would be constructed partially offset from the existing to allow the full width of the proposed bridge to be constructed in one phase. Due to the horizontal geometry of I-91, if Bridge(s) 28 are constructed partially off alignment Bridge(s) 27 would need to be as well.

Alternative 2A:

This alternative consists of constructing Bridges 28 partially off alignment to the west (inside of the curve) and replacing or permanently removing Bridges 27. The interchange will maintain the cloverleaf design for the northbound ramps and the diamond design for the southbound ramps. A portion of the existing ramps will need to be reconstructed to match into the realigned I-91 roadway. With the westward shift of I-91, reconfiguring the southbound on ramp is recommended by removing the slip lane as well as extending the acceleration lane to meet the minimum length per AASHTO.

This alternative would be constructed in three main stages. The crossovers for Bridges 25 & 26 may need to be constructed prior to Stage 1 but would have minimal impact to traffic. Stage 1 consists of crossing southbound traffic onto the northbound roadway south of Bridge 27 to construct Bridge 25S & 26S and then cross back to the existing southbound roadway. Northbound and southbound traffic would remain on their respective bounds (southbound traffic in a single lane) through Bridges 27 & 28 while Bridges 27S and 28S are partially demolished and reconstructed partially off alignment. Partial demolition and construction of Bridges 27N and 28N may also occur during this phase; however, the construction area may be narrow, and this work is assumed to occur in a separate phase.

During Stage 2, no work would be occurring at Bridges 25 & 26, but northbound and southbound roadways will still be reduced to one lane over those bridges to aid in the MOT setup at Bridges 27 & 28. Southbound traffic would be on the newly constructed roadway and Bridge 28S constructed during Stage 1. Northbound traffic would be shifted to the outside of Bridges 27N & 28N to demolish the inside portion of the existing structures and construct the new structure and roadway. A lane dedicated for the northbound ramp movements will be maintained.

Stage 3 would include shifting northbound traffic to the southbound roadway south of Bridge 25 to construct Bridges 25N & 26N. Northbound traffic would then cross back over to the northbound roadway beyond bridge 26 but remain in a single lane utilizing the new roadway and Bridge 28N constructed in Stage 2. A lane dedicated for the northbound ramp movements will be maintained and the remaining portions of those bridges would be demolished during this Stage.

Alternative 2B:

This alternative is the same as Alternative 2A, with the exception of the northbound on and off ramps are converted to a diamond layout as opposed to the existing cloverleaf and therefore Bridge 28N is 12-ft narrower. The phasing also matches Alternative 2A, however the diamond ramps would be constructed in the final stage concurrent with Bridge 25N & 26N construction and therefore are not available to maintain traffic during construction. Temporary ramps would be required to connect the existing cloverleaf ramps to the shifted northbound alignment during construction.

Advantages Category 2 - Phased Construction Alternatives:

- Opportunities to improve northbound ramp geometry.
- Opportunity to improve southbound on ramp geometry.
- Improve I-91 geometry by flattening curves.
- No temporary roadways are required to maintain traffic – Alt. 2A.
- Increase 14'-3" existing vertical clearance for I-91 NB over Route 5.
- Reduces impervious area by removing clover leaf ramps – Alt. 2B.
- Reduced long-term maintenance through removal of approximately 635-ft of concrete box culvert for Spencer Brook beneath the clover ramps (Culverts 28-1G and 28-1C)-Alt. 2B.

Disadvantages of Category 2 – Phased Construction Alternatives:

- Culvert extensions at Spencer Brook on I-91 NB.
- Additional stages resulting in longer construction duration and impacts to traffic.
- Temporary clover ramp connections required to maintain traffic even though diamond ramps will be the final configuration – Alt. 2B.

Category 3: Off-Alignment Construction

The purpose of off-alignment construction is to construct the new bridges offset from the existing so there are essentially no disruptions to traffic while the new structures are built. Due to the horizontal geometry of I-91, if Bridge(s) 28 are constructed off alignment, then Bridge(s) 27 would need to be as well, or at least partially off alignment. With off alignment construction, preservation of Bridge(s) 27 is not an option and a full replacement or permanent removal of Bridge 27 is assumed. Three alternatives were evaluated for off-alignment replacement.

Alternative 3A:

This alternative includes constructing both Bridges 27 (replacement bridge or new embankment) and Bridges 28 off alignment to the west (inside of the curve). The interchange will maintain the cloverleaf design for the northbound ramps and the diamond design for the southbound ramps. A portion of the existing ramps will need to be reconstructed to match into the realigned I-91 roadway. Reconfiguring the southbound on ramp by removing the slip lane is recommended as well as extending the acceleration lane to meet the minimum layout per AASHTO.

The phasing of this alternative would essentially be the same as Alternative 2A and constructed in three main phases with some nuances. The difference between the two alternatives is that Bridges 27 (replacement bridge or new embankment) and 28 are constructed fully off alignment rather than partially off alignment, which is a consideration in maintaining traffic.

Alternative 3B:

This alternative includes constructing Bridge 28S completely off alignment, Bridge 27S (replacement bridge or new embankment) partially off alignment with a phased approach, and Bridges 27N (replacement bridge or new embankment) & 28N on alignment. The existing northbound cloverleaf ramps are reconfigured to a diamond configuration and the southbound on ramp is constructed similarly to Alternatives 2A, 2B and 3A.

This alternative would be constructed in two main stages. A stage preceding Stage 1 would likely be needed to construct the crossovers for Bridges 25 & 26 with minimal disruption to traffic. Stage 1 is essentially the same as 2B except that Bridge 27N needs to be partially demolished in this stage to construct the northbound diamond ramps and Bridge 28S is constructed completely off alignment. Stage 2 includes crossing northbound traffic to the southbound roadway south of Bridge 25 to construct Bridge 25N & 26N and then immediately crossing back over to the northbound roadway. All I-91 northbound traffic will exit the interstate via the newly constructed diamond off ramp and then re-enter via the newly constructed diamond on ramp while Bridges 27N and 28N are constructed on alignment. A temporary traffic signal would be utilized at the intersection of Route 5 and the northbound ramps to manage the mainline traffic volume exiting the interstate. The use of prefabricated bridge elements may be desirable to minimize this stage of construction.

Alternative 3C:

This alternative includes constructing Bridges 28 N&S completely off alignment and replacing or removing Bridges 27 N&S similar to Alternative 3A. The difference with this alternative is that the alignment at existing Bridge 27 will be partially off alignment with a phased approach. The northbound cloverleaf configuration and the southbound diamond configuration will be maintained in the final condition and ramp reconstruction is required to match the new I-91 alignments. Construction phasing will consist of three main stages and is similar to Alternatives 2A and 3A.

Advantages of Category 3 - Off-Alignment Alternatives:

- Opportunities to improve ramp geometry and safety.
- Improve mainline geometry by flattening curves.
- Reduces impervious area by removing clover leaf ramps – Alt. 3B.
- Reduced long-term maintenance through removal of approximately 635-ft of concrete box culvert for Spencer Brook beneath the clover ramps (Culverts 28-1G and 28-1C) – Alt 3B

Disadvantages of Category 3 - Off-Alignment Alternatives:

- Culvert extensions at Spencer Brook – Alt. 3A & 3C.
- Relocation of a portion of Spencer Brook – Alt. 3B.
- Additional stages resulting in longer construction duration and impacts to traffic – Alt 3A & 3C.

Category 4: Median Crossovers

Median crossovers for maintaining traffic for Bridges 25 & 26 is assumed, and for this category, median crossovers are utilized for Bridges 28 as well so the final configuration of I-91 will match existing with the exception of Alternative 4C, which minimizes impacts to Spencer Brook. With this category Bridges 25, 26, 27, & 28 would all be constructed on one bound with traffic crossed over to the other bound and vice versa. Three different alternatives in this category were evaluated.

Alternative 4A:

This alternative involves utilizing a crossover to construct Bridges 28 on alignment while maintaining the existing interchange ramp configurations. This alternative allows for either removal, replacement, or preservation for Bridges 27. The construction phasing allows all eight bridges to be constructed in two main stages. A construction stage preceding Stage 1 would likely be needed to construct the crossover with minimum disruption to traffic. Stage 1 would begin by crossing over southbound traffic to the northbound roadway north of Bridge 28 to construct Bridges 25S, 26S, 27S, and 28S. The southbound on ramp would need to be temporarily relocated to accommodate construction at Bridge 27 and keep the ramp open. Stage 2 construction includes crossing northbound traffic to the southbound roadway south of Bridge 25 to construct Bridge 25N, 26N, 27N, and 28N. The exit 7 northbound on and off ramps would need to be extended to reach the southbound roadway and join the northbound through traffic. This extension requires reconstruction of a portion of the northbound roadway in order to meet required ramp superelevation requirements.

Alternative 4B:

This alternative allows for on alignment replacement of Bridges 28 and removal or replacement of Bridges 27. The difference between this alternative and Alternative 4A is that the northbound ramps would be converted from the cloverleaf configuration to a diamond requiring either replacement or removal of Bridges 27, but not preservation. The phasing is slightly different from Alternative 4A and requires three construction stages. Stage 1 is a short stage consisting of partially demolishing Bridge 27N to allow for the northbound ramps to be constructed in the diamond configuration. There are no impacts to southbound traffic in this stage. Stage 2 includes crossing northbound traffic to the southbound roadway south of Bridge 25 to construct Bridges 25N & 26N. Northbound traffic would stay on the southbound roadway through Bridges 27 & 28 to allow for construction of Bridges 27N (replacement or new embankment) & 28N before crossing back to the northbound roadway. A crossover would be required north of Bridge 26 to allow for northbound off ramp traffic to exit. In Stage 3 southbound traffic is shifted to the northbound roadway north of Bridge 28 to construct Bridges 25S, 26S, 27S (replacement or new embankment) & 28S before crossing back over to the southbound roadway. A temporary ramp and acceleration lane would be required for the southbound on ramp.

Alternative 4C:

This alternative is identical to 4B with the same construction phasing. The key difference is that I-91 northbound would be constructed partially off alignment rather than on alignment. This would allow the northbound on diamond ramp to be constructed without the need to relocate a portion of Spencer Brook. However, there would still be some impacts to Spencer Brook with the culvert extension required to accommodate the partial off alignment shift.

Advantages of Category 4 - Median Crossover Alternatives:

- Preservation at Bridge 27 is possible with Alt. 4A.
- Improvement of ramp geometry and safety for Alt. 4B & 4C.
- Increase vertical clearance for I-91 NB over Route 5 for Alt. 4C.
- Reduced long-term maintenance through removal of approximately 635-ft of concrete box culvert for Spencer Brook beneath the clover ramps Alt. 4B & 4C (Culverts 28-1G and 28-1C).

Disadvantages of Category 4 - Median Crossover Alternatives:

- Culvert extensions at Spencer Brook.
- Relocation of a portion of Spencer Brook – Alt. 4B.
- Additional stages resulting in longer construction duration and impacts to traffic.

Other Considerations for Maintenance of Traffic:

The existing northbound grade approaching Bridge 25 is a (5%) downgrade resulting in concerns of truck speeds approaching the median crossover. Three crossover alternatives were evaluated at this location:

- The first alternative was designed for 55 mph and has reverse curves to shift the northbound traffic to the southbound barrel. This is the shortest crossover of the three options at approximately 600' long.
- The second alternative was designed for 65 mph which matches the posted speed. This alternative also has reverse curves with flatter radii and has an overall length of 800'.
- The last alternative is also designed for 65 mph, and instead of reverse curves it takes advantage of the diverging geometry of the northbound and southbound barrels and is mostly a tangent and has one curve. This crossover is about 1,800' long, however it will likely avoid the ledge outcrop in the median unlike the other two alternatives, helping to offset some of the cost of a longer crossover. Alternative 3 is the preferred alternative due to the ability to maintain the posted speed and eliminating the need for reverse curves which are important considerations due to the 5% downgrade on the northbound roadway.

Some of the temporary ramp geometry required to maintain ramp movements for certain alternatives and stages of construction were undesirable. For this reason, temporary ramps where Route 5 crosses under I-91 (Bridges 25) were investigated as a potential solution. Due to right of way constraints and maximum grade criteria exceeded, temporarily relocating the ramps to this location was dismissed.

Construction of a temporary or permanent relocated northbound on ramp that runs along the existing northbound off ramp at Exit 7 was considered to eliminate the shorter weave distance in some of the MOT scenarios or eliminate the weave permanently. Some of the disadvantages to this configuration are temporary impacts to Spencer Brook and challenging topography which results in large cuts and likely rock excavation. While these could still be viable options, and are included graphically in the Appendix, some of the alternatives considered have fewer impacts.

VI. Structural Evaluations Discussion

Although the focus of this Scoping Report is specific to Bridges 25 N&S and 27 N&S, these bridges are planned to be improved in a single construction project concurrently with Bridges 26 N&S and 28 N&S and therefore cannot be discussed independently. Scoping Reports for Bridges 26 N&S and 28 N&S were prepared by others in 2016 and 2020, respectively. In support of this project to align construction schedules, maintenance of traffic, and future maintenance cycles, recommendations set forth in the Bridges 26 N&S were revisited to confirm a preferred solution. A summary of Bridge 26 N&S evaluations and the recommendations from the Bridge 28 N&S Scoping Report are provided here for complete project perspective.

Bridges 25 N&S: I-91 over Route 5

While Bridges 25 N&S are not structurally deficient, there are moderate maintenance needs as described in the Needs section. The following outlines a general maintenance history of the structures for context in this discussion:

- 1965: The bridges were constructed with a 7½” composite concrete deck and 1½” of pavement, but without a waterproofing membrane.
- 1985: The bridge railings were removed and replaced. No work to bridge curbs or pavement occurred. Tops of wingwalls were removed and recast.
- 1987: Pavement fully replaced with 1¾” of pavement, waterproofing membrane installed, and approximately 1% of the deck area for Bridge 25N was patched according to record plans. Bridge 25S had ½” of the deck also removed and a 2” concrete overlay placed.
- 2008: The southbound bridge surface pavement (¾”) was milled and overlaid, and asphaltic plug joints installed. No work to bridge railings, curb, membrane, or deck patching.
- 2011: The northbound bridge surface pavement (1¼”) was milled and overlaid, and asphaltic plug joints and finger plates installed. No work to the bridge railings, curb, membrane or deck patching.
- 2020: Joints over abutments were replaced with asphaltic plug joints, with replacement of abutment backwalls, except the northern abutment of Bridge 25 S, and deck ends. Deck curbs were patched and cleaned behind the granite.

As identified above, the bridge pavement has been replaced every 20-25 years since original construction, which suggests the pavement on the bridges will require replacement within approximately another 10-years.

Maintaining a common maintenance cycle for the northbound and southbound bridge is desirable; therefore, the recommended scope for Bridge 25N should be the same for Bridge 25S. Matching general maintenance cycles with Bridges 26 N&S, located approximately 1,600-ft to the north, may also be advantageous to minimize future disruptions to traffic and minimize costs associated with mobilization and traffic control measures.

Vertical Clearance Considerations

The existing minimum vertical clearance is 14'-3" for Bridge 25S and 17'-5" for Bridge 25N; however, the clearance is currently posted for 14'-0". Although the current vertical clearance meets current standards, a simple pavement overlay project along Route 5 would reduce the clearance below standard.

Improvements to the vertical clearance cannot easily be achieved by raising the grade of I-91 since the interstate is currently at its 5% maximum profile grade through the site. The most straightforward method to improve to the vertical clearance is through adjustments to Route 5, such as lowering the roadway grade or horizontally shifting the roadway to the south (uphill side of I-91).

Incremental adjustments to the Route 5 profile were evaluated in support of this project, including approximate roadway work limits and construction costs as shown in the table below. If a bridge replacement option is advanced, a single span structure would likely be advanced which would require a deeper superstructure and corresponding lowering of Route 5 to maintain or improve vertical clearance. The Bridge Replacement alternative assumes a 2'-0" lowering of Route 5 and is included in the alternative costs for comparison. However, since the current vertical clearance is not technically substandard, costs associated with Route 5 profile adjustments are not included with structural alternatives that maintain/reuse the existing substructure elements.

Route 5 Profile Adjustment	Length of Impact	Approximate Cost
0'-6"	675'	\$410,000
1'-0"	800'	\$480,000
2'-0"	1000'	\$600,000

The following Options were evaluated with respect to the needs of Bridges 25 N&S and to best align future maintenance cycles with Bridges 26 N&S, 27 N&S, and 28 N&S:

- No Action
- Option 1: Rehabilitation
- Option 2: Deck Replacement
- Option 3: Deck Replacement and Structure Widening
- Option 4: Bridge Replacement

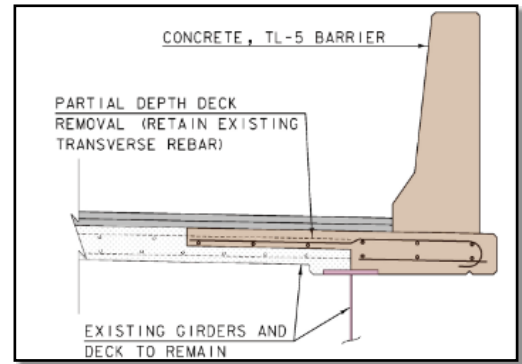
No Action

This option would involve sustaining the bridges in their current condition. A good rule of thumb for the "No Action" option is to determine whether the existing bridge can stay in place without any work being performed on it during the next 10 years. While Bridges 25 N&S are in fair to satisfactory condition, there are maintenance issues that should be addressed concurrently with work at Bridges 26 N&S, 27N&S and 28 N&S in order to extend the useful life of the structures and reduce the rate of future deterioration, most notably joint and bearing reconstruction. Since some work is required within the next 10 years, the No Action option will not be considered further in this report.

Option 1: Rehabilitation

This rehabilitation option includes the minimal amount of work necessary to address maintenance needs, correct substandard features, and extend the useful lives of the bridges. While the substructure, superstructure, and deck are rated as being in fair to satisfactory condition, there are maintenance issues that should be addressed. A rehabilitation for the bridges is recommended to include the following:

- Remove and replace the waterproofing membrane and pavement.
- Remove and replace the deck overhangs, curbs, and rail system as shown in the detail to the right. Overhang removal, with partial removal into the first girder bay, will be necessary to properly reinforce a TL-5 barrier.
- Patch the remaining portions of the concrete deck (approximately 15% of deck estimated to be patched based on visible full-depth patches, cracking, and moisture).
- Replace the bridge joints with asphaltic plug joints at the southern abutment and compression or strip seals at the northern abutments.
- Replace all abutment bearings.
- Patch the abutments and wingwalls (<10% of total surface area anticipated).
- Patch the piers (minimal patching anticipated).



Based on the repairs listed above, it is reasonable to assume the existing substructure and beams can safely carry anticipated traffic loads for an additional 20 to 25 years, without significant maintenance during that period. Although field painting the girders is not listed above, nor included in cost estimates presented later in this section, this work will likely be necessary within the next 20 years.

Also noteworthy is the existing decks are approximately 56 years old and received rehabilitation 33 years ago – Bridge 25N received deck patching and Bridge 25S a 2-inch concrete overlay. When the existing membrane is removed, there is a reasonable probability the uncovered deck will require significant patching to preserve the bridge. If the deck is not replaced as part of this project, deck replacement will likely be necessary in approximately 20 years.

The current curb to curb width of Bridges 25 N&S is approximately 30 feet. The width of both bridges is substandard by 8-ft. The shoulders may be increased slightly through railing replacement with a narrower system than existing; however, an additional girder line and substructure widening would be needed to meet current bridge width standards.

Advantages: This option provides the lowest upfront cost to extend the life of the structure.

Disadvantages: Maintaining the current out to out width of Bridges 25 N&S restricts significant improvements to the substandard shoulder widths. Expansion joints and bearings will continue to be long-term maintenance concerns and the aging substructure will continue to require additional maintenance compared to an integral abutment replacement structure.

Maintenance of traffic: This work can be accomplished with single lane closures utilizing phased construction on I-91. This work can occur separately from bridge improvements at Bridges 26 N&S and concurrently with the construction of other temporary maintenance of traffic solutions, such as median crossovers and temporary bridges.

Option 2: Deck Replacement

This option includes the same improvements as Option 1 and also includes complete deck replacement. Additionally, the backwalls could be completely removed and replaced with integral backwalls to remove open joints to reduce future maintenance. This consideration will be evaluated further in final design and was not progressed at this phase. With these repairs, it is reasonable to assume that the existing substructure and beams can safely carry anticipated traffic loads for an additional 40 years.

Advantages: This option would provide additional improvements compared to Option 1 and better align future major maintenance projects with Bridges 26 N&S, 27 N&S and 28 N&S. The curb-to-curb width of the existing bridges would be slightly widened through the use of a narrower railing system. Risk associated with unknown deck patching extents and associated construction cost is removed.

Disadvantages: The decks are in Satisfactory condition and may not warrant immediate replacement. The resulting right-hand shoulder width will continue to be substandard by approximately 6-ft.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

Option 3: Deck Replacement and Bridge Widening

This option is similar to Option 2, Deck Replacement, and also includes widening of both structures approximately 8-ft to the outside of I-91 to meet current shoulder width standards.

- The existing outside wingwalls of both bridges would be removed, abutment foundations extended in-kind with driven H-piles, remaining abutment widened to accept the wider superstructure, including new wingwalls.
- The pier caps would be extended and supported with an additional pier column and spread footing foundation at each pier. This work would require significant earth retention systems immediately adjacent to Route 5.
- The existing superstructure would be widened with one additional girder line and a full deck replacement. The additional beam would likely be spaced approximately 6-ft from the current fascia beam; whereas the remaining beams are spaced at 7.5-ft. Field drilling to connect diaphragms is anticipated, which may require field paint touch-ups.

Similar to Option 2, it is reasonable to assume that, with the repairs listed above, the existing substructure and beams can safely carry anticipated traffic loads for an additional 50 years.

Advantages: This option would provide additional improvements compared to Option 1 and better align future major maintenance projects with Bridges 26 N&S, 27 N&S and 28 N&S. Compared to Option 2, the curb-to-curb width of the existing bridges would be widened to meet current standards.

Disadvantages: The incremental cost to widen the shoulder across the bridge is significantly greater than Option 2. Additionally, either the route 5 profile under the bridge would need to be lowered or a girder shallower than existing utilized since the widening of the bridge would further encroach on the vertical clearance.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

Option 4: Bridge Replacement

This option would replace the existing bridges with new superstructures as well as new substructures. The various considerations under this option include: the bridge width, length, skew, superstructure type and substructure type.

a. Bridge Width

The current curb to curb width of Bridges 25 N&S is approximately 30 feet wide, which is substandard by 8-feet. Since a new 100-year bridge is being proposed, the bridge geometry should meet the minimum standards. As such, the standard typical sections of 4'-12'-12'-10' (38' curb-to-curb) is proposed.

b. Bridge Length and Skew

The existing bridges are 210-ft and 225-ft for southbound and northbound bridges, respectively. Both bridges are three span bridges with a skew of approximately 45 degrees. The replacement structure would incorporate a similar overall span length as existing; however, lengthening the bridge to reduce or remove the high skew could also be considered, but is not included in the estimated cost presented herein. The exact span length would be determined during the next phase of project development.

c. Superstructure Type

The most economical superstructure type for this span is likely a weathering steel girder superstructure with a cast-in-place composite concrete deck. Prestressed concrete beams could also be considered, but would require additional substructure units or increased improvements to vertical clearance to accommodate deeper girder depths associated with concrete girders. Final structure type and beam spacing would be selected in future phases.

The current vertical clearance under the southbound bridge is approximately 14.25-feet to the underlying roadway. Therefore, with the structure depth likely increasing, modifications to Route 5 would be required.

d. Substructure Type

The existing abutments are founded on steel piles. Based on the record plans, bedrock appears to be approximately 25 to 40-feet below the I-91 road surface and subsurface material generally consists of sands and silts. Due to bridge geometry and sufficient depth to bedrock, integral abutments should be considered to eliminate bearings and open expansion joints. Sufficient subsurface information should be obtained in design to verify the in-situ conditions and confirm the substructure and foundation type.

Advantages: This option provides the longest service life and is able to meet all geometric requirements including bridge width and vertical clearance above Route 5.

Disadvantages: The condition of the bridges, considered by themselves, do not currently warrant replacement. The cost of the alternative is the largest for both initial cost and annualized cost.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

Bridge 25 N&S Summary

The table below summarizes the estimated construction and removal bridge costs for Bridges 25 N&S options (total for both bridges). Note the costs shown are only bridge costs for comparison purposes and do not include associated costs such as roadway, traffic control, or engineering. Route 5 roadway adjustments to increase the vertical clearance is included in the Bridge Replacement option (Option 4) only since this is the only option that requires an adjustment. Also note that the cost for painting the existing girders is not included in the table below since this is likely not needed for 20 years, future painting is estimated to be approximately \$315,000 per bridge.

Option	Bridge Removal	Bridge Cost	Service Life	Annualized Cost
Option 1: Rehabilitation	\$120,000	\$1,012,000	20	\$56,600
Option 2: Deck Replacement	\$609,000	\$1,853,000	40	\$61,550
Option 3: Deck and Widening	\$609,000	\$2,928,000	50	\$70,740
Option 4: Bridge Replacement	\$1,008,000	\$7,656,000	100	\$86,640

Option 2, Deck Replacement, is recommended for advancement due to the similar annualized cost to the rehabilitation option, reduced construction risk by replacing the deck instead of repairing, and better aligning maintenance cycles with the other projects along the corridor that are noted within this report. The annualized costs between rehabilitation and deck replacement are similar, with the deck replacement providing a longer service life and improving structure details at the abutment to relocate/eliminate expansion joints with an integral backwall. The deck replacement option is carried forward as the preferred solution at Bridges 25 N&S for consideration with the remainder of the corridor-wide project.

Bridges 26 N&S: I-91 over the Black River

The recommendations identified in the 2016 scoping report for Bridges 26 N&S generally concluded that a deck replacement, pin-and-link and hinge replacement with continuous field splices, bearing replacement, expansion joint replacement/relocation, and substructure patching was the preferred solution. These recommendations were made to improve structure resiliency by eliminating fracture critical details and improve performance of the structure in the event of an earthquake. Since this report was developed five years ago and the recommended improvements include temporary works with moderate levels of field work and risk, three options are being revisited as follows:

- Option 1a: Deck Replacement with Field Splices
- Option 1b: Deck Replacement with Central Span Replacement
- Option 2: Superstructure Replacement

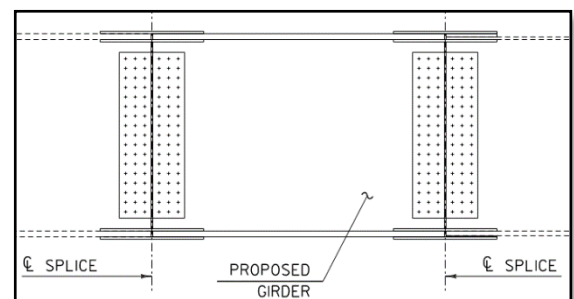
Common to each of these options are bearing replacement with elastomeric bearings (due to changes in substructure fixity), expansion joint relocation, bridge barrier replacement with a TL-5 barrier, and substructure rehabilitation. Replacement of the bridge railing will improve the shoulder widths from 3-ft to approximately 4-ft without increasing the out-to-out width of the bridges and their return wingwalls. Consideration of bridge widening to obtain 10-ft right shoulders was not considered in this report since this was studied and dismissed in the previous scoping report. Additionally, specific seismic retrofitting analyses were not considered during this phase since it appears the structure is located in Seismic Zone 1 – additional geotechnical evaluation will be necessary to confirm a Site Classification of D or better.

Additional recommendations, not identified in the 2016 scoping report, include replacing the abutment backwalls with integral backwalls, approach slab replacement, correcting the undermined abutment foundation of the BR 26N northern abutment, and infilling the sloughing riprap that is partially exposing remaining abutment foundations to prevent future undermining.

All work is expected to be completed utilizing temporary median crossovers to maintain traffic in conjunction with maintenance of traffic across other bridges in this project.

Option 1a: Deck Replacement with Field Splices

This deck replacement option involves the removal of the existing pin and link system, used to suspend the majority of the central bridge span, with four continuous field splices per girder line (two field splices per pin and link location as shown to the right).



General Sequence of Work and Schedule

Progression of this work can occur from the top of the deck using strong backs or from beneath the deck using temporary towers and jacks. Each of these construction approaches have advantages and disadvantages. Top-down construction will eliminate channel impacts but require additional attention to sequence of work and overall fit-up, whereas temporary towers may eliminate risk and sensitivity to operations but requires in-water work. To avoid the cost and impacts associated with temporary access within the channel, a top-down approach is assumed for the following discussion.

Replacing the existing pins will need to follow a linear and sequential progression of work, assumed as follows:

- Remove the deck and shear connectors between pin and link and hinge system.
- Install strong-backs transverse to the bridge and adjacent to the proposed field splice locations (4 total).
- Remove the pin and link system from girders 1 and 5, each end of the span.
- Carefully measure and cut the existing girders to accept new girder inserts and field splices.
- Release bearing fixity at the abutments to allow for adjustments while installing girder segments.
- Install girder sections (ten total, approximately 10' long) and perform field drilling to install field splices. Temporary supports may be necessary for fit up of field splices. Bolts should only be snug tightened during this phase to avoid locked-in stresses from subsequent operations.
- Repeat the above three steps for girders 2, 3, and 4 after completion of field splices for girders 1 and 5.
- Perform paint touch-ups around the field splices.
- Remove the remaining deck and shear connectors.
- Fully tighten the field splice bolts.
- Jack the girders to replace bearings.
- Remove the abutment backwalls.
- Proceed with typical deck construction operations and substructure patching.

The overall construction schedule, per bridge, is estimated to be eight to nine months once traffic is removed from the bridge. Depending on final details and start date, seasonal limitations may prohibit paving on the bridge until the following year.

Advantages

This option can be accomplished without significant impacts to the river, although access to the piers for repairs and bearing replacement may still impact the river. This option also retains the majority of the existing steel beams compared to other options.

Disadvantages

The sequential construction requires significant field and shop coordination to ensure fit up of the multiple field splices while accommodating thermal movements of the girders. The existing girders will need to be field painted in approximately 10-15 years based upon current conditions. Efforts to replace bearing, rehabilitate the abutments, and repair the riprap slope are difficult and more time consuming with the existing girders present. The overall construction duration may not allow the bridge to be paved prior to winter and the desirable time to place traffic back on the bridge.

Option 1b: Deck Replacement with Central Span Replacement

This deck replacement option involves the removal of the existing pin and link system and replacement of the central girder segment using two continuous field splices per girder line (one field splice per pin and link location).

General Sequence of Work and Schedule

Progression of this work is best accomplished from the top of the deck using cranes to remove and replace the girder segments.

Similar to Option 1A, this work will need to follow a linear and sequential progression, assumed as follows:

- Remove the deck and shear connectors between the pin and link systems.
- Working from span 1 or 3, remove the central girder segments and carefully cut/remove the pin and link girder ends.
- Release bearing fixity at the abutments to allow for adjustments while installing girder segments.
- Install new girder segments (five total, approximately 100' long) and perform field drilling to install field splices. Temporary supports or crane support will be necessary for fit up of field splices. Bolts should only be snug tightened during this phase to avoid locked-in stresses from subsequent operations.
- Perform paint touch-ups around the field splices.
- Remove the remaining deck and shear connectors.
- Fully tighten the field splice bolts.
- Jack the girders to replace bearings.
- Remove the abutment backwalls.
- Proceed with typical deck construction operations and substructure patching.

The overall construction schedule, per bridge, is estimated to be seven to eight months once traffic is removed from the bridge – approximately one month quicker than Option 1a due to less sequential work and less field drilling. Depending on final details and start date, seasonal limitations may prohibit paving on the bridge until the following year.

Advantages

This option can be accomplished without significant impacts to the river, although access to the piers for repairs and bearing replacement may still impact the river. This option retains significant portions of the existing steel and compared to Option 1b, reduces the number of new field segments to handle and fit with existing steel, and magnitude of field drilling and paint touchups.

Disadvantages

The sequential construction requires significant field and shop coordination to ensure fit up of the field splices while accommodating thermal movements of the girders. The existing girders will need to be field painted in approximately 10-15 years based upon current conditions. Efforts to replace bearing, rehabilitate the abutments, and repair the riprap slope are difficult and more time consuming with the existing girders present. The overall construction duration may not allow the bridge to be paved prior to winter and the desirable time to place traffic back on the bridge.

Option 2: Superstructure Replacement

This option involves complete removal and replacement of the superstructure. To best reuse the existing substructure, the replacement superstructure is anticipated to incorporate five girder lines of similar depth as the existing girders. Weathering steel plate girders are recommended to omit future painting needs and maintain a girder weight similar to the existing bridge (note – girder height above ordinary high water is approximately 17-ft). Differences in bearing height, compared to existing, can be accommodated through slightly deeper girders, concrete pedestals, or steel bolsters.

General Sequence of Work and Schedule

- Install a construction access road and a work trestle within the median of I-91. The work trestle would extend from one side of the channel to slightly past the first pier in the river. This work is anticipated to occur simultaneously with median crossover construction.
- Remove the existing superstructure and abutment backwall.
- Replace the bearings.
- Repair the riprap slopes.
- Erect new steel girders.
- Proceed with typical deck construction operations and substructure patching.

The overall construction schedule, per bridge, is estimated to be four to five months once traffic is removed from the bridge. Depending on final details and start date, final paving on the bridge is anticipated to occur within the same construction season.

Advantages

The new weathering steel girders will eliminate the need for a field painting project in 10-15 years with additional traffic disruptions, as well as future painting projects. Overall risk is reduced, compared to retrofitting the pin and link system, by eliminating fit up concerns and significant field work. Superstructure removal improves construction access to the bearings and riprap slope. The active construction schedule per bridge is shorter than the rehabilitation options.

Disadvantages

The existing girders are in satisfactory condition and do not necessarily warrant immediate replacement.

Bridge 26 N&S Summary

The table below summarizes the estimated bridge construction and removal costs for Bridges 26 N&S options. Note the costs shown are bridge-only costs for comparison purposes and do not include associated costs such as roadway or engineering. Also note that the cost for painting the existing girders is included for the rehabilitation options in the table below since this work will be necessary in the near future, providing a more reflective comparison of the options.

Option	Bridge Removal	Bridge Cost	Service Life	Annualized Cost
Option 1a: Deck Replacement with Field Splices	\$507,800	\$5,024,800	40	\$138,315
Option 1b: Deck Replacement with Central Span Replacement	\$507,800	\$5,349,400	40	\$146,430
Option 2: Superstructure Replacement	\$1,085,000	\$5,039,600	50	\$122,490

The costs of the options are similar, and the superstructure replacement is assumed to provide additional structure longevity. The construction duration for Option 2 is the shortest among the options which could provide scheduling float with contractor operations and labor magnitude. Option 2 also requires the fewest operations and has the least amount of risk with respect to fit-up and field drilling operations. However, Option 2 will likely have the greatest temporary in-water impacts.

Option 2, Superstructure Replacement, is recommended for advancement due to the lower maintenance, elimination of future traffic disruptions for future girder painting, the reduced construction duration, and reduced construction risk. This option is carried forward for consideration with the remainder of the corridor-wide project.

Bridges 27 N&S: I-91 over the Toonerville Rail Trail

While Bridges 27 N&S are not structurally deficient, there are moderate maintenance needs as described in the Needs section. The following outlines a general maintenance history of the structures for context in this discussion:

- 1965: The bridges were constructed with a 7½” composite concrete deck and 1½” of pavement, but without a waterproofing membrane.
- 1985: The bridge railings were removed and replaced. No work to bridge curbs or pavement occurred. Tops of wingwalls were removed and recast.
- 1987: Pavement fully replaced with 2½” of pavement, waterproofing membrane installed, and approximately 23% of the deck area was patched according to record plans.
- 2008: The southbound bridge surface pavement (¾”) was milled and overlaid, and asphaltic plug joints installed. No work to bridge railings, curb, membrane, or deck patching.
- 2011: The northbound bridge surface pavement (1¼”) was milled and overlaid, and asphaltic plug joints installed. No work to bridge railings, curb, membrane, or deck patching.

As identified above, the bridge pavement has been replaced every 20-25 years since original construction, which suggests the pavement on the bridges will require replacement within approximately another 10-years.

Since Bridges 27 N&S are situated between Bridges 26 N&S and 28 N&S, efforts to improve Bridges 27 N&S should occur simultaneously to capitalize on overlapping work zone costs and minimize impacts to the travelling public rather than returning a few years later to address Bridge 27 N&S needs. Similarly, keeping the northbound and southbound direction for each bridge on the same maintenance cycle is desirable; therefore, the recommended scope for Bridge 27N should be the same for Bridge 27S. Matching general maintenance cycles with Bridges 28 N&S, located approximately 600-ft to the north, may be advantageous to minimize future disruptions to traffic and minimize costs associated with mobilization and traffic control measures.

The replacement of Bridges 28 N&S has a direct implication on the evaluation of Bridges 27 N&S due to the close proximity—improvements to these four bridges and corresponding maintenance of traffic solutions need to be evaluated at a holistic project level, rather than individually.

The following Options were evaluated with respect to the needs of Bridges 27 N&S, implications on the replacement of Bridges 28 N&S, and to best align future maintenance cycles with Bridges 25 N&S, 26 N&S and 28 N&S:

- No Action
- Option 1: Rehabilitation
- Option 2: Deck Replacement
- Option 3: Deck Replacement and Structure Widening
- Option 4: Bridge Replacement with an At-Grade Structure
- Option 5: Replacement with a Buried Structure
- Option 6: Bridge Removal

Common to all of these options is the need to close the trail during wall improvement operations and any overhead work associated with repairs and/or replacement of the bridge. The exact duration(s) of the closure will depend on the recommended option and maintenance of traffic solution.

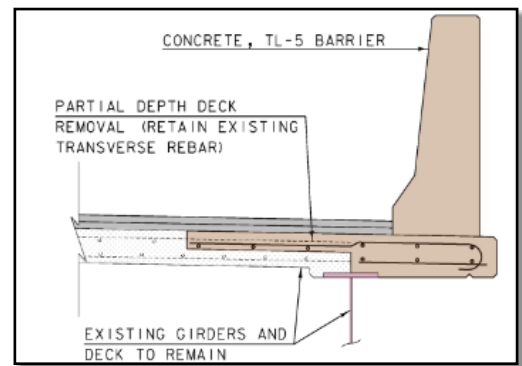
No Action

This option would involve sustaining the bridges in their current condition. A good rule of thumb for the “No Action” option is to determine whether the existing bridge can stay in place without any work being performed on it during the next 10 years. While Bridges 27 N&S are in satisfactory to good condition, there are maintenance issues that should be addressed concurrently with work at Bridges 26 N&S and 28 N&S in order to extend the useful life of the structures and reduce the rate of future deterioration, most notably the bin walls. Since some work is required within the next 10 years, the No Action option will not be considered further in this report.

Option 1: Rehabilitation

This rehabilitation option includes the minimal amount of work necessary to address maintenance needs, correct substandard features, and extend the useful lives of the bridges. While the substructure, superstructure, and deck are rated as being in satisfactory to good condition, there are maintenance issues that should be addressed. A rehabilitation for the bridges would include the following:

- Remove and replace the waterproofing membrane and pavement.
- Remove and replace the deck overhangs, including curbs and rail system as shown in the detail to the right. Overhang removal, with partial removal into the first girder bay, will be necessary to properly reinforce a TL-5 barrier.
- Patch the remaining portions of the concrete deck (approximately 10% of deck estimated to be patched based on visible full-depth patches, cracking, and moisture).
- Replace the asphaltic plug joints.
- Clean the bridge seats and correct the infiltrating backfill fines.



- Patch the abutments and wingwalls (<5% of total surface area anticipated).
- Address the failing metal bin retaining walls by raising the trail grade or strengthening the wall system. Raising the trail grade along the walls will bury the walls within approximate 3:1 slopes and render the walls unnecessary. Alternatively, the bin walls could be faced with structural precast and/or cast in-place concrete and restrained with soil anchors; however, anchors will need to be carefully placed to avoid conflicts with abutment piles. Estimated costs for raising the trail grade or strengthening the wall are \$150,000 and \$800,000 respectively. Since raising the trail grade is more cost effective and results in less long-term maintenance, this cost is carried forward for all options that preserve and reuse a portion of the existing bridges.

Based on the repairs listed above, it is reasonable to assume the existing substructure and beams can safely carry anticipated traffic loads for an additional 20 to 25 years, without significant maintenance during that period. Although field painting the girders is not listed above, this work may be necessary within the next 20 years.

Also noteworthy is the existing deck is approximately 56 years old and received numerous patches 33 years ago. When the existing membrane is removed, there is a reasonable probability the uncovered deck will require significant patching to preserve the bridge. If the deck is not replaced as part of this project, deck replacement will likely be necessary in 10 to 20 years.

The current curb to curb width of Bridges 27N and 27S is approximately 38 feet and 42 feet wide respectively. The width of Bridge 27N meets current standards whereas the width of Bridge 27S is substandard by 8-ft. The overhangs may be increased slightly during railing replacement to provide a wider shoulder over the bridge; however, an additional girder line and substructure widening would be needed to meet current bridge width standards.

Advantages: This option provides the lowest upfront cost to extend the life of the structure.

Disadvantages: Preserving Bridges 27 N&S in their current geometric condition restricts alignment improvement considerations at Bridges 28 N&S as well as restricts implementation of several maintenance of traffic solutions. Specifically, only minor profile adjustments at Bridges 28 N&S are feasible which, in turn, restricts the structure depth and vertical clearance improvements over Route 5. Maintaining the current out to out width of Bridges 27 N&S restricts several feasible maintenance of traffic solutions, prohibits off alignment and partial off-alignment replacement of Bridges 28 N&S, and does not allow for improvements of the substandard acceleration length of the southbound on-ramp that crosses over Bridge 27S.

Maintenance of traffic: This work can be accomplished with single lane closures utilizing phased construction on I-91. This work can occur separately from bridge improvements at Bridges 26 N&S and 28N&S and concurrently with the construction of other temporary maintenance of traffic solutions, such as median crossovers and temporary bridges.

Option 2: Deck Replacement

This option includes the same improvements as Option 1 and also includes complete deck replacement with integral backwalls (curtainwalls) and bearing replacement. It is reasonable to assume that, with these repairs, the existing substructure and beams can safely carry anticipated traffic loads for an additional 40 years.

Advantages: This option would provide additional improvements compared to Option 1 and better align future major maintenance projects with Bridges 26 N&S and 28 N&S. The curb-to-curb width of the existing bridges would be slightly widened, and minor profile adjustments could be implemented, through increased deck haunches, to improve the profile, structure depth, and clearance at Bridges 28 N&S.

Disadvantages: The decks are in Fair condition and may not warrant immediate replacement. In addition, maintaining the footprint of Bridges 27 N&S results in the same restrictions noted in the Option 1 discussion.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

Option 3: Deck Replacement and Bridge Widening

This option is similar to Option 2, Deck Replacement, and also includes widening the southbound bridge approximately 8-ft to the west to meet current shoulder width standards.

- The existing western wingwalls of Bridge 27S would be removed, abutment foundations extended in-kind with driven H-piles, and substructure widened to accept the wider superstructure, including new wingwalls.

The existing superstructure would be widened with one additional girder line and a full deck replacement. The additional beam would likely be spaced 8-ft from the current fascia beam; whereas the remaining beams are spaced at 7-ft. Field drilling to connect diaphragms is anticipated, which may require field paint touch-ups.

Similar to Option 2, it is reasonable to assume that, with the repairs listed above, the existing substructure and beams can safely carry anticipated traffic loads for an additional 40 years.

Advantages: This option would provide additional improvements compared to Option 1 and better align future major maintenance projects with Bridges 26 N&S and 28 N&S. Compared to Option 2, the curb-to-curb width of the existing bridges would be widened to meet current standards and the additional bridge width provides more flexibility with maintenance of traffic solutions now and in the future. Replacing and widening the deck allows for minor vertical adjustments to improve the profile, structure depth, and clearance at Bridges 28 N&S.

Disadvantages: The decks are in Fair condition and may not warrant immediate replacement. In addition, maintaining the footprint of Bridge 27N and the median fascia of Bridge 27S results in horizontal restrictions on replacement options for Bridges 28 N&S and several maintenance of traffic solutions. Widening the southbound substructure will also require widening the underlying soil retention system or extending the limits of the trail raising to provide sufficient embedment of the widened abutment foundation.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

Option 4: Bridge Replacement with an At-Grade Structure

This option would replace the existing bridges with new superstructures as well as new substructures. To support alignment improvements and maintenance of traffic, partial and full off-alignment replacements should be considered. To minimize the structure length, raising the trail grade should be considered regardless of structure details; however, the existing metal bin retaining walls would be completely removed with this option.

The various considerations under this option include: the bridge width, length, skew, superstructure type and substructure type.

a. Bridge Width

The current curb to curb width of Bridges 27N and 27S is approximately 38 feet and 42 feet wide, respectively, which is substandard by 8-feet on the southbound bridge. Since a new 100-year bridge is being proposed, the bridge geometry should meet the minimum standards. As such, the standard typical sections of 4'-12'-12'-10' (38' curb-to-curb) for the northbound bridge and 4'-12'-12'-12'-10' (50' curb-to-curb) for the southbound bridge will be proposed. If the northbound on/off ramps are converted from a clover ramp system to a diamond, additional width on the northbound bridge may be necessary to accommodate the deceleration lane added in the vicinity of the bridge.

b. Bridge Length and Skew

The existing bridges are each 74-ft single span bridges with a skew of approximately 20 degrees. The replacement structure could incorporate a similar span length as existing; however, lengthening the span to approximately 110-ft would allow the substructures to be constructed behind the existing substructures, the bin walls to be removed, and for the structure skew to be eliminated. This longer structure also allows the trail grade to remain unchanged, incorporate 2:1 fore slopes, and use integral abutments. The exact span length would be determined during the next phase of project development.

c. Superstructure Type

The most economical superstructure type for this span is likely a weathering steel girder superstructure with a cast-in-place composite concrete deck. Prestressed concrete beams could also be considered. Final structure type and beam spacing would be selected in future phases.

The current vertical clearance under each bridge is approximately 20.5-feet to the underlying trail, which meets the minimum standard.

d. Substructure Type

The existing abutments are founded on steel piles. Based on the record plans, bedrock appears to be approximately 45 to 75-feet below the I-91 road surface and subsurface material generally consists of sands and silts. Due to bridge geometry and sufficient depth to bedrock, integral abutments should be considered to eliminate bearings and open expansion joints. Sufficient subsurface information should be obtained in design to verify the in-situ conditions and confirm the substructure and foundation type.

Advantages: This option provides flexibility to accommodate alignment changes at Bridge 28 N&S and align service life and maintenance cycles with Bridge 28 N&S.

Disadvantages: The condition of the bridges, considered by themselves, do not currently warrant replacement. The proposed bridge widths do not easily accommodate all maintenance of traffic alternatives and restrict future phasing operations without over-widening the bridges. Future maintenance of the bridge is generally greater than a buried structure.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

Option 5: Bridge Replacement with a Buried Structure

This option would replace the existing bridges with a new buried structure(s). To support I-91 alignment improvements and maintenance of traffic operations, various lengths of buried structure should be considered as well as consideration of a single structure or two structures. Additionally, to minimize excavation for foundation construction, raising the trail grade approximately three feet should be considered regardless of structure details.

The various considerations under this option include: the bridge width, height, length, structure type, and substructure type.

a. Bridge Width

The minimum standard trail width is 18-ft. This value includes a 12-ft paved path and 3-ft aggregate shoulders to accommodate passing bicyclists, allow for emergency services along the trail, and provide sufficient width for paving the trail within the structure. Providing this minimum opening allows the structure to be constructed between the existing metal bin walls, approximately 31-ft wall to wall distance, and for the bin walls to remain in-place and buried within the embankment. However, removal of the walls should be considered if maintenance of traffic and access allows.

b. Bridge Height

The current vertical clearance beneath Bridges 27 N&S is approximately 20.5-ft and the existing structure depth is approximately 4-ft for an overall height between trail surface and I-91 surface of approximately 24.5-ft. The minimum vertical clearance through the buried structure should be 12-ft to accommodate emergency and maintenance vehicles – this value is measured as a rectangular envelope above the paved trail surface, therefore additional structure height may be necessary in the case of an arch-shaped structure. Additional height should be considered to accommodate trail paving and construction exhaust and ventilation considerations. Allowing for a 3-ft trail grade raise and installation of guardrail posts on I-91 above the structure, the maximum arch height is approximately 15.5-ft. Careful review of buried structure geometry, clearance requirements, and survey data will be necessary to finalize the structure height; however, meeting the minimum 12-ft vertical clearance appears feasible.

c. Bridge Length

The existing embankment width of I-91, from the outer edge of I-91 northbound to the outer edge of I-91 southbound, is approximately 225-ft. The recommended pavement width for the northbound and southbound roadways over the buried structure is 38-ft and 50-ft, respectively, with an approximate median width of 42-ft. Depending on final I-91 alignments, buried structure height and headwall needs, and maintenance of traffic operations, the buried structure length may vary from a single ± 190 -ft to 260-ft long structure to two independent ± 48 -ft and ± 60 -ft long structures with shared wingwalls within the interstate median region. Lighting may be necessary within the single continuous buried structure, with the likely power source at the adjacent VTrans maintenance garage. Final structure length selection should be determined in future project phases.

d. Structure Type

Several buried structure types are available to meet the needs of this project. However, precast concrete frames and concrete-filled fiberglass tube structures will best meet project need and provide long-term, low-maintenance solutions. Precast structures are typically detailed on the Plans and designed by the vendor, whereas concrete-filled fiberglass tube structures are fully designed and detailed on the Plans. The final structure type should be determined in future project phases.



e. Substructure Type

The existing abutments are founded on steel piles. Based on the record plans, bedrock appears to be approximately 45 to 75-feet below the I-91 road surface, 20 to 50-ft below the trail, and subsurface material generally consists of sands and silts. Depending on the final structure type and loading, the foundation may consist of independent spread footings, independent pile-supported foundations, or a single mat foundation spanning beneath the trail. Sufficient subsurface information should be obtained in design to verify the in-situ conditions and confirm the substructure and foundation type.

Advantages: This option would provide flexibility to accommodate alignment changes at Bridge 28 N&S and align service life and maintenance cycles with Bridge 28 N&S. The length of the structure can cost-effectively be adjusted during design to accommodate maintenance of traffic without the need for temporary structures. If the median is closed with a single structure, future maintenance of traffic operations could be improved. Future maintenance of the bridge is generally less than all other options presented.

Disadvantages: The condition of the bridges, considered independently, do not currently warrant replacement.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

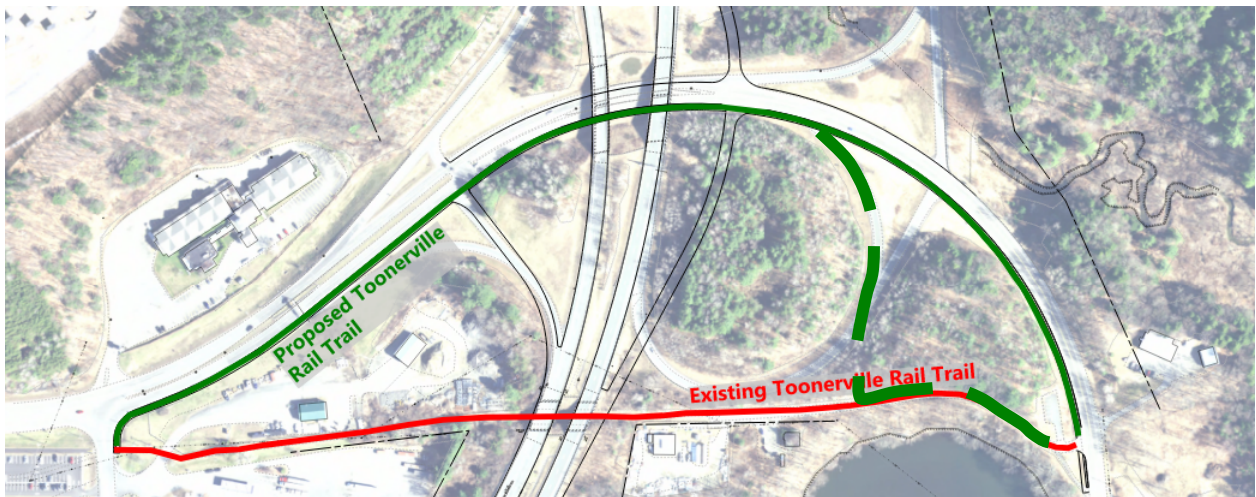
Option 6: Bridge Removal

Along with the replacement of Bridge 28 N&S, the Exit 7 ramp configurations also have direct implications on the evaluation of Bridge 27 N&S. The existing slip lanes along Route 5 create safety concerns for pedestrians if a shared use path (trail) is added to Route 5, due to the speed at which traffic would cross the crosswalks. However, if the slip lanes are removed and the ramps are configured as a t-intersection as noted in the Exit 7 Improvements section previously, it would be feasible to shift the Toonerville Rail Trail to be along Route 5 and entirely remove Bridges 27 N&S.

Two alternatives for a new location of the trail along Route 5 were investigated in support of this project:

- One alternative will relocate the shared use path along Route 5 from the large park and ride until the trail intersects with Youngs Road, as shown with a solid green line below.
- The other alternative diverts the trail along the disinvested northbound clover on-ramp, and ties back into the existing trail along Youngs Road, shown as a dashed green line below.

Both of the trail relocations would not significantly increase the length of the trail, would maintain the same trail connection points, and would allow Bridges 27 N&S to be removed while only increasing the length of Bridges 28 N&S by 10-15 feet. Diverting the trail onto the disinvested on-ramp would beneficially limit the amount of new trail construction, as the existing ramp pavement could be partially left in place and reused for the trail. Additionally, trail users would be placed further from the roadway to provide greater buffer from traffic. In order for the ramp clover to be reused, the diamond interchange ramps will need to be constructed, southbound slip lane removed, and pedestrian safety improvements implemented – this will likely require a prolonged closure of the trail. The final path location should be determined in future project phases based on community input and limitations of closure periods for the trail.



Toonerville Rail Trail Relocation Figure

The bridge removal option would remove the existing bridges and fill in the opening with typical earthen embankments. To support I-91 alignment improvements and maintenance of traffic, the embankment could be over widened to accommodate any required phasing and improve the southbound on-ramp geometry. The Toonerville Rail Trail that Bridges 27 N&S span over, will be relocated to along Route 5 as noted above. The existing metal bin walls would be left in place and filled in completely; therefore, no additional cost would be required for removal or repair of the walls.

Advantages: This option would remove Bridge 27 N&S, requiring no future maintenance needs for the bridge. The removal of the bridge and replacing with typical earthen embankments will provide flexibility to accommodate alignment changes and maintenance of traffic operations with lesser cost than replacing the bridges.

Disadvantages: The condition of the bridges, considered independently, do not currently warrant significant work. The proposed Bridge 28 N&S bridge will need to be approximately 10 to 15 feet longer to accommodate the relocation of the Toonerville Rail Trail to Route 5.

Maintenance of Traffic: Traffic could be maintained on a temporary bridge, median crossovers or with phased construction.

Bridge 27 N&S Summary

The table below summarizes the estimated construction and removal bridge costs for Bridges 27 N&S options. Note the costs shown are bridge and applicable wall improvement-only costs for comparison purposes and do not include associated costs such as roadway or engineering. Also note that the cost for painting the existing girders is not included in the table below since this is likely not needed for 20 years.

Option	Bridge Removal	Bridge Cost	Service Life	Annualized Cost
Option 1: Rehabilitation	\$45,000	\$657,800	20	\$35,130
Option 2: Deck Replacement	\$240,000	\$906,600	40	\$28,665
Option 3: Deck and Widening	\$288,000	\$1,054,600	40	\$33,565
Option 4: At-Grade Replacement	\$407,000	\$3,290,400	100	\$36,975
Option 5: Buried Structure	\$360,000	\$2,133,000	100	\$24,930
Option 6: Bridge Removal	\$360,000	\$760,000	100	\$11,200

Note: The bridge cost shown for Option 6, Bridge Removal, is the cost for relocation of the Toonerville Rail Trail and backfill required to fill in the void caused by Bridge 27 N&S removal. This cost was included here for comparable comparisons, the Alternative Matrix will have these items included in the roadway costs. The Service Life was subjectively set to 100 years to develop a corresponding Annualized Cost for comparative purposes.

Option 6, Bridge Removal is the recommended option due to its initial and long-term cost, as well as eliminated future maintenance costs. The trail relocation to Route 5 requires the removal of the slip lanes at Exit 7 to ensure pedestrian safety. The removal of Bridge 27 will also accommodate all maintenance of traffic options as the roadway can be built slightly wider if necessary, with minimal cost implications. This option is carried forward for consideration with the remainder of the corridor-wide project.

Bridges 28 N&S: I-91 over Route 5

The recommendations identified in the scoping report for Bridges 28 N&S concluded that a complete replacement of the bridges on their existing alignment utilizing temporary bridges within the median to maintain traffic during construction was the preferred solution. In addition to previous recommendations, the overall length of Bridges 28 N&S is recommended to accommodate three lanes of Route 5 traffic, two shoulders, and a shared use path corresponding to the relocated Toonerville Rail Trail. This recommendation to replace Bridges 28 N&S was carried forward for all discussions in this report; however, additional maintenance of traffic solutions were evaluated in conjunction with Bridge 27 N&S as previously discussed within this report. Final span configurations, structure depths, and profiles will be determined in future project development phases.

VII. Alternatives Summary

Based on the existing site conditions and bridge conditions, there are several viable alternatives:

- Alternative 1A:** 3 Lane Temporary Bridge within Bridge 28 Median
- Alternative 1B:** 2 Lane Temporary Bridge within Bridge 28 Median, 1 Lane Temporary Bridge within Bridge 27 Median
- Alternative 1C:** 3 Lane Temporary Bridge within Bridge 28 Median, Phasing

- Alternative 2A:** Partial Off Alignment Maintaining Northbound Clover Ramps
- Alternative 2B:** Partial Off Alignment Constructing Northbound Diamond Ramps

- Alternative 3A:** Bridge 27 & 28 Full Off Alignment
- Alternative 3B:** Bridge 28 Full Off Alignment, Construct Northbound Diamond Ramps, I-91 NB Ramp Detour W/ Temporary Signals
- Alternative 3C:** Bridge 28 Full Off Alignment, Bridge 27 Partial Off Alignment

- Alternative 4A:** Construct Crossovers, Construct Bridge 27 & 28 On Alignment Maintaining Northbound Clover Ramps.
- Alternative 4B:** Construct Crossovers, Construct Bridge 27 & 28 On Alignment with Northbound Diamond Ramps.
- Alternative 4C:** Construct Crossovers, Construct Bridge 27N & 28N Partially Off Alignment with Northbound Diamond Ramps, Construct Bridge 27S & 28S On Alignment

VIII. Evaluation Summary Matrix

Evaluation Criteria	Do Nothing	On-Alignment (Temporary Bridge)			Partial Off-Alignment		Off-Alignment			On Alignment (Crossovers)			Evaluation Criteria				
		Alternative 1A (3 Lane Temp. Bridge, Bridge 28 Median)	Alternative 1B (2 Lane Temp. Bridge, Bridge 28 Median - 1 Lane Temp. Bridge, Bridge 27 Median)	Alternative 1C (3 Lane Temp. Bridge, Bridge 28 Median - Phasing W/ Bridge 27 Removal)	Alternative 2A (Maintain Northbound Clover Ramps)	Alternative 2B (Construct Northbound Diamond Ramps)	Alternative 3A (Bridge 27 & 28 Full Off Alignment)	Alternative 3B (Construct Diamond Interchange, I-91 NB Ramp Detour W/ Temp. Signals)	Alternative 3C (Bridge 27 Partial Off Alignment, Bridge 28 Full Off Alignment)	Alternative 4A (Maintain Northbound Clover Ramps)	Alternative 4B (Construct Northbound Diamond Ramps)	Alternative 4C (Construct Northbound Diamond Ramps W/ NB Partial Off Alignment)					
COST	Combined Project	Bridge Br. 25	\$0	\$1,853,000	\$1,853,000	\$1,853,000	\$1,853,000	\$1,853,000	\$1,853,000	\$1,853,000	\$1,853,000	\$1,853,000	Bridge Br. 25				
		Removal of Exist. Structure	\$0	\$609,000	\$609,000	\$609,000	\$609,000	\$609,000	\$609,000	\$609,000	\$609,000	\$609,000	\$609,000	Removal of Exist. Structure			
		Bridge Br. 26	\$0	\$5,039,600	\$5,039,600	\$5,039,600	\$5,039,600	\$5,039,600	\$5,039,600	\$5,039,600	\$5,039,600	\$5,039,600	\$5,039,600	Bridge Br. 26			
		Removal of Exist. Structure	\$0	\$1,085,000	\$1,085,000	\$1,085,000	\$1,085,000	\$1,085,000	\$1,085,000	\$1,085,000	\$1,085,000	\$1,085,000	\$1,085,000	Removal of Exist. Structure			
		Bridge Br. 27	\$0	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	\$360,000	Bridge Br. 27			
		Removal of Exist. Structure	\$0	\$7,459,200	\$7,459,200	\$7,459,200	\$7,459,200	\$6,526,800	\$7,459,200	\$7,459,200	\$6,526,800	\$7,459,200	\$6,526,800	Removal of Exist. Structure			
		Bridge Br. 28	\$0	\$1,209,600	\$1,209,600	\$1,209,600	\$1,209,600	\$1,209,600	\$1,209,600	\$1,209,600	\$1,209,600	\$1,209,600	\$1,209,600	Bridge Br. 28			
		Removal of Exist. Structure	\$0	\$2,580,000	\$2,580,000	\$2,580,000	\$6,400,000	\$6,960,000	\$6,960,000	\$6,720,000	\$3,260,000	\$4,190,000	\$4,190,000	Removal of Exist. Structure			
		Roadway	\$0	\$1,761,500	\$1,761,500	\$1,761,500	\$1,779,700	\$1,686,400	\$1,761,500	\$1,668,300	\$1,668,300	\$1,668,300	\$1,668,300	Roadway			
		Mobilization	\$0	\$4,330,000	\$3,920,000	\$4,530,000	\$2,950,000	\$3,220,000	\$3,040,000	\$2,990,000	\$3,000,000	\$3,350,000	\$3,330,000	\$3,400,000	Mobilization		
		Maintenance of Traffic	\$0	\$3,943,000	\$3,881,500	\$3,973,000	\$4,339,000	\$4,309,600	\$4,406,500	\$4,209,200	\$4,339,000	\$3,811,000	\$3,741,200	\$3,891,200	Maintenance of Traffic		
		Construction Engineering & Contingencies	\$0	\$6,046,000	\$5,951,700	\$6,092,000	\$6,653,100	\$6,608,100	\$6,756,700	\$6,454,100	\$6,653,200	\$5,843,600	\$5,736,500	\$5,966,500	Construction Engineering & Contingencies		
		Escalation	\$0	\$36,275,900	\$35,710,100	\$36,551,900	\$39,918,600	\$39,648,500	\$40,540,100	\$38,724,600	\$39,919,100	\$35,061,500	\$34,419,000	\$35,799,000	Escalation		
		Total Construction W/ CEC	\$0	\$2,628,700	\$2,341,500	\$2,402,500	\$2,892,700	\$2,873,100	\$2,937,700	\$2,806,100	\$2,892,700	\$2,540,700	\$2,494,100	\$2,594,100	Total Construction W/ CEC		
		Preliminary Engineering	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Preliminary Engineering		
		Right of Way	\$0	\$38,904,600	\$38,051,600	\$38,954,400	\$42,811,300	\$42,521,600	\$43,477,800	\$41,530,700	\$42,811,800	\$37,602,200	\$36,913,100	\$38,393,100	Right of Way		
		Total Project	\$0	\$584,600	\$572,600	\$584,800	\$636,077	\$638,942	\$646,360	\$626,840	\$637,371	\$567,059	\$564,051	\$584,176	Total Project		
Annualized	N/A	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	Annualized				
SCHEDULE	Combined Project	Project Development Duration	N/A	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	Project Development Duration				
		Number of Main Construction Stages	N/A	2	2	2	3	3	2	2	2	3	Number of Main Construction Stages				
		Construction Duration	N/A	4 Years	4 Years	4 Years	3 Years	3 Years	3 Years	3 Years	4 Years	4 Years	4 Years	Construction Duration			
ENGINEERING	Combined Project	Typical Section - Bridge (Ft) Br. 25	NB: 30' SB: 30'	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	Typical Section - Bridge (Ft) Br. 25				
		Typical Section - Bridge (Ft) Br. 26	NB: 30' SB: 30'	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	NB: 4'-12'-12'-4" (32') SB: 4'-12'-12'-4" (32')	Typical Section - Bridge (Ft) Br. 26			
		Typical Section - Bridge (Ft) Br. 27	NB: 38' SB: 42'	NB: 4'-12'-12'-10" (38') SB Preservation: 4'-12'-12'-2" (42') SB Replacement: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-2" (42')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	NB: 4'-12'-12'-10" (38') SB: 4'-12'-12'-10" (50')	Typical Section - Bridge (Ft) Br. 27	
		Traffic Safety	N/A	No Change	No Change	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Adequate shoulder width provided at Bridge 27 SB on ramp, SB on ramp acceleration length extended to meet minimum standard	Traffic Safety		
		Alignment Change, I-91	N/A	No Change	No Change	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Horizontal curves are flatter than existing on I-91 and SB on ramp	Alignment Change, I-91		
		Bike/Ped Access	Provided on trail below bridge, I-91 is a limited access highway.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Existing trail alignment under Bridge 27 discontinued and trail relocated along Route 5.	Bike/Ped Access	
		Vertical Clearance over Path	19'-0"	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	N/A (Bridge Removed)	Vertical Clearance over Path	
		Typical Section - Bridge (Ft) Br. 28	NB: 42' SB: 30'	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	NB: 4'-12'-12'-10" (50') SB: 4'-12'-12'-10" (38')	Typical Section - Bridge (Ft) Br. 28		
		Traffic Safety	N/A	No Change	No Change	No Change	Weave for NB ramps eliminated	No Change	Weave for NB ramps eliminated	No Change	No Change	Weave for NB ramps eliminated	Weave for NB ramps eliminated	No Change	Traffic Safety		
		Alignment Change, I-91	N/A	No Change	No Change	Horizontal curves are flatter than existing on I-91 and NB ramps	Horizontal curves are flatter than existing on I-91 and diamond geometry favorable	Horizontal curves are flatter than existing on I-91 and NB ramps	Horizontal curves are flatter than existing on I-91 and diamond geometry favorable	Horizontal curves are flatter than existing on I-91 and NB ramps	Horizontal curves are flatter than existing on I-91 and diamond geometry favorable	Horizontal curves are flatter than existing on I-91 and NB ramps	Horizontal curves are flatter than existing on I-91 and diamond geometry favorable	Horizontal curves are flatter than existing on I-91 and NB ramps	Alignment Change, I-91		
		Bike/Ped Access	Route 5 does not have any sidewalks and shoulders are too narrow to safely accommodate bicycles (3'). I-91 is a limited access highway.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Trail relocated to Route 5, 10' trail with 5' grass separation. Proposed 5' Shoulders on Route 5.	Bike/Ped Access	
		Southbound Ramp Configuration	N/A	No Change	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	SB On Ramp Realignment, eliminates slip lane	Southbound Ramp Configuration	
		Northbound Ramp Configuration	N/A	No Change (Maintains Cloverleaf)	Eliminates Slip lanes for safer trail crossings. (Maintains Cloverleaf)	Eliminate slip lanes (Maintains Cloverleaf)	Diamond	Eliminate slip lanes (Maintains Cloverleaf)	Diamond	Eliminate slip lanes (Maintains Cloverleaf)	Eliminate slip lanes (Maintains Cloverleaf)	Diamond	Eliminate slip lanes (Maintains Cloverleaf)	Diamond	Eliminate slip lanes (Maintains Cloverleaf)	Northbound Ramp Configuration	
		Rte. 5 Typical Section	72'	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	5'-11'-2'-4'-2'-11'-11'-5" (51') w/ 10' Trail and 5' grass separation.	Rte. 5 Typical Section		
		Vertical Clearance over Rte. 5	NB: 17'-4" SB: 14'-11"	NB: 14'-3" Min. SB: 14'-3" Min.	NB: 14'-3" Min. SB: 14'-3" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	NB: 16'-0" Min. SB: 16'-0" Min.	Vertical Clearance over Rte. 5		
		MOT LAYOUT	Combined Project	Pros	N/A	-Bridge 27 can be preservation -Bridge 28N and 28S can be constructed at same time -Temp. SB on ramp not needed with preservation	-Bridge 27 is preservation	-Bridge 28N and 28S can be constructed at same time	-Minimal construction of temporary roadways	-Minimal construction of temporary roadways	-Minimal construction of temporary roadways	-No Partial demo of existing Bridge 27/28 Minimal construction of temporary roadways	-Minimal construction of temporary roadways	-Bridge 27 can be preservation	-NB Diamond ramps can be utilized for ramp traffic in subsequent Stages	-NB Diamond ramps can be utilized for ramp traffic in subsequent Stages	Pros
				Cons	N/A	-Weave length for NB ramps is shorter during MOT	-Weave length for NB ramps is shorter during MOT -Bridge 28N and 28S constructed at different times -Additional temporary bridge at Bridge 27	-Weave length for NB ramps is shorter during MOT -Temporary earth support and/or additional phasing needed for stage 2 traffic at Bridge 27	-3 main stages of construction instead of 2 -Work at Bridge 26 done in stages 1 and 3 but not 2	-3 main stages of construction instead of 2 -Work at Bridge 26 done in stages 1 and 3 but not 2	-3 main stages of construction instead of 2 -Work at Bridge 26 done in stages 1 and 3 but not 2	-Diamond ramps w/ temporary signals utilized as detour for I-91 NB traffic in stage 2	-3 main stages of construction instead of 2 -Work at Bridge 26 done in stages 1 and 3 but not 2	-Bridge 28S must be overwidened to accommodate 3 lanes of temporary traffic -NB crossover and temporary NB off ramp crosses Spencer Brook	-3 main stages of construction instead of 2 -NB crossover crosses Spencer Brook	-3 main stages of construction instead of 2 -NB crossover crosses Spencer Brook	Cons
OTHER	Combined Project	Bridge 25 Design Life (Years)	N/A	40	40	40	40	40	40	40	40	40	40	40	Bridge 25 Design Life (Years)		
		Bridge 26 Design Life (Years)	N/A	50	50	50	50	50	50	50	50	50	50	50	Bridge 26 Design Life (Years)		
		Bridge 27 Design Life (Years)	N/A	100	100	100	100	100	100	100	100	100	100	100	Bridge 27 Design Life (Years)		
		Bridge 28 Design Life (Years)	N/A	100	100	100	100	100	100	100	100	100	100	100	Bridge 28 Design Life (Years)		
		ROW Acquisition	N/A	No	No	No	No	No	No	No	No	No	No	No	ROW Acquisition		
Constructibility	N/A	Construction of temporary bridge approach between Bridge 27 and 28 is difficult to meet design criteria for both stages.	Due to temporary bridge in median at Bridge 27, replacement is not an option with this alternative.	No constructibility concerns	No constructibility concerns	Diamond ramps must be constructed last due to phasing of Bridge 27, requiring the need for temporary NB ramps	No constructibility concerns	No constructibility concerns	No constructibility concerns	No constructibility concerns	No constructibility concerns	No constructibility concerns	No constructibility concerns	Constructibility			
Spencer Brook Permanent Impact (LF)	0	0	0	0	0	25	45	15	45	0	500	15	Spencer Brook Permanent Impact (LF)				
Spencer Brook Permanent Culvert Removal (LF)	0	0	0	0	0	665	0	665	0	0	665	665	Spencer Brook Permanent Culvert Removal (LF)				

Notes:
 1. Costs for crossovers for Bridges 25 & 26 construction are included in MOT Costs for all options
 2. Annualized Costs are based on each individual bridge costs and service life. Roadway and Maintenance of Traffic costs are split such that 10% is included in the Bridge 25 costs, 10 % in Bridge 26 costs and the other 80% split between the other two bridges. Mobilization, Contingency and Engineering split based on ratio of bridge costs. 100 year service life is assumed for Bridge 27 for bridge Disinvestment for comparison purposes.
 3. Escalation is 20% of the construction cost to account for recent bid environment escalation.
 4. Cost only includes bridge removal cost, additional cost to backfill the existing structure and relocate the Toonerville Rail Trail to Route 5 are included in the roadway costs.

IX. Conclusion

Alternative 4B is recommended: Maintaining traffic on median crossovers and constructing northbound diamond ramps, with the following improvements at each bridge site:

- Bridges 25 N&S: Deck replacement and potential incorporation of an integral backwall.
- Bridges 26 N&S: Superstructure replacement.
- Bridges 27 N&S: Disinvestment with relocation of the Toonerville Rail Trail.
- Bridges 28 N&S: Complete Replacement.

Discussion:

This Alternative has the lowest total project and annualized cost and provides the greatest, necessary improvements in terms of structure service life at each bridge location, improved safety, reduced impervious surfaces, and reduced maintenance costs through removal of Bridges 27 N&S, construction of a narrower Bridge 28N and removed ramp pavement and culverts. There are also several disadvantages associated with this alternative, including: impacts to Spencer Brook, more substantial tree clearing than alternatives that maintain the clover ramps, and potentially impacting traffic for an additional half year to construct the diamond ramps.

Replacing the deck of Bridges 25 N&S addresses current maintenance needs, slightly improves substandard shoulders widths, and can incorporate details to reduce future maintenance concerns.

Replacing Bridges 27 N&S with an earthen embankment/roadway provides flexibility with maintenance of traffic (now and the future), allows for the northbound diamond off ramp to be constructed, addresses the substandard shoulder width over Bridge 27S, and eliminates long term maintenance of the structure. With the removal of Bridge 27, the existing Toonerville Rail Trail is recommended to be relocated along Route 5 and partially along the disinvested on-ramp clover. While rehabilitating and preserving Bridges 27 N&S will result in an overall lower project cost (Alternative 4A), the cost difference will quickly diminish when future painting, paving, and culvert replacement of Spencer Brook are considered at this project site.

Geotechnical borings should be advanced early in the design phase to determine foundation type(s) for Bridges 28 N&S and implications on maintenance of traffic and construction phasing. Borings should also be obtained within the median and beneath proposed ramps to identify the potential presence of bedrock.

Traffic Control:

Traffic is recommended to be maintained on median crossovers during construction. Although there is an elevation difference between the northbound and southbound barrels north of Bridges 28 N&S, the wide median provides sufficient distance to maintain reasonable profile grades and sight distance. Bridges 27 N&S will require phased construction, in addition to the crossovers, to be replaced with an embankment and construct the diamond ramps.

Additional Considerations:

Final maintenance of traffic and construction of Bridge 28N partially off-alignment (similar to Alternative 4C) should potentially be revisited during the Conceptual Plans phase, once project survey is available. Alternative 4C was evaluated as an iteration of Alternative 4B to eliminate the need to relocate Spencer Brook; however, there is an increased cost associated with eliminating relocation.

If relocating the brook is not permitted, Alternative 4C should be considered for advancement. Phasing of the construction may allow sufficient volumes of earth from the abandoned clover ramps to be reused for construction of the partial off-alignment mainline, which could reduce estimated construction costs.

X. Appendices

Appendix A: Site Pictures – Bridges 25 N&S

Appendix B: Bridge Inspection Reports– Bridges 25 N&S

Appendix C: Existing Geotechnical Information– Bridges 25 N&S

Appendix D: Crash Data– Bridges 25 N&S

Appendix E: Site Pictures – Bridges 27 N&S

Appendix F: Bridge Inspection Reports – Bridges 27 N&S

Appendix G: Existing Geotechnical Information – Bridges 27 N&S

Appendix H: Crash Data – Bridges 27 N&S

Appendix I: Resource ID Completion Memo

Appendix J: Archaeology ID Memo

Appendix K: Historic Resource ID Memo

Appendix L: Natural Resource ID Memo

Appendix M: Stormwater Resource ID Memo

Appendix N: Landscape Resource ID Memo

Appendix O: Environmental Specialist Resource ID Memo

Appendix P: Hazardous Waste Sites

Appendix Q: Floodplains Rivers Map

Appendix R: Other Resource Map

Appendix S: Town Map

Appendix T: Local Input

Appendix U: Plans

Appendix A: Site Pictures – Bridges 25 N&S



Looking South over Bridge 25N



Bridge 25N, Northern Abutment Eastern Fascia



Bridge 25N, Northern Abutment Backwall and Seat



Bridge 25N Northern Pier



Bridge 25N Southern Pier



Bridge 25N Northern Abutment Western Fascia



Bridge 25N Eastern Fascia



Bridge 25N Deck Underside at Northern Abutment



Bridge 25N Deck Underside at Midspan



Bridge 25S from Route 5 Looking East



Bridge 25S Southern Abutment and Bridge Seat



Bridge 25S Southern Abutment Typical Bearing Condition



Bridge 25S Northern Pier



Bridge 25S Southern Pier



Bridge 25S Northern Abutment Western Fascia



Bridge 25S Median Fascia



Bridge 25S Deck underside at Northern End



Bridge 25S Deck Underside at Midspan



Bridge 25S Northern Deck Joint

Appendix B: Bridge Inspection Reports – Bridges 25 N&S

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for : **SPRINGFIELD**
Located on: **I 00091 over I 91 OVER US 5**

Bridge No.: **0025N**
approximately **0.8 MI S EXIT 7**

District: **2**
Owner: **STATE-OWNED**

CONDITION

Deck Rating: **6 SATISFACTORY**
Superstructure Rating: **6 SATISFACTORY**
Substructure Rating: **6 SATISFACTORY**
Channel Rating: **N NOT APPLICABLE**
Culvert Rating: **N NOT APPLICABLE**
Federal Str. Number: **200091025N14182**
Federal Sufficiency Rating: **79.2**
Deficiency Status of Structure: **ND**

STRUCTURE TYPE and MATERIALS

Bridge Type: **3 SP CONT ROLLED BM**
Number of Approach Spans: **0000** Number of Main Spans: **003**
Kind of Material and/or Design: **4 STEEL CONTINUOUS**
Deck Structure Type: **1 CONCRETE CIP**
Type of Wearing Surface: **6 BITUMINOUS**
Type of Membrane: **2 PREFORMED FABRIC**
Deck Protection: **0 NONE**

AGE and SERVICE

Year Built: **1965** Year Reconstructed: **0000**
Service On: **1 HIGHWAY**
Service Under: **1 HIGHWAY**
Lanes On the Structure: **02**
Lanes Under the Structure: **02**
Bypass, Detour Length (miles): **01**
ADT: **015000** % Truck ADT: **13**
Year of ADT: **2018**

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: **1 MEETS CURRENT STANDARD**
Transitions: **1 MEETS CURRENT STANDARD**
Approach Guardrail: **1 MEETS CURRENT STANDARD**
Approach Guardrail Ends: **1 MEETS CURRENT STANDARD**
Structural Evaluation: **6 EQUAL TO MINIMUM CRITERIA**
Deck Geometry: **4 MEETS MINIMUM TOLERABLE CRITERIA**
Underclearances Vertical and Horizontal: **9 SUPERIOR TO DESIRABLE CRITERIA**

Waterway Adequacy: **N NOT OVER WATER**

Approach Roadway Alignment: **8 EQUAL TO DESIRABLE CRITERIA**

Scour Critical Bridges: **N NOT OVER WATERWAY**

GEOMETRIC DATA

Length of Maximum Span (ft): **0090**
Structure Length (ft): **000231**
Lt Curb/Sidewalk Width (ft): **0**
Rt Curb/Sidewalk Width (ft): **0.7**
Bridge Rdwy Width Curb-to-Curb (ft): **30**
Deck Width Out-to-Out (ft): **35**
Appr. Roadway Width (ft): **038**
Skew: **45**
Bridge Median: **1 OPEN MEDIAN**
Min Vertical Clr Over (ft): **99 FT 99 IN**
Feature Under: **HIGHWAY BENEATH STRUCTURE**
Min Vertical Underclr (ft): **17 FT 05 IN**

DESIGN VEHICLE, RATING and POSTING

Load Rating Method (Inv): **1 LOAD FACTOR(LF)**
Posting Status: **A OPEN, NO RESTRICTION**
Bridge Posting: **5 NO POSTING REQUIRED**
Load Posting: **10 NO LOAD POSTING SIGNS ARE NEEDED**
Posted Vehicle: **POSTING NOT REQUIRED**
Posted Weight (tons):
Design Load: **5 HS 20**

INSPECTION

Insp. Date: **052020** Insp. Freq. (months): **24**
X-Ref. Route: **US5**
X-Ref. BrNum: **0043A**

INSPECTION SUMMARY and NEEDS

11/19/2020 Recent repairs have been made to deck curbs and joints. Deck curbs have been cleaned and patched behind the granite facing. Steel finger joints over abutments have been replaced with asphaltic plug joints with concrete in surrounding areas cleaned and patched. SMP & MAC

5/12/2020 Finger joints continue to allow leakage to structure below and should be replaced. Heavy concrete deterioration along curblines and fascias should be cleaned and patched. Abutments have areas of scaling / spalling that should be cleaned and patched. Bearings should be repaired, cleaned and reset to allow for proper structure expansion with missing anchor bolts replaced, rust scaling cleaned and repainted and greased bearing areas fixed. SMP & SEP

5/15/2018 This structure should be considered for a joint replacement project with new joints installed that extend to the fascias. The curbs have scattered areas of spalling with heavy scaling and small voids throughout, concrete repairs are needed. The abutment bearings should be considered for replacement, many swedge bolts have significant section loss or have rotted out. JW/MC

5/12/2016 This structure needs to have concrete repairs made to the curbs in the surrounding areas of the joints. There is some heavy spalling with exposed reinforcing and these open areas are affecting the substructures below. The finger plate joint at abutment 1 should be considered for replacement with a Vermont joint and new scuppers installed. JW/AC

5/13/2014 Curbs should be cleaned and patched. ~FRE/TJB

5/21/2012 Curb on the passing lane side should be cleaned and patched. ~FRE/SJH

04/12/2010 Patching needed behind granite stones along both curbs. The exterior beams are in need of touch-up paint. Both finger plate joint areas need vertical re-alignment. PLB

5/15/08 This structure is in satisfactory to good condition. The deck wearing surface and underside of the deck continue to deteriorate. The large cutout at the abutment ends into the deck and curb was a bad idea. There is a lot of leakage onto the fascia beams and the bridge seats from the cut outs. Should add some kind of trough to protect the fascia beams and bridge seats. DCP

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for : **SPRINGFIELD**
Located on: **I 00091 over I 91 OVER US 5**

Bridge No.: **0025S**
approximately **0.8 MI S EXIT 7**

District: **2**
Owner: **STATE-OWNED**

CONDITION

Deck Rating: **6 SATISFACTORY**
Superstructure Rating: **6 SATISFACTORY**
Substructure Rating: **5 FAIR**
Channel Rating: **N NOT APPLICABLE**
Culvert Rating: **N NOT APPLICABLE**
Federal Str. Number: **200091025S14182**
Federal Sufficiency Rating: **66.9**
Deficiency Status of Structure: **ND**

STRUCTURE TYPE and MATERIALS

Bridge Type: **3 SP CONT ROLLED BM**
Number of Approach Spans: **0000** Number of Main Spans: **003**
Kind of Material and/or Design: **4 STEEL CONTINUOUS**
Deck Structure Type: **1 CONCRETE CIP**
Type of Wearing Surface: **6 BITUMINOUS**
Type of Membrane: **2 PREFORMED FABRIC**
Deck Protection: **0 NONE**

AGE and SERVICE

Year Built: **1965** Year Reconstructed: **0000**
Service On: **1 HIGHWAY**
Service Under: **1 HIGHWAY**
Lanes On the Structure: **02**
Lanes Under the Structure: **02**
Bypass, Detour Length (miles): **01**
ADT: **015000** % Truck ADT: **13**
Year of ADT: **2018**

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: **1 MEETS CURRENT STANDARD**
Transitions: **1 MEETS CURRENT STANDARD**
Approach Guardrail: **1 MEETS CURRENT STANDARD**
Approach Guardrail Ends: **1 MEETS CURRENT STANDARD**
Structural Evaluation: **5 BETTER THAN MINIMUM TOLERABLE**
Deck Geometry: **4 MEETS MINIMUM TOLERABLE CRITERIA**
Underclearances Vertical and Horizontal: **5 BETTER THAN MINIMUM TOLERABLE CRITERIA**

Waterway Adequacy: **N NOT OVER WATER**

Approach Roadway Alignment: **8 EQUAL TO DESIRABLE CRITERIA**

Scour Critical Bridges: **N NOT OVER WATERWAY**

GEOMETRIC DATA

Length of Maximum Span (ft): **0090**
Structure Length (ft): **000211**
Lt Curb/Sidewalk Width (ft): **0**
Rt Curb/Sidewalk Width (ft): **0.7**
Bridge Rdwy Width Curb-to-Curb (ft): **30**
Deck Width Out-to-Out (ft): **35**
Appr. Roadway Width (ft): **038**
Skew: **45**
Bridge Median: **1 OPEN MEDIAN**
Min Vertical Clr Over (ft): **99 FT 99 IN**
Feature Under: **HIGHWAY BENEATH STRUCTURE**
Min Vertical Underclr (ft): **14 FT 03 IN**

DESIGN VEHICLE, RATING and POSTING

Load Rating Method (Inv): **1 LOAD FACTOR(LF)**
Posting Status: **A OPEN, NO RESTRICTION**
Bridge Posting: **5 NO POSTING REQUIRED**
Load Posting: **10 NO LOAD POSTING SIGNS ARE NEEDED**
Posted Vehicle: **POSTING NOT REQUIRED**
Posted Weight (tons):
Design Load: **5 HS 20**

INSPECTION

X-Ref. Route: **US5**
Insp. Date: **052020** Insp. Freq. (months): **24** X-Ref. BrNum: **0043B**

INSPECTION SUMMARY and NEEDS

11/19/2020 Recent repairs have been made to deck curbs and joints. Deck curbs have been cleaned and patched behind the granite facing. Steel finger joints over abutments have been replaced with asphaltic plug joints with concrete in surrounding areas cleaned and patched. SMP & MAC

5/12/2020 Finger joint continues to allow leakage to structure below and should be replaced over abutment #1 and asphaltic plug joint over abutment #2 has heavy transverse cracking and should also be replaced. Abutments have areas of heavy scaling and should be cleaned and patched with worst being on the western side of abutment #2. Bearing #5 over abutment #1 has base plate sliding out of place and should be set back. Curbs should be sealed at both joint areas to prevent further leakage to structure below. SMP & SEP

5/15/2018 This structure should be considered for a joint replacement project with new joints installed that extend to the fascias. The abutment bearings should be considered for replacement, many swedge bolts have significant section loss or have rotted out. The west end of abutment 2 needs to have concrete repairs made, continued spalling has undermined the fascia beam bearing. JW/MC

5/12/2016 This structure needs to have concrete repairs made to the curbs in the surrounding areas of the joints. There is some heavy spalling with exposed reinforcing and the open areas are affecting the substructures below. The finger plate joint at abutment 1 should be considered for replacement with a Vermont joint and new scuppers installed. JW/AC

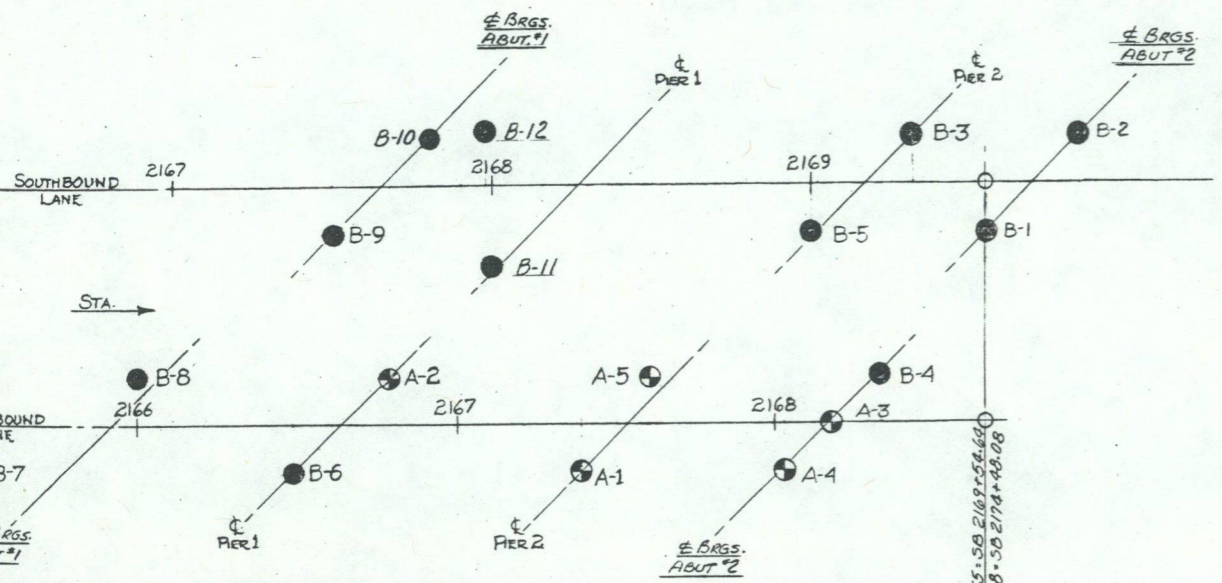
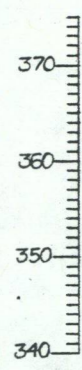
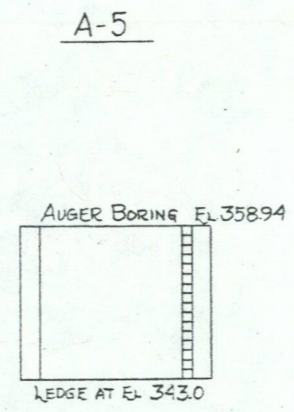
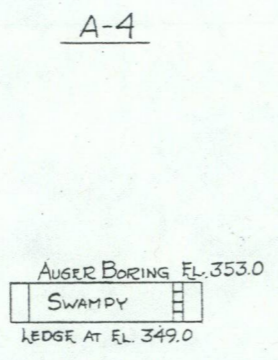
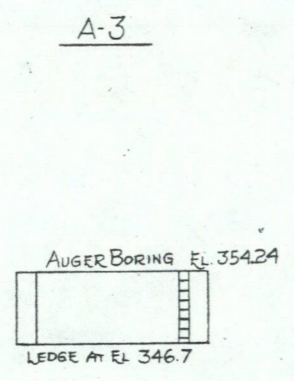
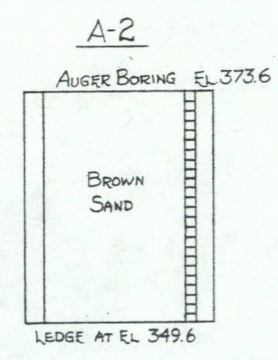
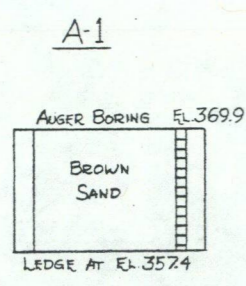
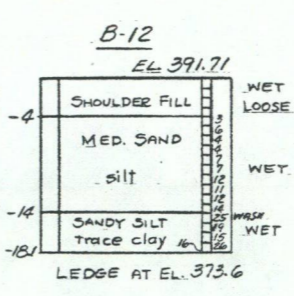
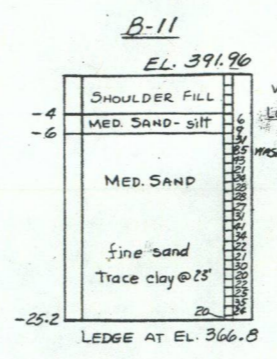
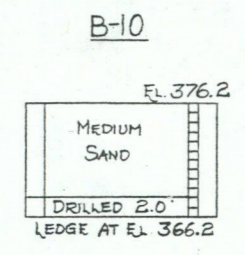
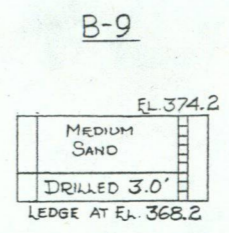
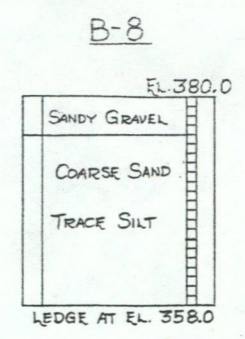
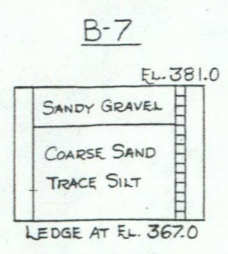
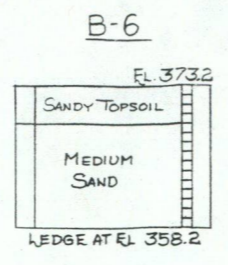
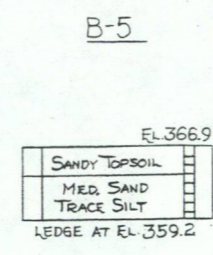
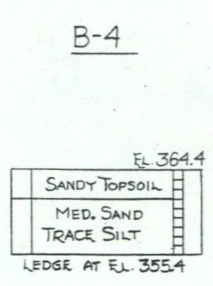
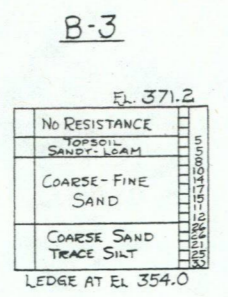
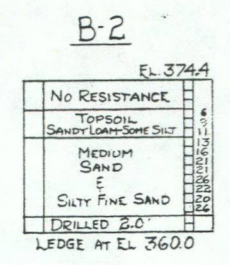
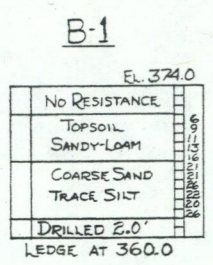
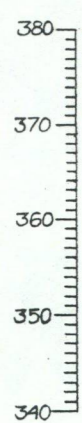
5/13/2014 Curbs should be cleaned and patched. ~FRE/TJB

5/21/2012 Curb should be cleaned and patched. ~ FRE/SJH

04/12/10 Concrete patching is needed behind granite stones along both curbs. The exterior beams are in need of touch-up paint. Top rails along the left snow fence are in need of repairs. PLB

5/15/08 This structure is in satisfactory to good condition. The deck wearing surface and underside of the deck continue to deteriorate. There are delams over US5 in the westbound lane on the underside of the deck. Form work should be added under the delams to catch the concrete when the delams spall out or clean the delams out. The large cut out at the abutment ends into the deck and curb was a bad idea. There is a lot of leakage on the fascia beams and the bridge seats from the cut out. Should add some kind of trough to protect the fascia beams and the bridge seats. DCP

Appendix C: Existing Geotechnical Information– Bridges 25 N&S



BORING LOCATIONS
Scale 1"=30'
Key: ● Wash Boring
⊙ Auger Boring

ITEM NO.	ITEM	UNIT	NET	OVERRUN	TOTAL	FINAL
106-A	CHAN. EXCAV. OF EARTH	C. Y.				
106-B	CHAN. EXCAV. OF ROCK	C. Y.				
106-C	UNCLASS. CHAN. EXCAV.	C. Y.				
107	STRUCT. EXCAV.	C. Y.				
401-B	CONC. CLASS B (MOD.)	C. Y.				
402	REINF. STEEL	LBS.				
407	ASPHALTIC-ASB. COATING	S. Y.				
502-B	TREATED TIMBER PILING	L. F.				
503	SPLICES FOR STEEL PILING	EA.				
504	STEEL PILING	L. F.				
502-A	UNTREATED TIMBER PILING	L. F.				

STATE OF VERMONT
DEPARTMENT OF HIGHWAYS

TOWN OF SPRINGFIELD
ROUTE No. I-91 STA. 2168+00
BORING LOG
INTERSTATE OVER U.S. ROUTE #5
SCALE AS NOTED

SURVEYED BY _____
DRAWN BY RJD CHECKED BY GAB
PROJECT No. I-91-1(19) CONT. 3
SHEET 49 OF 141

BL-15

Appendix D: Crash Data– Bridges 25 N&S

Vermont Agency of Transportation
 Formal Statewide Sections - Route Log Order /2 - Statewide
 Years: 2012 - 2016

Road: I-91

H.C.L No.	/3.	Route	System	Town	Mileage	AADT	Years	Crashes	Fatalities	Injuries	PDO Crashes	Critical Rate	Actual Rate	Ratio Actual/Critical	Severity Index (\$/Crash/1.)
	339	I-89	Interstate, Rural (r)	Georgia	107.000 - 107.300	17,100	5	23	0	1	22	1.688	2.457	1.455	\$14,657
	425	I-89	Interstate, Rural (r)	Georgia	108.000 - 108.300	17,100	5	21	0	3	18	1.688	2.243	1.329	\$22,329
	423	I-89	Interstate, Rural (r)	Georgia	108.800 - 109.100	17,100	5	21	0	8	15	1.688	2.243	1.329	\$41,786
	338	I-89	Interstate, Rural (r)	Georgia	109.800 - 110.100	17,100	5	23	0	10	17	1.688	2.457	1.455	\$46,830
	474	I-89	Interstate, Rural (r)	St. Albans Town	112.800 - 113.100	17,100	5	20	0	3	17	1.688	2.136	1.265	\$22,880
	422	I-89	Interstate, Rural (r)	St. Albans Town	113.900 - 114.200	11,100	5	15	0	1	14	1.855	2.468	1.330	\$16,447
	600	I-89	Interstate, Rural (r)	St. Albans Town	115.800 - 116.100	11,100	5	13	0	0	13	1.855	2.139	1.153	\$11,300
	466	I-89	Interstate, Rural (r)	Swanton	123.000 - 123.300	9,700	5	13	0	0	13	1.914	2.448	1.279	\$11,300
	381	I-89	Interstate, Rural (r)	Highgate	128.800 - 129.100	3,100	5	6	0	0	6	2.543	3.535	1.390	\$11,300
	366	I-91	Interstate, Rural (r)	Guilford	1.000 - 1.300	16,700	5	22	0	1	21	1.697	2.406	1.418	\$14,809
	737	I-91	Interstate, Rural (r)	Vernon	3.000 - 3.300	16,700	5	16	0	4	12	1.697	1.750	1.031	\$30,600
	678	I-91	Interstate, Urban (u)	Brattleboro	7.800 - 8.100	18,100	5	15	0	1	14	1.400	1.514	1.081	\$16,447
	433	I-91	Interstate, Urban (u)	Brattleboro	9.000 - 9.300	22,769	5	22	0	5	18	1.334	1.765	1.323	\$29,359
	749	I-91	Interstate, Urban (u)	Brattleboro	11.000 - 11.300	22,800	5	17	0	1	16	1.333	1.362	1.022	\$15,841
	740	I-91	Interstate, Urban (u)	Brattleboro	12.000 - 12.300	14,500	5	12	0	2	11	1.470	1.512	1.028	\$25,108
	721	I-91	Interstate, Rural (r)	Putney	19.600 - 19.900	10,200	5	11	0	3	8	1.892	1.970	1.041	\$32,355
	303	I-91	Interstate, Rural (r)	Putney	20.800 - 21.100	10,200	5	16	0	5	13	1.892	2.865	1.514	\$36,838
	186	I-91	Interstate, Rural (r)	Westminster	27.800 - 28.100	10,200	5	19	0	1	18	1.892	3.402	1.798	\$15,363
	496	I-91	Interstate, Rural (r)	Rockingham	35.000 - 35.300	11,072	5	14	0	1	13	1.857	2.309	1.244	\$16,814
	567	I-91	Interstate, Rural (r)	Rockingham	35.300 - 35.600	10,800	5	13	0	15	7	1.867	2.199	1.178	\$108,200
	568	I-91	Interstate, Rural (r)	Rockingham	36.900 - 37.200	10,800	5	13	0	5	9	1.867	2.199	1.178	\$41,862
	246	I-91	Interstate, Rural (r)	Rockingham	37.800 - 38.100	10,800	5	18	0	1	17	1.867	3.044	1.630	\$15,589
	402	I-91	Interstate, Rural (r)	Springfield	40.000 - 40.300	10,800	5	15	0	5	12	1.867	2.537	1.359	\$38,540
	153	I-91	Interstate, Rural (r)	Springfield	40.900 - 41.200	10,800	5	21	0	0	21	1.867	3.551	1.902	\$11,300
	429	I-91	Interstate, Rural (r)	Springfield	42.000 - 42.300	10,200	5	14	0	1	13	1.892	2.507	1.325	\$16,814
	618	I-91	Interstate, Rural (r)	Springfield	43.000 - 43.300	10,200	5	12	0	6	7	1.892	2.149	1.136	\$50,842
	511	I-91	Interstate, Rural (r)	Weathersfield	47.000 - 47.300	10,200	5	13	0	2	11	1.892	2.328	1.231	\$23,177
	506	I-91	Interstate, Rural (r)	Weathersfield	48.000 - 48.300	10,200	5	13	1	1	12	1.892	2.328	1.231	\$132,623
	508	I-91	Interstate, Rural (r)	Weathersfield	50.000 - 50.300	10,200	5	13	0	7	11	1.892	2.328	1.231	\$57,215

Road: I-91

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VT0140200/15SF02249	Springfield	0.09	05/12/2015	16:10	Clear	Followed too closely, No improper driving	Rear End	0	0	0	S, N	Ramp/S pur
VTVSP0400/16D100375	Springfield	0.12	02/16/2016	09:40	Sleet, Hail (Freezing Rain or Drizzle)	Failure to keep in proper lane, Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	Ramp/S pur
VT0140200/17SF012140	Springfield	0.12	12/27/2017	23:04	Clear	Driving too fast for conditions, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0	0	E	Ramp/S pur
VT0140200/18SF007851	Springfield	0.19	09/01/2018	20:12	Clear	Inattention, No improper driving	Rear End		0	0	W	Ramp/S pur
VT0140200/15SF00904	Springfield	0.39	03/01/2015	19:36	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	S	Ramp/S pur
VT0140200/17SF005258	Springfield	0.39	06/22/2017	21:21	Clear	Followed too closely, Other improper action, Operating defective equipment	Same Direction Sideswipe	2	0	0	W	Ramp/S pur
VT0140200/17SF005313	Springfield	0.39	06/24/2017	12:13	Clear		Head On	0	0	0	W	Ramp/S pur
VTVSP0400/15D100876	Springfield	39.20	03/21/2015	07:26	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/14D103097	Springfield	39.25	10/06/2014	22:55	Clear	Other Outside Vehicle	Single Vehicle Crash	1	0	0	S	SH
VTVSP0400/15D103534	Springfield	39.35	11/23/2015	07:34	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	1	0	0	S	SH
VTVSP1600/18B105319	Springfield	39.40	09/02/2018	21:36	Clear	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP0400/16D101627	Springfield	39.46	06/20/2016	15:19	Cloudy	Fatigued, asleep, Failure to keep in proper lane	Single Vehicle Crash	1	0	0	N	SH State Owned
VTVSP1600/18B103114	Springfield	39.54	05/27/2018	15:28	Rain	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP0400/15D102861	Springfield	39.55	09/08/2015	16:15	Cloudy	Other improper action, Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	SH
VTVSP1600/17B106648	Springfield	39.60	10/13/2017	11:31	Clear	No improper driving	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP1600/17B107250	Springfield	39.60	11/10/2017	11:00	Clear	No improper driving	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP0400/14D100600	Springfield	40.00	02/21/2014	06:56	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/14D101036	Springfield	40.00	04/02/2014	18:15	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D100038	Springfield	40.00	01/04/2015	08:03	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D100048	Springfield	40.00	01/05/2015	01:49	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D100429	Springfield	40.00	02/09/2015	08:40	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D100719	Springfield	40.00	03/07/2015	21:51	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D101764	Springfield	40.00	06/06/2015	06:14	[No Weather]		[No Direction of Collision]	0	0	0		SH

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General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VTVSP1600/16D002963	Springfield	40.00	10/24/2016	06:50	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/16D003733	Springfield	40.00	11/19/2016	04:49	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B100217	Springfield	40.00	01/10/2017	22:58	Clear	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP1600/17B102694	Springfield	40.00	05/04/2017	13:47	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B107046	Springfield	40.00	11/01/2017	03:03	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B107965	Springfield	40.00	12/12/2017	11:41	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1100/17B205516	Springfield	40.00	12/12/2017	12:40	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B108099	Springfield	40.00	12/16/2017	20:06	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B108269	Springfield	40.00	12/23/2017	13:27	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B108276	Springfield	40.00	12/23/2017	15:17	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B100475	Springfield	40.05	01/24/2017	14:22	Sleet, Hail (Freezing Rain or Drizzle)	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/17B105623	Springfield	40.05	08/30/2017	15:50	Clear	Failure to keep in proper lane	Same Direction Sideswipe	0	0	0	S	SH State Owned
VTVSP0400/16D100383	Springfield	40.08	02/16/2016	14:02	Sleet, Hail (Freezing Rain or Drizzle)	Driving too fast for conditions	Single Vehicle Crash	1	0	0	N	SH State Owned
VTVSP0400/14D102155	Springfield	40.10	07/16/2014	06:08	Rain	Failure to keep in proper lane	Single Vehicle Crash	1	0	0	N	SH
VTVSP1600/18B101556	Springfield	40.13	03/13/2018	23:40	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP0400/14D100601	Springfield	40.15	02/21/2014	07:01	Sleet, Hail (Freezing Rain or Drizzle)	Followed too closely, Failure to keep in proper lane, No improper driving	Rear End	3	0	0	N	SH
VTVSP1600/16D000055	Springfield	40.20	07/03/2016	15:30	Clear		Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP1600/18B107616	Springfield	40.20	12/19/2018	15:48	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	N	SH State

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General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VTVSP0600/17B107970	Springfield	40.25	12/12/2017	12:53	Snow	Unknown	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP0400/14D101717	Springfield	40.44	06/08/2014	09:40	Clear	No improper driving	Single Vehicle Crash	0	0	0	S	SH
VTVSP0400/15D103867	Springfield	40.51	12/29/2015	14:05	Sleet, Hail (Freezing Rain or Drizzle)		Single Vehicle Crash	0	0	0	S	SH
VTVSP1600/17B100767	Springfield	40.55	02/09/2017	14:15	Snow	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/17B108495	Springfield	40.80	12/31/2017	08:13	Clear	Driving too fast for conditions	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP0400/14D102662	Springfield	40.92	08/24/2014	10:19	Cloudy	Fatigued, asleep, Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	SH
VTVSP0400/14D100577	Springfield	41.00	02/19/2014	13:24	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/14D102304	Springfield	41.00	07/26/2014	13:26	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/14D103253	Springfield	41.00	10/20/2014	16:55	Cloudy	Failed to yield right of way, No improper driving	Same Direction Sideswipe	0	0	0	S	SH
VTVSP0400/15D100344	Springfield	41.00	02/02/2015	09:44	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D101873	Springfield	41.00	06/13/2015	22:49	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D102222	Springfield	41.00	07/14/2015	08:48	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D102552	Springfield	41.00	08/10/2015	08:14	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D103287	Springfield	41.00	10/24/2015	17:24	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/16D100312	Springfield	41.00	02/09/2016	09:01	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/16D001283	Springfield	41.00	08/23/2016	22:55	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B102518	Springfield	41.00	04/26/2017	15:46	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B104031	Springfield	41.00	06/27/2017	10:00	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/17B107671	Springfield	41.00	11/30/2017	19:28	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B107872	Springfield	41.00	12/09/2017	17:26	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B108010	Springfield	41.00	12/13/2017	02:47	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned

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General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VTVSP1600/17B108316	Springfield	41.00	12/25/2017	05:56	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B108374	Springfield	41.00	12/27/2017	11:52	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/18B100392	Springfield	41.00	01/17/2018	16:41	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/18B100393	Springfield	41.00	01/17/2018	17:04	Snow	Driving too fast for conditions, No improper driving	Same Direction Sideswipe	2	0	0	N	SH State Owned
VTVSP1600/18B100371	Springfield	41.00	01/17/2018	03:44	Snow	Driving too fast for conditions, Not Distracted	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP1600/18B105755	Springfield	41.00	09/24/2018	06:17	Clear	No improper driving	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/18B104015	Springfield	41.13	07/06/2018	17:42	Clear	Other improper action	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP0400/14D101365	Springfield	41.55	05/08/2014	18:35	Clear	Distracted	Single Vehicle Crash	0	0	0	S	SH
VTVSP1600/16D003100	Springfield	41.60	10/27/2016	21:58	Snow	Driving too fast for conditions, Failure to keep in proper lane	Other - Explain in Narrative	0	0	0	S	SH State Owned
VTVSP1600/17B107210	Springfield	41.63	11/08/2017	13:37	Clear	wrong side or wrong way, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	1	0	0	S	SH State Owned
VTVSP1600/18B103483	Springfield	41.75	06/13/2018	16:44	Clear	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	1	0	0	S	SH State Owned
VTVSP1600/18B107395	Springfield	41.83	12/07/2018	18:57	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Unknown	Same Direction Sideswipe	0	0	0	S	SH State Owned
VTVSP0400/14D100897	Springfield	42.00	03/20/2014	16:09	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D100345	Springfield	42.00	02/02/2015	10:15	Snow	Driving too fast for conditions, Followed too closely, No improper driving	Rear End	1	0	0	S	SH
VTVSP0400/15D102152	Springfield	42.00	07/08/2015	10:03	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D103859	Springfield	42.00	12/29/2015	10:18	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D103872	Springfield	42.00	12/29/2015	19:08	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/16D100582	Springfield	42.00	03/11/2016	09:27	Clear	Fatigued, asleep, Failure to keep in proper lane, No improper driving	Rear End	0	0	0	S	SH State Owned
VTVSP1600/16D001598	Springfield	42.00	09/07/2016	00:03	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B107971	Springfield	42.00	12/12/2017	13:51	[No Weather]		[No Direction of Collision]	0	0	0		SH State

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General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VTVSP0400/14D103726	Springfield	42.10	11/30/2014	18:26	Clear	No improper driving	Single Vehicle Crash	0	0	0	S	SH Owned
VTVSP1600/17B100065	Springfield	42.15	01/03/2017	18:13	Sleet, Hail (Freezing Rain or Drizzle)	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/17B103991	Springfield	42.20	06/25/2017	13:50	Clear	No improper driving	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/18B100841	Springfield	42.20	02/09/2018	18:36	Snow	Driving too fast for conditions, No improper driving	Same Direction Sideswipe	0	0	0	N	SH State Owned
VTVSP0400/15D103593	Springfield	42.21	12/01/2015	11:11	Sleet, Hail (Freezing Rain or Drizzle)	Driving too fast for conditions, Not Distracted	Single Vehicle Crash	0	0	0	N	SH
VTVSP0400/16D101566	Springfield	42.24	06/16/2016	07:10	Cloudy	Fatigued, asleep	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP0400/14D103111	Springfield	42.25	10/08/2014	06:14	Rain	Exceeded authorized speed limit, Driving too fast for conditions	Single Vehicle Crash	0	0	0	S	SH
VTVSP0400/14D100565	Springfield	42.32	02/18/2014	17:12	Snow	Driving too fast for conditions, Followed too closely	No Turns, Thru moves only, Broadside ^<	0	0	0	N	SH
VTVSP0400/15D103607	Springfield	42.50	12/02/2015	13:50	Rain	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	0	0	0	N	SH
VTVSP0400/16D101418	Springfield	42.50	06/03/2016	21:06	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/17B101365	Springfield	42.50	03/08/2017	12:24	Clear	Failure to keep in proper lane	Single Vehicle Crash	2	0	0	N	SH State Owned
VTVSP1600/17B103831	Springfield	42.80	06/19/2017	13:56	Rain	Failure to keep in proper lane, Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP0400/14D100521	Springfield	43.00	02/14/2014	09:21	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D101236	Springfield	43.00	04/22/2015	00:56	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D103228	Springfield	43.00	10/19/2015	09:16	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP1600/17B100901	Springfield	43.00	02/15/2017	14:02	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B103221	Springfield	43.00	05/26/2017	02:27	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/18B100273	Springfield	43.00	01/12/2018	16:45	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/18B100786	Springfield	43.00	02/06/2018	06:47	Clear	Failure to keep in proper lane	Head On	0	0	0	S	SH State Owned

*Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.

Vermont Agency of Transportation
 Formal Statewide Sections - Route Log Order /2 - Statewide
 Years: 2012 - 2016

Road: US Route 5

H.C.L No.	/3.	Route	System	Town	Mileage	AADT	Years	Crashes	Fatalities	Injuries	PDO Crashes	Critical Rate	Actual Rate	Ratio Actual/Critical	Severity Index (\$/Crash/1.)
	132	US-5	Major Collector (r)	Putney	0.041 - 0.341	5,448	5	13	0	0	13	2.137	4.358	2.039	\$11,300
	179	US-5	Major Collector (r)	Putney	0.641 - 0.941	3,300	5	8	0	3	7	2.431	4.428	1.822	\$43,075
	391	US-5	Major Collector (r)	Westminster	4.956 - 5.256	4,041	5	7	0	2	6	2.307	3.164	1.372	\$34,971
	587	US-5	Minor Arterial (r)	Westminster	5.856 - 6.156	5,096	5	9	0	4	5	2.778	3.226	1.161	\$45,611
#	234	US-5	Major Collector (r)	Rockingham	0.241 - 0.541	5,708	5	11	0	0	11	2.113	3.520	1.666	\$11,300
#	428	US-5	Major Collector (r)	Rockingham	1.041 - 1.341	5,920	5	9	0	0	9	2.093	2.777	1.326	\$11,300
	477	US-5	Major Collector (r)	Rockingham	1.641 - 1.941	5,400	5	8	0	1	7	2.142	2.706	1.263	\$20,950
	393	US-5	Major Collector (r)	Rockingham	3.241 - 3.541	5,669	5	9	0	6	5	2.116	2.900	1.370	\$65,278
	49	US-5	Major Collector (r)	Springfield	2.187 - 2.487	7,111	5	20	0	12	15	2.001	5.137	2.568	\$61,575
	588	US-5	Minor Arterial (r)	Springfield	2.487 - 2.787	6,636	5	11	0	2	9	2.607	3.028	1.161	\$25,336
	254	US-5	Major Collector (r)	Springfield	2.987 - 3.287	2,063	5	5	0	1	4	2.745	4.427	1.613	\$26,740
	3	US-5	Major Collector (r)	Weathersfield	4.869 - 5.169	1,680	5	13	0	10	8	2.892	14.134	4.887	\$75,031
	557	US-5	Major Collector (r)	Weathersfield	5.969 - 6.269	4,900	5	7	0	0	7	2.196	2.609	1.188	\$11,300
#	99	US-5	Major Collector (r)	Windsor	3.178 - 3.478	3,953	5	11	0	2	9	2.320	5.083	2.191	\$25,336
#	105	US-5	Major Collector (r)	Windsor	3.578 - 3.878	5,600	5	14	0	2	12	2.123	4.566	2.151	\$22,329
	572	US-5	Major Collector (r)	Hartford	1.861 - 2.161	4,968	5	7	0	0	7	2.188	2.574	1.176	\$11,300
	154	US-5	Major Collector (r)	Hartford	2.261 - 2.561	5,383	5	12	0	1	11	2.144	4.072	1.899	\$17,733
*	257	US-5	Major Collector (r)	Hartford	2.661 - 2.961	9,045	5	15	0	3	12	1.888	3.029	1.604	\$26,740
	616	US-5	Major Collector (r)	Hartford	3.461 - 3.761	8,346	5	10	0	5	6	1.924	2.188	1.137	\$51,030
	273	US-5	Major Collector (r)	Hartford	4.361 - 4.661	6,936	5	12	0	0	12	2.013	3.160	1.570	\$11,300
	205	US-5	Major Collector (r)	Hartford	4.761 - 5.061	6,671	5	13	0	8	7	2.032	3.559	1.751	\$60,546
	379	US-5	Major Collector (r)	Hartford	5.361 - 5.661	6,383	5	10	0	5	6	2.054	2.861	1.393	\$51,030
	689	US-5	Major Collector (r)	Hartford	5.761 - 6.061	4,589	5	6	0	2	4	2.233	2.388	1.070	\$37,033
	83	US-5	Major Collector (r)	Norwich	0.311 - 0.611	4,244	5	12	0	7	7	2.278	5.164	2.267	\$58,217
*	575	US-5	Major Collector (r)	Norwich	1.211 - 1.511	4,052	5	6	0	1	5	2.305	2.705	1.173	\$24,167
	144	US-5	Major Collector (r)	Norwich	5.311 - 5.611	1,600	5	5	0	2	3	2.928	5.708	1.950	\$42,180
	74	US-5	Major Collector (r)	Thetford	2.821 - 3.121	1,241	5	5	0	4	2	3.115	7.359	2.362	\$75,320
	720	US-5	Major Collector (r)	Fairlee	2.641 - 2.941	3,715	5	5	0	0	5	2.357	2.458	1.043	\$11,300
	37	US-5	Major Collector (r)	Bradford	1.263 - 1.563	4,544	5	16	0	7	11	2.238	6.431	2.873	\$46,488
	113	US-5	Major Collector (r)	Bradford	3.463 - 3.763	2,700	5	8	0	1	7	2.560	5.412	2.114	\$20,950
	50	US-5	Major Collector (r)	Newbury	9.304 - 9.604	4,423	5	14	0	3	11	2.254	5.781	2.565	\$27,843
	288	US-5	Major Collector (r)	Waterford, St. Johnsbury	1.057 - 0.266	2,800	5	6	0	3	3	2.536	3.914	1.543	\$49,900
	416	US-5	Minor Arterial (u)	St. Johnsbury	3.666 - 3.966	6,316	5	28	0	5	25	6.071	8.097	1.334	\$25,893

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

Road: US Route 5

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VTVSP1600/18B107558	Rockingham	8.56	12/16/2018	13:47	Sleet, Hail (Freezing Rain or Drizzle)	Driving too fast for conditions	Single Vehicle Crash	1	0	0	N	SH State Owned
VT0130100/2014BF000217	Rockingham	UNK	01/27/2014	08:08	[No Weather]		[No Direction of Collision]	0	0	0	E	SH
VT0130100/2017BF000464	Rockingham	UNK	02/17/2017	18:40	[No Weather]		[No Direction of Collision]	0	0	0	S	SH Class 1 TH
VT0140200/18SF002644	Springfield	0.13	03/20/2018	20:09	Clear	Under the influence of medication/drugs/alcohol, Passenger	Single Vehicle Crash	0	0	0	N	SH State Owned
VT0140200/17SF011282	Springfield	0.15	11/29/2017	06:40	Clear	No improper driving	Head On	0	0	0	N	SH State Owned
VT0140200/18SF008124	Springfield	0.25	09/12/2018	07:26	Cloudy	No improper driving	Head On	0	0	0	N	SH State Owned
VT0140200/15SF05942	Springfield	1.74	11/08/2015	20:45	Clear	Failed to yield right of way	Single Vehicle Crash	0	0	0	N	SH
VT0140200/16SF02468	Springfield	1.86	05/20/2016	20:30	[No Weather]	No improper driving	[No Direction of Collision]	0	0	0	N	SH State Owned
VT0140200/18SF006039	Springfield	1.96	06/30/2018	19:02	Clear	Operating defective equipment	Single Vehicle Crash	0	0	0	N	SH State Owned
VT0140200/15SF02445	Springfield	2.08	05/22/2015	13:32	Cloudy	Inattention, No improper driving, Other improper action	Rear End	0	0	0	S	SH
VT0140200/14SF03243	Springfield	2.19	07/29/2014	21:31	Cloudy	Inattention, No improper driving	Same Direction Sideswipe	0	0	0	W, P	SH
VT0140200/17SF009154	Springfield	2.19	09/26/2017	13:17	Clear		Rear End	0	0	0	E, P	SH State Owned
VT0140200/18SF008432	Springfield	2.19	09/24/2018	15:42	Clear	Failed to yield right of way, Visibility obstructed, No improper driving	Left Turn and Thru, Angle Broadside -->v--	0	0	0	E, W	SH State Owned
VT0140200/15SF06494	Springfield	2.20	12/17/2015	15:50	Rain	Inattention, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	W, N	SH
VT0140200/15SF06679	Springfield	2.20	12/29/2015	[No Time]	Sleet, Hail (Freezing Rain or Drizzle)	Unknown, No improper driving	Left Turns, Opposite Directions, Head On/Angle Crash --^v--	0	0	0	P	SH
VT0140200/17SF006861	Springfield	2.20	08/01/2017	12:10	Clear		Other - Explain in Narrative	0	0	0	W, N	SH State Owned
VT0140200/18SF002469	Springfield	2.20	03/15/2018	22:00	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Single Vehicle Crash	0	0	0	N	SH State Owned
VT0140200/14SF05530	Springfield	2.21	11/30/2014	11:44	Cloudy	Failed to yield right of way, Inattention, No improper driving	Other - Explain in Narrative	4	0	0	W, N	SH
VT0140200/17SF003755	Springfield	2.21	05/14/2017	15:42	Cloudy		Rear-to-rear	0	0	0	W, S	SH State Owned
VT0140200/14SF03796	Springfield	2.24	08/28/2014	23:45	Clear	Followed too closely, No improper driving	Rear End	1	0	0	N	SH

*Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VT0140200/15SF00355	Springfield	2.24	01/23/2015	07:55	Clear	Visibility obstructed, No improper driving	Same Direction Sideswipe	0	0	0	S	SH
VT0140200/15SF04532	Springfield	2.24	08/28/2015	23:45	Clear	Failure to keep in proper lane, No improper driving	Right Turn and Thru, Angle Broadside -->^--	0	0	0	N	SH
VT0140200/17SF004078	Springfield	2.24	05/24/2017	18:50	Clear	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH State Owned
VT0140200/17SF009735	Springfield	2.24	10/16/2017	18:00	Clear		Same Direction Sideswipe		0	0	E, W	SH State Owned
VT0140200/18SF000705	Springfield	2.24	01/22/2018	15:20	Cloudy	Failed to yield right of way, No improper driving	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	0	0	0	N, S	SH State Owned
VT0140200/18SF007326	Springfield	2.24	08/14/2018	14:48	[No Weather]		[No Direction of Collision]	0	0	0	N, E	SH State Owned
VT0140200/18SF004610	Springfield	2.26	05/17/2018	17:19	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Failure to keep in proper lane, No improper driving	Same Direction Sideswipe	0	0	0	E	SH State Owned
VT0140200/17SF000511	Springfield	2.34	01/23/2017	13:25	Clear	Inattention, No improper driving	Same Direction Sideswipe	0	0	0	N	SH State Owned
VT0140200/16SF03465	Springfield	2.35	07/07/2016	15:33	[No Weather]	Driving too fast for conditions, Failure to keep in proper lane	[No Direction of Collision]	0	0	0	E	SH State Owned
VT0140200/16SF02469	Springfield	2.36	05/20/2016	20:46	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	W	SH State Owned
VT0140200/17SF006815	Springfield	2.36	07/31/2017	10:20	Clear		Left Turn and Thru, Head On ^v--	1	0	0	E, W	SH State Owned
VT0140200/15SF02993	Springfield	2.43	06/21/2015	20:20	Rain	Driving too fast for conditions, Inattention	Single Vehicle Crash	0	0	0	E	SH
VT0140200/14SF02228	Springfield	2.44	06/02/2014	13:30	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Broadside v<--	2	0	0	S, W	SH
VT0140200/17SF002638	Springfield	2.45	04/07/2017	08:10	[No Weather]		[No Direction of Collision]	0	0	0	W, S	SH State Owned
VT0140200/17SF006358	Springfield	2.45	07/19/2017	14:53	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Head On ^v--	0	0	0	S, W	SH State Owned
VT0140200/14SF01202	Springfield	2.52	04/05/2014	10:32	Clear		Same Direction Sideswipe	0	0	0	E	SH
VT0140200/15SF03279	Springfield	2.53	07/03/2015	18:40	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Broadside v<--	0	0	0	S, W	SH
VT0140200/14SF00947	Springfield	2.55	03/19/2014	12:15	Unknown	Inattention, No improper driving	Same Direction Sideswipe	0	0	0	S, W	SH
VT0140200/18SF008910	Springfield	2.55	10/13/2018	07:44	Rain		Single Vehicle Crash	0	0	0	E	SH State Owned

*Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VT0140200/14SF00590	Springfield	2.64	02/19/2014	13:26	Snow	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, No improper driving	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	0	0	0	S, E	SH
VT0140200/14SF03655	Springfield	2.67	08/22/2014	07:53	Clear	Other improper action, No improper driving	Left Turn and Thru, Angle Broadside -->v--	0	0	0	S, E	SH
VT0140200/14SF05700	Springfield	2.67	12/09/2014	16:38	Snow		No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH
VT0140200/15SF00093	Springfield	2.67	01/07/2015	01:45	Clear	Driving too fast for conditions, Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Same Direction Sideswipe	0	0	0	W, E	SH
VT0140200/16SF007812	Springfield	2.67	11/30/2016	19:24	Cloudy	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH State Owned
VT0140200/16SF008485	Springfield	2.67	12/29/2016	12:58	Snow	Driving too fast for conditions, Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	1	0	0	N, W	SH State Owned
VT0140200/18SF004663	Springfield	2.67	05/19/2018	13:37	Rain	Disregarded traffic signs, signals, markings, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH State Owned
VT0140200/18SF008628	Springfield	2.67	10/02/2018	11:32	Rain		No Turns, Thru moves only, Broadside ^<	0	0	0	W, S	SH State Owned
VT0140200/17SF010345	Springfield	2.79	11/03/2017	05:45	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	W	SH State Owned
VT0140200/15SF02034	Springfield	3.01	05/02/2015	10:47	Clear	Under the influence of medication/drugs/alcohol, Manually Operating an Electronic Communications Device (texting, typing, dialing)	Single Vehicle Crash	0	0	0	E	SH
VT0140200/18SF006825	Springfield	3.04	07/27/2018	[No Time]	Severe Crosswinds	No improper driving	Single Vehicle Crash	0	0	0	W	SH State Owned
VT0140200/15SF00235	Springfield	3.06	01/16/2015	08:15	Clear	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	1	0	0	E	SH
VT0140200/17SF003008	Springfield	3.06	04/19/2017	17:09	Cloudy	Failed to yield right of way, No improper driving	Left Turn and Thru, Angle Broadside -->v--	1	0	0	W, N	SH State Owned
VT0140200/17SF12210	Springfield	3.06	12/30/2017	12:04	Clear	Driving too fast for conditions	Single Vehicle Crash	1	0	0	E	SH State Owned
VT0140200/18SF005726	Springfield	3.06	06/20/2018	11:20	Clear	Inattention, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, N	SH State Owned
VT0140200/15SF00047	Springfield	3.09	01/04/2015	11:11	Clear		Other - Explain in Narrative	0	0	0	E, S	SH
VT0140200/17SF008897	Springfield	4.48	09/19/2017	12:10	Clear		Same Direction Sideswipe	0	0	0	S	SH State Owned
VT0140200/15SF04465	Springfield	4.86	08/26/2015	09:43	Rain	Unknown	Single Vehicle Crash	0	0	0	N	SH
VT0140200/18SF006445	Springfield	5.06	07/14/2018	15:03	Clear	No improper driving	Single Vehicle Crash	0	0	0	N	SH State

*Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.

Appendix E: Site Pictures – Bridges 27 N&S



Looking north over Bridge 27N



Bridge 27N Abutment Backwall and Seat



Bridge 27N Deck Underside at Abutment



Bridge 27N Abutment and Bin Wall



Bridge 27N Median Fascia



Bridge 27N Wingwall and Deck End



Looking South over Bridge 27S



Bridge 27S Abutment Backwall and Seat



Bridge 27S Median Fascia



Bridge 27S Median Wingwall and Curb End



Bridge 27S Deck Underside at Abutment



Bridge 27S Abutment and Bin Wall



Bridge 27S Curb Deterioration at Bridge End



Northern Bin Wall



Northern Bin Wall Under 26S Median Fascia



Northern Bin Wall Under 26N Median Fascia



Southern Bin Wall



Spencer Brook Culvert un Exit 7 Ramp

Appendix F: Bridge Inspection Reports – Bridges 27 N&S

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for :SPRINGFIELD

bridge no.: 0027N

District: 2

Located on: I 00091 ML over BIKE PATH

approximately 0.1 MI S EXIT 7

Owner: 01 STATE-OWNED

CONDITION

Deck Rating: 6 SATISFACTORY

Superstructure Rating: 7 GOOD

Substructure Rating: 7 GOOD

Channel Rating: N NOT APPLICABLE

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200091027N14182

Federal Sufficiency Rating: 0

Deficiency Status of Structure: ND

STRUCTURE TYPE and MATERIALS

Bridge Type: ROLLED BEAM

Number of Approach Spans: 0000 Number of Main Spans: 001

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane: 2 PREFORMED FABRIC

Deck Protection: 0 NONE

AGE and SERVICE

Year Built: 1965 Year Reconstructed: 0000

Service On: 1 HIGHWAY

Service Under: 3 PEDESTRIAN

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 01

ADT: 015000 % Truck ADT: 13

Year of ADT: 2018

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 7 BETTER THAN MINIMUM CRITERIA

Deck Geometry: 6 EQUAL TO MINIMUM CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: N NOT OVER WATER

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: N NOT OVER WATERWAY

GEOMETRIC DATA

Length of Maximum Span (ft): 0072

Structure Length (ft): 000074

Lt Curb/Sidewalk Width (ft): 0 0

Rt Curb/Sidewalk Width (ft): 0 0

Bridge Rdwy Width Curb-to-Curb (ft): 38

Deck Width Out-to-Out (ft): 43

Appr. Roadway Width (ft): 038

Skew: 21

Bridge Median: 1 OPEN MEDIAN

Min Vertical Clr Over (ft): 999 FT 99 IN

Feature Under: NEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 000 FT 00 IN

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 1 LOAD FACTOR (LF)

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 5 HS 20

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 052020

Insp. Freq. (months): 24

X-Ref. BrNum:

INSPECTION SUMMARY and NEEDS

5/13/2020 Asphaltic plug joints over both abutments have minor transverse cracking along edges and should be considered for replacement to prevent leakage to structure below. Eastern concrete curb has areas of concrete scaling and should be cleaned and patched. Debris should be cleaned off abutment bridge seats. General cleaning of the paint is needed along the lower flanges at beam ends and bearings should be cleaned and repainted. SMP & SEP

5/17/2018 The curbs have scattered large areas of spalling along the granite facing w/ heavy scaling and deep voids. The curb ends over the abutments have spalled out leaving sections of the granite facing unsupported, concrete repairs are needed. The failed section of the retaining wall below the west fascia needs to be repaired before further erosion occurs. JW/MC

5/13/2016 This structure is in good to satisfactory condition. The curb joint areas over the abutments need concrete repairs. Spalling continues and large voids allow runoff to fall onto the superstructure and substructure below. JW/AC

5/15/2014 Structure is in good condition. However the curbs should be cleaned and patched. ~FRE/TJB

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for :SPRINGFIELD

bridge no.: 0027S

District: 2

Located on: I 00091 ML over BIKE PATH

approximately 0.1 MI S EXIT 7

Owner: 01 STATE-OWNED

CONDITION

Deck Rating: 6 SATISFACTORY

Superstructure Rating: 7 GOOD

Substructure Rating: 7 GOOD

Channel Rating: N NOT APPLICABLE

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200091027S14182

Federal Sufficiency Rating: 0

Deficiency Status of Structure: ND

STRUCTURE TYPE and MATERIALS

Bridge Type: ROLLED BEAM

Number of Approach Spans: 0000 Number of Main Spans: 001

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane: 2 PREFORMED FABRIC

Deck Protection: 0 NONE

AGE and SERVICE

Year Built: 1965 Year Reconstructed: 0000

Service On: 1 HIGHWAY

Service Under: 3 PEDESTRIAN

Lanes On the Structure: 03

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 01

ADT: 015000 % Truck ADT: 13

Year of ADT: 2018

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 7 BETTER THAN MINIMUM CRITERIA

Deck Geometry: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: N NOT OVER WATER

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: N NOT OVER WATERWAY

GEOMETRIC DATA

Length of Maximum Span (ft): 0072

Structure Length (ft): 000074

Lt Curb/Sidewalk Width (ft): 0 0

Rt Curb/Sidewalk Width (ft): 0 0

Bridge Rdwy Width Curb-to-Curb (ft): 42

Deck Width Out-to-Out (ft): 47

Appr. Roadway Width (ft): 041

Skew: 20

Bridge Median: 1 OPEN MEDIAN

Min Vertical Clr Over (ft): 999 FT 99 IN

Feature Under: NEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 000 FT 00 IN

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 1 LOAD FACTOR (LF)

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 5 HS 20

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 052020

Insp. Freq. (months): 24

X-Ref. BrNum:

INSPECTION SUMMARY and NEEDS

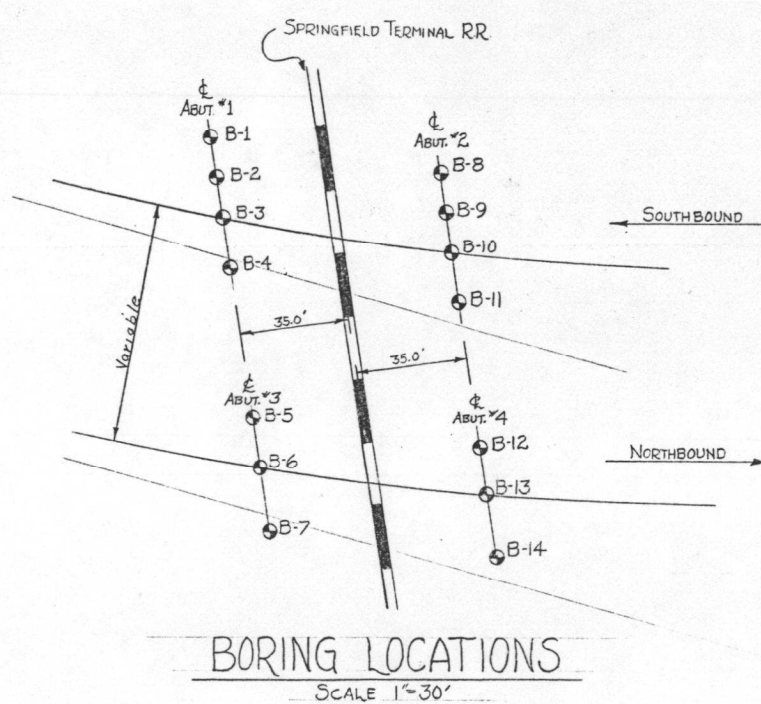
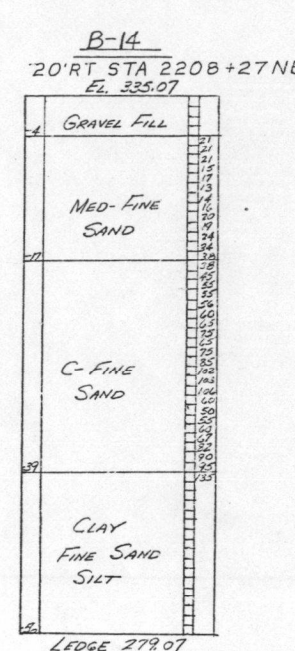
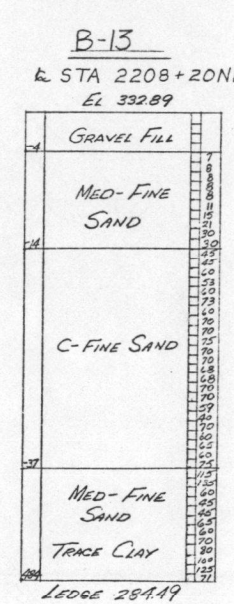
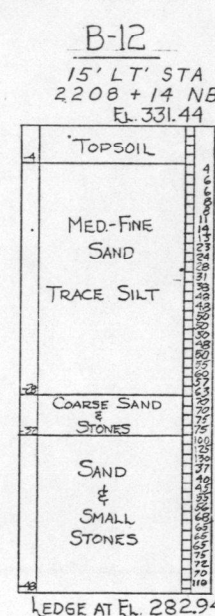
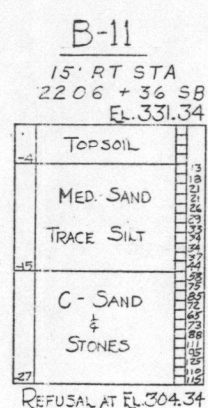
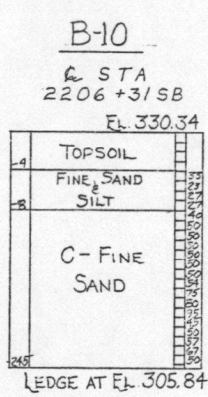
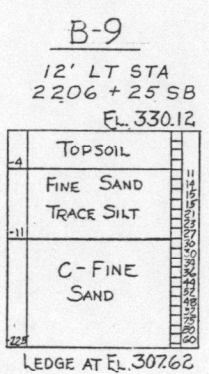
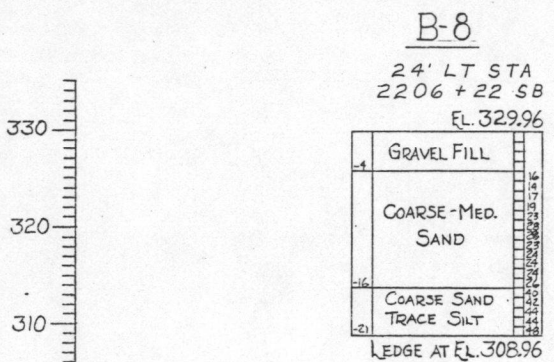
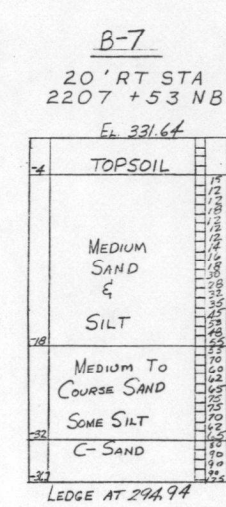
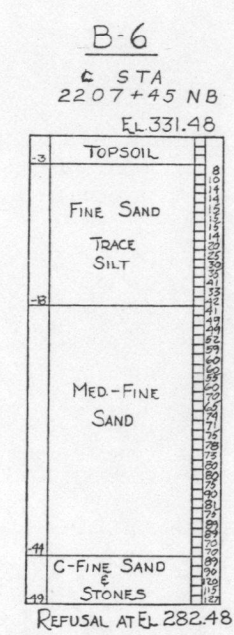
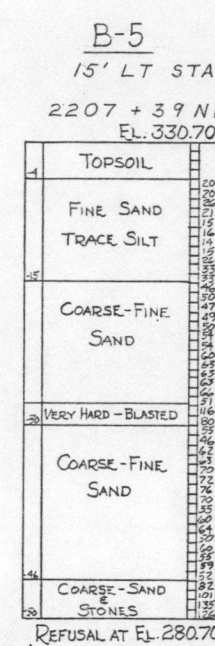
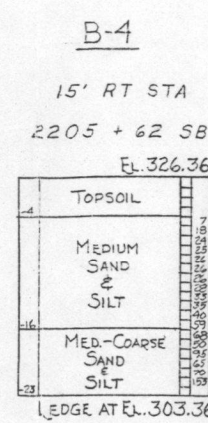
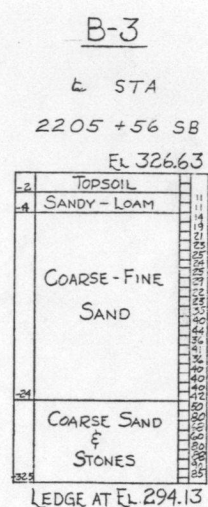
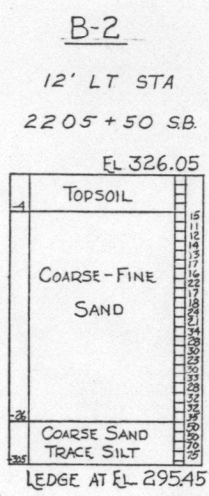
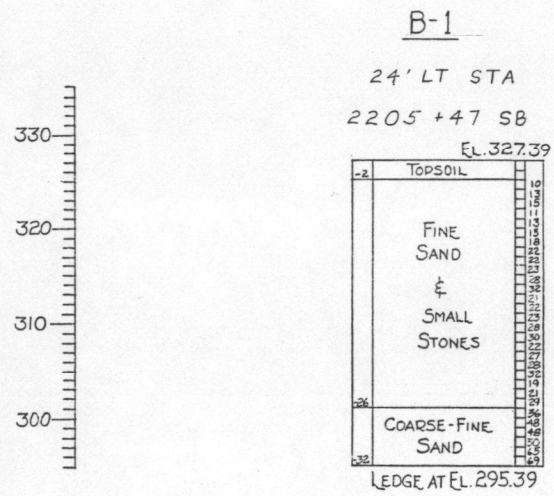
5/13/2020 Structure is in fairly good condition having minor deterioration. Older sections of rail and damaged rail should be replaced. Asphaltic plug joints over both abutments have minor transverse cracking along edges and should be considered for replacement to prevent leakage to structure below. Concrete curbing has areas of concrete scaling and should be cleaned and patched. Debris should be cleaned off abutment bridge seats. General cleaning of the paint is needed along the lower flanges at beam ends and bearings should be cleaned and repainted. SMP & SEP

5/17/2018 Scattered small spalls with scaling and small voids along the granite facing. The curb ends over the abutments have spalled out leaving sections of the granite facing unsupported, concrete repairs are needed. The failed section of the retaining wall below the west fascia of the north bound bridge needs to be repaired before further erosion occurs. JW/MC

5/13/2016 This structure is in good to satisfactory condition. The curb joint areas over the abutments need concrete repairs. Spalling continues and large voids allow runoff to fall onto the superstructure and substructure below. JW/AC

5/15/2014 Structure is in good condition. However the curbs should be cleaned and patched. ~FRE/TJB

Appendix G: Existing Geotechnical Information – Bridges 27 N&S



ITEM NO.	ITEM	UNIT	NET	OVERRUN	TOTAL	FINAL
106-A	CHAN. EXCAV. OF EARTH	C. Y.				
106-B	CHAN. EXCAV. OF ROCK	C. Y.				
106-C	UNCLASS. CHAN. EXCAV.	C. Y.				
107	STRUCT. EXCAV.	C. Y.				
401-B	CONC. CLASS B (MOD.)	C. Y.				
402	REINF. STEEL	L.F.S.				
407	ASPHALTIC-ASB. COATING	S. Y.				
502-B	TREATED TIMBER PILING	L. F.				
503	SPLICES FOR STEEL PILING	EA.				
504	STEEL PILING	L. F.				
502-A	UNTREATED TIMBER PILING	L. F.				

STATE OF VERMONT
DEPARTMENT OF HIGHWAYS

TOWN OF SPRINGFIELD

ROUTE No. I-91 LOG STA. _____

BORING LOG

INTERSTATE OVER SPRINGFIELD TR. RR.

SCALE AS NOTED _____

SURVEYED BY _____

DRAWN BY RND CHECKED BY AV

PROJECT No. I-91-1(19) CON. 3

SHEET 07 OF 141

Appendix H: Crash Data – Bridges 27 N&S

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

Road: I-91

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VTVSP1600/17B108316	Springfield	41.00	12/25/2017	05:56	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B108374	Springfield	41.00	12/27/2017	11:52	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/18B100392	Springfield	41.00	01/17/2018	16:41	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/18B100393	Springfield	41.00	01/17/2018	17:04	Snow	Driving too fast for conditions, No improper driving	Same Direction Sideswipe	2	0	0	N	SH State Owned
VTVSP1600/18B100371	Springfield	41.00	01/17/2018	03:44	Snow	Driving too fast for conditions, Not Distracted	Single Vehicle Crash	0	0	0	S	SH State Owned
VTVSP1600/18B105755	Springfield	41.00	09/24/2018	06:17	Clear	No improper driving	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP1600/18B104015	Springfield	41.13	07/06/2018	17:42	Clear	Other improper action	Single Vehicle Crash	0	0	0	N	SH State Owned
VTVSP0400/14D101365	Springfield	41.55	05/08/2014	18:35	Clear	Distracted	Single Vehicle Crash	0	0	0	S	SH
VTVSP1600/16D003100	Springfield	41.60	10/27/2016	21:58	Snow	Driving too fast for conditions, Failure to keep in proper lane	Other - Explain in Narrative	0	0	0	S	SH State Owned
VTVSP1600/17B107210	Springfield	41.63	11/08/2017	13:37	Clear	wrong side or wrong way, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	1	0	0	S	SH State Owned
VTVSP1600/18B103483	Springfield	41.75	06/13/2018	16:44	Clear	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	1	0	0	S	SH State Owned
VTVSP1600/18B107395	Springfield	41.83	12/07/2018	18:57	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Unknown	Same Direction Sideswipe	0	0	0	S	SH State Owned
VTVSP0400/14D100897	Springfield	42.00	03/20/2014	16:09	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D100345	Springfield	42.00	02/02/2015	10:15	Snow	Driving too fast for conditions, Followed too closely, No improper driving	Rear End	1	0	0	S	SH
VTVSP0400/15D102152	Springfield	42.00	07/08/2015	10:03	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D103859	Springfield	42.00	12/29/2015	10:18	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/15D103872	Springfield	42.00	12/29/2015	19:08	[No Weather]		[No Direction of Collision]	0	0	0		SH
VTVSP0400/16D100582	Springfield	42.00	03/11/2016	09:27	Clear	Fatigued, asleep, Failure to keep in proper lane, No improper driving	Rear End	0	0	0	S	SH State Owned
VTVSP1600/16D001598	Springfield	42.00	09/07/2016	00:03	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
VTVSP1600/17B107971	Springfield	42.00	12/12/2017	13:51	[No Weather]		[No Direction of Collision]	0	0	0		SH State

*Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.

Vermont Agency of Transportation

Statewide Sections - Route Log Order /2 - Statewide

Years: 2010 - 2014

H.C.L. No.	Route	System	Town	Mileage	ADT	Years	Crashes	Fatalities	Injuries	PDO Crashes	Critical Rate	Actual Rate	Ratio Actual/Critical	Severity Index (\$/Accident/1.)
503 I-91		Interstate, Rural (r)	Vernon, Guilford	5.000 - 5.300	16700	5	12	0	1	11	1.168	1.312	1.124	\$14,733
504 I-91		Interstate, Rural (r)	Guilford	6.000 - 6.300	16700	5	12	0	1	11	1.168	1.312	1.124	\$14,733
521 I-91		Interstate, Urban (r)	Brattleboro	7.600 - 7.900	18900	5	11	0	1	10	0.967	1.063	1.099	\$15,264
290 I-91		Interstate, Urban (r)	Brattleboro	8.500 - 8.800	18900	5	14	0	4	11	0.967	1.352	1.399	\$29,536
111 I-91		Interstate, Urban (r)	Brattleboro	9.000 - 9.300	22774	5	22	0	5	17	0.926	1.764	1.904	\$24,809
505 I-91		Interstate, Urban (r)	Brattleboro	9.800 - 10.100	22800	5	13	0	0	13	0.926	1.041	1.124	\$8,900
394 I-91		Interstate, Rural (r)	Dummerston	17.800 - 18.100	14600	5	12	0	5	9	1.205	1.501	1.246	\$39,550
530 I-91		Interstate, Rural (r)	Putney	18.400 - 18.700	10200	5	8	0	1	7	1.314	1.432	1.09	\$17,650
310 I-91		Interstate, Rural (r)	Putney	19.000 - 19.300	10200	5	10	0	1	9	1.314	1.79	1.363	\$15,900
417 I-91		Interstate, Rural (r)	Putney	19.600 - 19.900	10200	5	9	0	1	8	1.314	1.611	1.226	\$16,678
308 I-91		Interstate, Rural (r)	Putney	21.000 - 21.300	10200	5	10	0	4	7	1.314	1.79	1.363	\$37,790
415 I-91		Interstate, Rural (r)	Westminster	24.000 - 24.300	10200	5	9	0	4	7	1.314	1.611	1.226	\$41,989
186 I-91		Interstate, Rural (r)	Westminster, Rockingham	31.000 - 31.300	12400	5	14	0	7	10	1.253	2.062	1.646	\$45,807
620 I-91		Interstate, Rural (r)	Rockingham	35.000 - 35.300	11155	5	8	0	1	7	1.285	1.309	1.019	\$17,650
276 I-91		Interstate, Rural (r)	Rockingham	36.400 - 36.700	10900	5	11	0	5	7	1.292	1.843	1.426	\$41,527
277 I-91		Interstate, Rural (r)	Rockingham	37.900 - 38.200	10900	5	11	0	0	11	1.292	1.843	1.426	\$8,900
458 I-91		Interstate, Rural (r)	Rockingham, Springfield	39.000 - 39.300	10900	5	9	0	3	7	1.292	1.508	1.166	\$33,222
457 I-91		Interstate, Rural (r)	Springfield	40.000 - 40.300	10900	5	9	0	5	6	1.292	1.508	1.166	\$49,767
76 I-91		Interstate, Rural (r)	Springfield	40.800 - 41.100	10900	5	16	0	2	14	1.292	2.681	2.074	\$17,650
266 I-91		Interstate, Rural (r)	Springfield	41.500 - 41.800	10650	5	11	0	2	9	1.3	1.886	1.451	\$21,627
416 I-91		Interstate, Rural (r)	Springfield	42.100 - 42.400	10200	5	9	0	3	6	1.314	1.611	1.226	\$32,233
414 I-91		Interstate, Rural (r)	Springfield	43.000 - 43.300	10200	5	9	0	5	5	1.314	1.611	1.226	\$48,778

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

Road: US Route 5

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VT0140200/15SF00355	Springfield	2.24	01/23/2015	07:55	Clear	Visibility obstructed, No improper driving	Same Direction Sideswipe	0	0	0	S	SH
VT0140200/15SF04532	Springfield	2.24	08/28/2015	23:45	Clear	Failure to keep in proper lane, No improper driving	Right Turn and Thru, Angle Broadside -->^--	0	0	0	N	SH
VT0140200/17SF004078	Springfield	2.24	05/24/2017	18:50	Clear	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH State Owned
VT0140200/17SF009735	Springfield	2.24	10/16/2017	18:00	Clear		Same Direction Sideswipe		0	0	E, W	SH State Owned
VT0140200/18SF000705	Springfield	2.24	01/22/2018	15:20	Cloudy	Failed to yield right of way, No improper driving	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	0	0	0	N, S	SH State Owned
VT0140200/18SF007326	Springfield	2.24	08/14/2018	14:48	[No Weather]		[No Direction of Collision]	0	0	0	N, E	SH State Owned
VT0140200/18SF004610	Springfield	2.26	05/17/2018	17:19	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Failure to keep in proper lane, No improper driving	Same Direction Sideswipe	0	0	0	E	SH State Owned
VT0140200/17SF000511	Springfield	2.34	01/23/2017	13:25	Clear	Inattention, No improper driving	Same Direction Sideswipe	0	0	0	N	SH State Owned
VT0140200/16SF03465	Springfield	2.35	07/07/2016	15:33	[No Weather]	Driving too fast for conditions, Failure to keep in proper lane	[No Direction of Collision]	0	0	0	E	SH State Owned
VT0140200/16SF02469	Springfield	2.36	05/20/2016	20:46	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	W	SH State Owned
VT0140200/17SF006815	Springfield	2.36	07/31/2017	10:20	Clear		Left Turn and Thru, Head On ^v--	1	0	0	E, W	SH State Owned
VT0140200/15SF02993	Springfield	2.43	06/21/2015	20:20	Rain	Driving too fast for conditions, Inattention	Single Vehicle Crash	0	0	0	E	SH
VT0140200/14SF02228	Springfield	2.44	06/02/2014	13:30	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Broadside v<--	2	0	0	S, W	SH
VT0140200/17SF002638	Springfield	2.45	04/07/2017	08:10	[No Weather]		[No Direction of Collision]	0	0	0	W, S	SH State Owned
VT0140200/17SF006358	Springfield	2.45	07/19/2017	14:53	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Head On ^v--	0	0	0	S, W	SH State Owned
VT0140200/14SF01202	Springfield	2.52	04/05/2014	10:32	Clear		Same Direction Sideswipe	0	0	0	E	SH
VT0140200/15SF03279	Springfield	2.53	07/03/2015	18:40	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Broadside v<--	0	0	0	S, W	SH
VT0140200/14SF00947	Springfield	2.55	03/19/2014	12:15	Unknown	Inattention, No improper driving	Same Direction Sideswipe	0	0	0	S, W	SH
VT0140200/18SF008910	Springfield	2.55	10/13/2018	07:44	Rain		Single Vehicle Crash	0	0	0	E	SH State Owned

*Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

* Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
VT0140200/14SF00590	Springfield	2.64	02/19/2014	13:26	Snow	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, No improper driving	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	0	0	0	S, E	SH
VT0140200/14SF03655	Springfield	2.67	08/22/2014	07:53	Clear	Other improper action, No improper driving	Left Turn and Thru, Angle Broadside -->v--	0	0	0	S, E	SH
VT0140200/14SF05700	Springfield	2.67	12/09/2014	16:38	Snow		No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH
VT0140200/15SF00093	Springfield	2.67	01/07/2015	01:45	Clear	Driving too fast for conditions, Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Same Direction Sideswipe	0	0	0	W, E	SH
VT0140200/16SF007812	Springfield	2.67	11/30/2016	19:24	Cloudy	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH State Owned
VT0140200/16SF008485	Springfield	2.67	12/29/2016	12:58	Snow	Driving too fast for conditions, Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	1	0	0	N, W	SH State Owned
VT0140200/18SF004663	Springfield	2.67	05/19/2018	13:37	Rain	Disregarded traffic signs, signals, markings, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	SH State Owned
VT0140200/18SF008628	Springfield	2.67	10/02/2018	11:32	Rain		No Turns, Thru moves only, Broadside ^<	0	0	0	W, S	SH State Owned
VT0140200/17SF010345	Springfield	2.79	11/03/2017	05:45	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	W	SH State Owned
VT0140200/15SF02034	Springfield	3.01	05/02/2015	10:47	Clear	Under the influence of medication/drugs/alcohol, Manually Operating an Electronic Communications Device (texting, typing, dialing)	Single Vehicle Crash	0	0	0	E	SH
VT0140200/18SF006825	Springfield	3.04	07/27/2018	[No Time]	Severe Crosswinds	No improper driving	Single Vehicle Crash	0	0	0	W	SH State Owned
VT0140200/15SF00235	Springfield	3.06	01/16/2015	03:15	Clear	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	1	0	0	E	SH
VT0140200/17SF003008	Springfield	3.06	04/19/2017	17:09	Cloudy	Failed to yield right of way, No improper driving	Left Turn and Thru, Angle Broadside -->v--	1	0	0	W, N	SH State Owned
VT0140200/17SF12210	Springfield	3.06	12/30/2017	12:04	Clear	Driving too fast for conditions	Single Vehicle Crash	1	0	0	E	SH State Owned
VT0140200/18SF005726	Springfield	3.06	06/20/2018	11:20	Clear	Inattention, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, N	SH State Owned
VT0140200/15SF00047	Springfield	3.09	01/04/2015	11:11	Clear		Other - Explain in Narrative	0	0	0	E, S	SH
VT0140200/17SF008897	Springfield	4.48	09/19/2017	12:10	Clear		Same Direction Sideswipe	0	0	0	S	SH State Owned
VT0140200/15SF04465	Springfield	4.86	08/26/2015	09:43	Rain	Unknown	Single Vehicle Crash	0	0	0	N	SH
VT0140200/18SF006445	Springfield	5.06	07/14/2018	15:03	Clear	No improper driving	Single Vehicle Crash	0	0	0	N	SH State

*Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.

Appendix I: Resource ID Completion Memo



OFFICE MEMORANDUM
AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Carolyn Cota, Project Manager
FROM: Lee Goldstein, Environmental Specialist
DATE: 05/06/2022
Project: Springfield IM 091-1(83)-12A574

ENVIRONMENTAL RESOURCES:

Table with 4 columns: Resource Name, Yes, No, and Reference. Rows include Archaeological Resources, Historic Resources, Wetlands, Aquatic Organism Passage, Agricultural Soils, Wildlife Habitat, Endangered Species, Stormwater Considerations, Landscape Considerations, 6(f) Properties, Hazardous Waste, Contaminated Soils, Wild Scenic Rivers, Act 250 Permits, FEMA Floodplains, Flood Hazard Area, River Corridor, Protected Lands, US Coast Guard, Lakes and Ponds, Scenic Highway/ Byway, and Other.

cc: Carolyn Cota
Project File

Appendix J: Archaeology ID Memo

Brennan Gauthier
VTrans Senior Archaeologist
Vermont Agency of Transportation
Project Delivery Bureau
Environmental Section
tel. 802-279-1460
Brennan.Gauthier@Vermont.gov

To: Lee Goldstein, VTrans Environmental Specialist
From: Brennan Gauthier, VTrans Senior Archaeologist
Date: 9/24/2021
Subject: Springfield IM 091-1(83) EXPANDED Archaeological Resource Identification

Dear Lee,

I have completed my field inspection and background research for the expanded resource identifications efforts near Bridges No. 26 n/s, 27 n/s and 28 n/s as well as the interstate cloverleaves and several other smaller areas. With the exception of potentially undisturbed areas adjacent to the Black River, the majority of the resource ID area is located within the previously disturbed Interstate ROW. This area was heavily altered during the construction of I-91 in 1964 and 1965 respectively. Essentially, the new resource lines extend northerly from the sensitive areas identified during the last iteration of the project. I've included a screenshot of the new areas below.

Feel free to reach out with any questions or concerns.

Sincerely,



Brennan

NOTE: Adam Goudreau (VTrans PM) and Brennan Gauthier had discussion how the findings remain the same when adding Bridges No. 25 n/s to the project, as the only archaeological sensitive areas are adjacent to the Black River.

Images and Illustrations

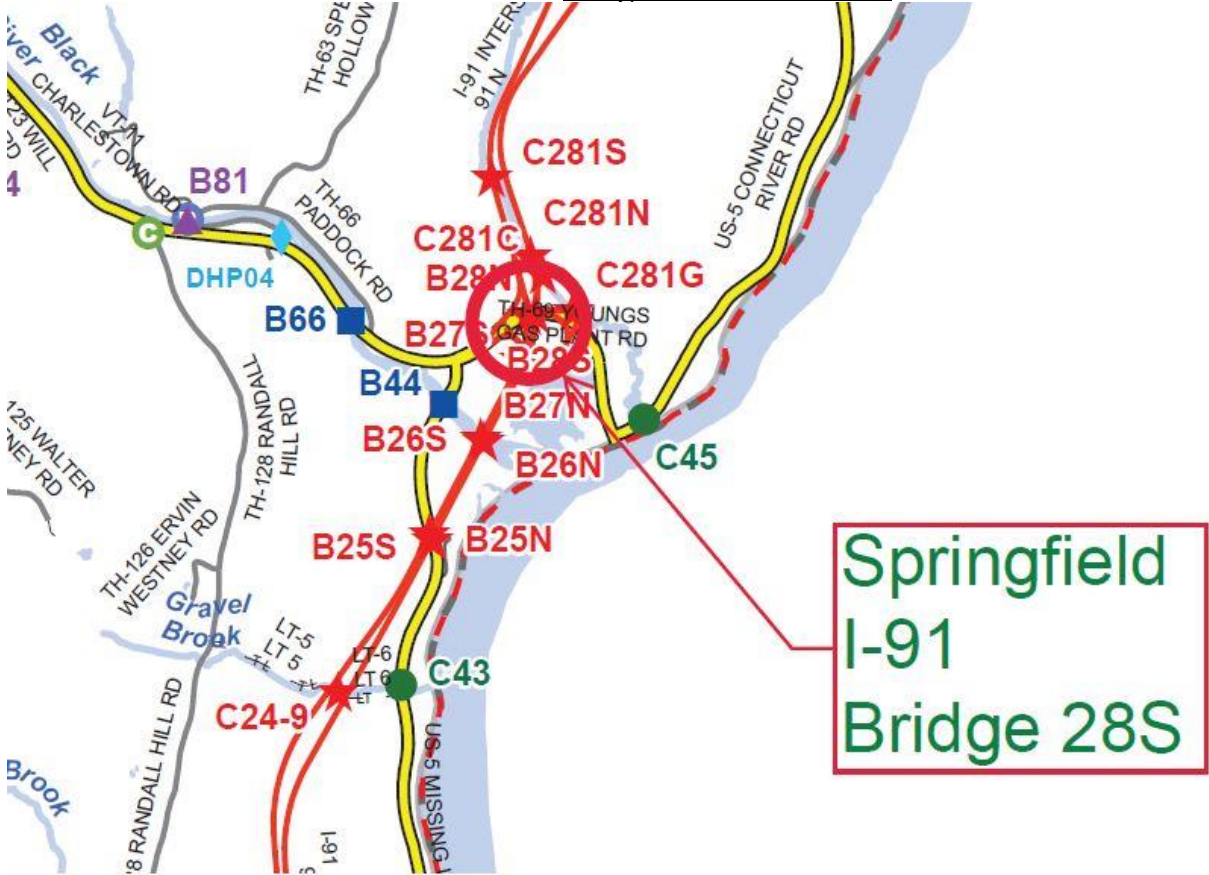


Figure 1: Resource ID Location.

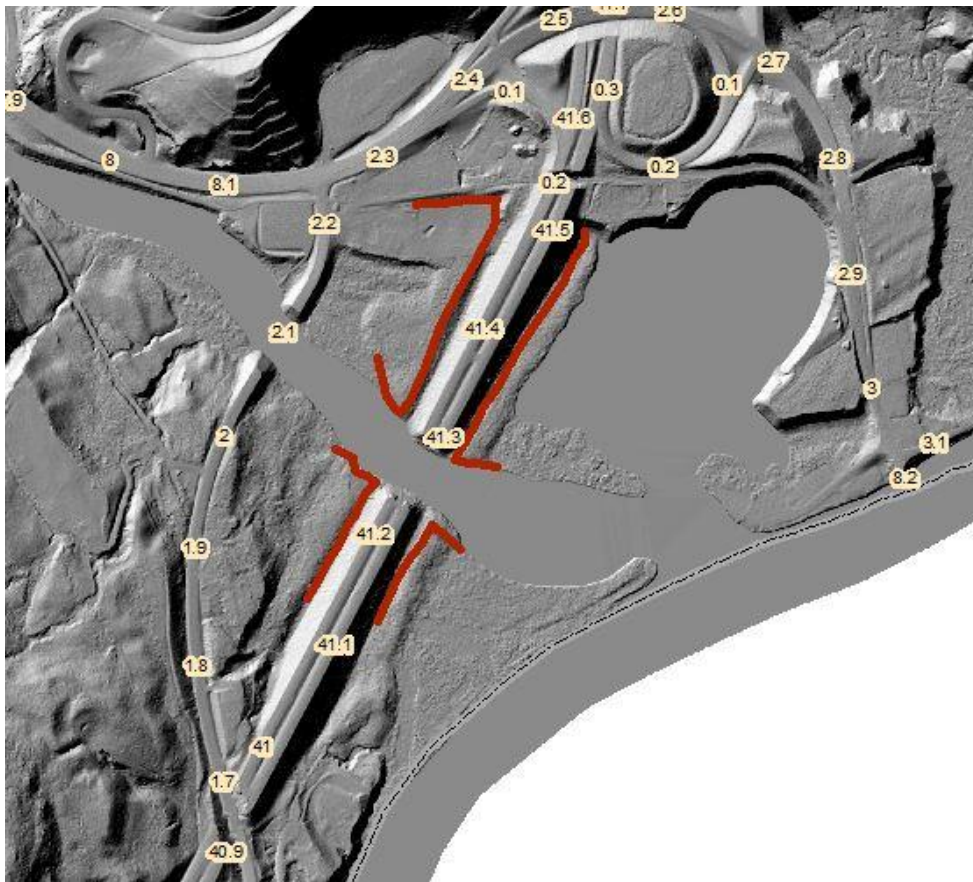


Figure 2: Sensitive Areas.

Appendix K: Historic Resource ID Memo



Kyle Obenauer

Senior Architectural Historian

Project Delivery Bureau - Environmental Section
219 N. Main Street
Barre, VT 05641

Vermont Agency of Transportation

kyle.obenauer@vermont.gov
(802) 279-7040
www.vtrans.vermont.gov

Historic Preservation Resource Identification Memo

To: Lee Goldstein, VTTrans Environmental Specialist
Cc: Brennan Gauthier, VTTrans Senior Archaeologist

Date: 06/25/201

Subject: Springfield IM 091-1(83)

Lee,

This Resource Identification effort expands on a previous Resource ID (Springfield IM 091-1[74]) and now includes a broad preliminary survey area that could possibly be impacted by a future Interstate 91 bridge project(s) at Bridges No. 26 n/s, 27 n/s, and 28 n/s, including the area around the Exit 7 interchange and 600' on either side of Interstate 91 along the Toonerville Rail Trail (*Figure 1*). Once a project has been defined at the conceptual design phase, VTTrans Cultural Resources staff will be able to determine a formal Area of Potential Effect (APE) for purposes of Section 106 and 22 VSA § 14.

Only one noteworthy resource was identified within the expanded survey area of this preliminary resource identification: **The Toonerville Rail Trail** (*Figure 2*). This pedestrian path is a **Section 4(f) property** and all project related impacts to its design, use, and/or function should be avoided. If feasible and safe, this path should remain open during construction.

There were no other significant buildings, structures, or objects identified. Work to Interstate 91 bridges at the locations above will most likely be considered Exempt from Section 106 review under the Advisory Council on Historic Preservation's *Exemption Regarding Historic Preservation Review Process for Effects to the Interstate Highway System*, listed in the *Federal Register*, Vol. 70; No. 46; 2005.

Please, let me know if there are any questions.

Images and Illustrations

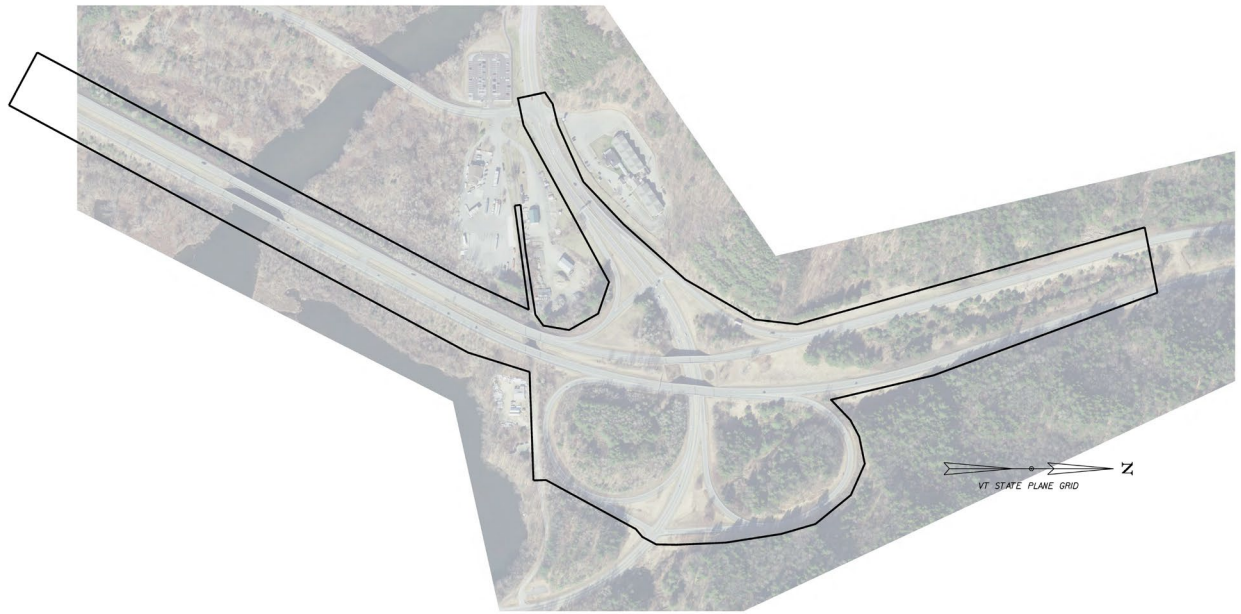


Figure 1. Expanded Survey Area

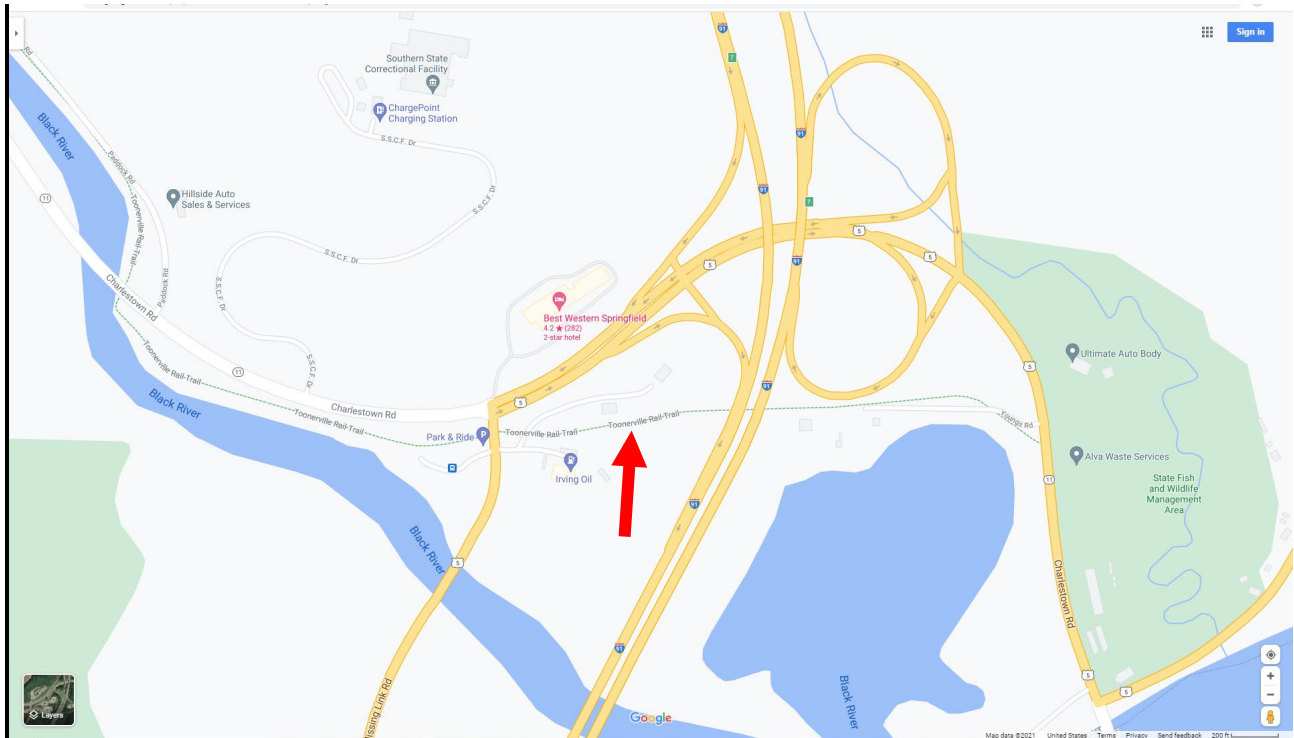


Figure 2. Toonerville Rail Trail within Survey Area

From: [Obenauer, Kyle](#)
To: [Goldstein, Lee](#)
Cc: [Gauthier, Brennan](#)
Subject: FW: Resource Request NOTIFICATION: SPRINGFIELD IM 091-1(83) 12A574
Date: Wednesday, January 26, 2022 10:22:00 AM

Good Morning Lee,

My resource ID dated 06/25/2021 for this project remains valid. New proposed work associated with Bridge Nos. 25 and potential shifts in the crossover location to the south of Bridge Nos. 25 remain exempt from Section 106 review, if confined to the existing Interstate Right of Way as proposed.

Finally, impacts to the adjacent Toonerville Rail Trail should still be avoided, if possible. This is a Section 4(f) property and potential impacts would need to be reviewed under 4(f).

I've saved a copy of this email to the project folder and updated the VPINS.

Thanks!

Kyle Obenauer | Senior Architectural Historian
Vermont Agency of Transportation
(802) 279-7040 | [VTrans Cultural Resources](#)

This is our shot, Vermont! Everyone age five and older is now eligible for a COVID-19 vaccine. Sign up for your shot today at healthvermont.gov/MyVaccine or follow @healthvermont on [Facebook](#) and [Twitter](#) for walk-in opportunities. **#OurShotVT**

From: EnterpriseSQL@vermont.gov <VPinsDoNotReply@vermont.gov>
Sent: Tuesday, January 4, 2022 9:09 AM
To: Griffin, Jonathan <Jonathan.Griffin@vermont.gov>
Cc: Wright, Andrea <Andrea.Wright@vermont.gov>; Donahue, Bonnie <Bonnie.Donahue@vermont.gov>; Gauthier, Brennan <Brennan.Gauthier@vermont.gov>; Slesar, Chris <Chris.Slesar@vermont.gov>; Folsom, Garret <Garret.Folsom@vermont.gov>; Voisin, Heather <Heather.Voisin@vermont.gov>; Ramsey, Jeff <Jeff.Ramsey@vermont.gov>; Armstrong, Jon <Jon.Armstrong@vermont.gov>; Obenauer, Kyle <Kyle.Obenauer@vermont.gov>; Goldstein, Lee <Lee.Goldstein@vermont.gov>; Lout, Meg <Meg.Lout@vermont.gov>
Subject: Resource Request NOTIFICATION: SPRINGFIELD IM 091-1(83) 12A574

Please DO NOT reply to this email.

CONFIRMATION EMAIL

**The following Resource Identification (030.01.06) Request has been successfully submitted:
Your Artemis schedule has been updated with the Actual Start date. Please review your project schedule to ensure it is correct and enter the expected finish date.**

Date Requested: 1/4/2022 9:08:40 AM

Project Request Type: Capital Program

Pin: 12A574

Project Name and Number: SPRINGFIELD IM 091-1(83) 12A574

Request Activity: Resource Identification (030.01.06)

Comments: Please reach out with any questions, I'm happy to have a quick kick off call if it would be helpful! Thank you!

Contact Information:

Name: Jonathan Griffin

Phone Number:

Email: jonathan.griffin@vermont.gov

Attachment Links:

[Click here for 'M:\Projects\12A574\Structures\Scoping\Springfield IM 091-1\(83\) Resource ID Request.pdf'](#)

Appendix L: Natural Resource ID Memo

State of Vermont

Highway Division-Project Delivery Bureau-Environmental
219 N. Main Street

Barre, VT 05641

Phone (802) 595-6708

www.aot.state.vt.us

To: Lee Goldstein, VTrans Environmental Specialist

From: Meg Lout, VTrans Biologist

Date: February 21, 2023

Subject: Springfield IM 091-1(83) - Natural Resource ID

I have reviewed Springfield IM 091-1(83) (the Project) for presence of natural resources (see **Figure 1**), which includes the north and southbound lanes of Bridges 25, 26, 27 and 28 on Interstate 91. My review encompasses area within 0.5 mile of the Project and included wetlands and waterways, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed existing mapping (Natural Resource Atlas and NRCS Soils) and imagery to capture natural resource presence.

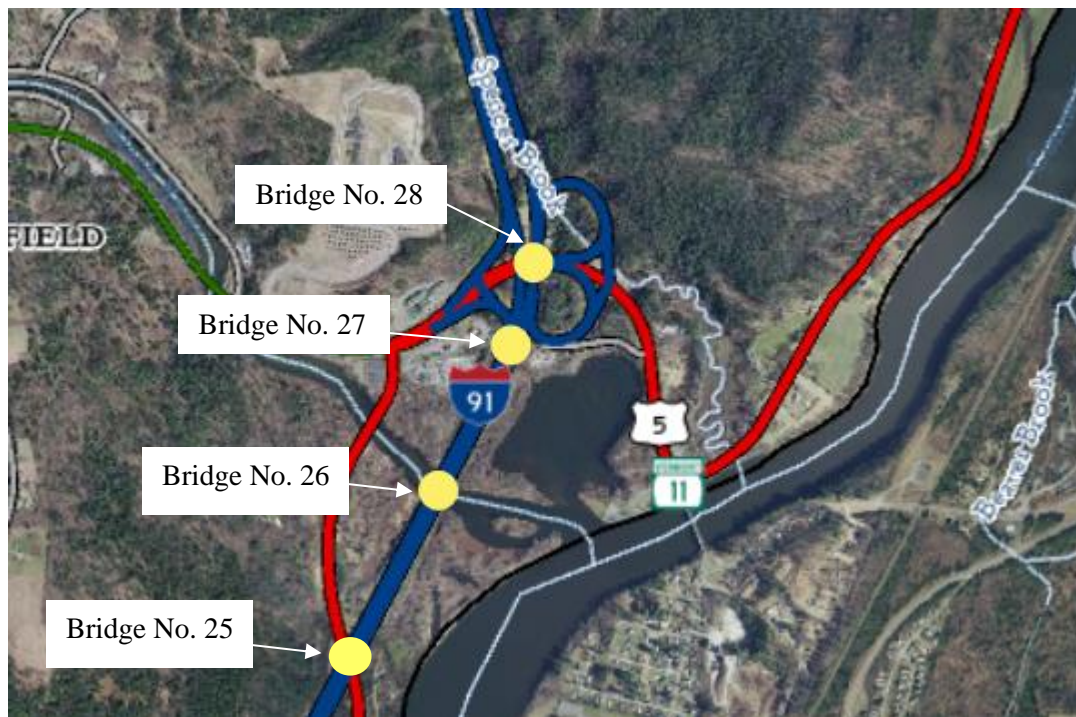


Figure 1. Location of Springfield IM 091-1(83).

Wetlands

Several Agency of Natural Resources' (ANR) wetland projects and mapped Class II wetlands are located near and adjacent to the Project, specifically at Bridges 26 and 27. A Vermont Wetlands Permit (VWP) will be required for impacts to wetland and associated buffer areas.

Watercourses

Spencer Brook is located approximately 500 feet northeast of Bridge No. 28 at its closest point, and Bridge No. 26 spans the Black River. Both Spencer Brook and the Black River are two watercourses that are regulated by the U.S. Army Corps of Engineers (COE) and the Ordinary High Water (OHW) mark is the regulatory boundary. A COE General Permit (GP) will be required for impacts below OHW.

Wildlife Habitat

I completed a review of wildlife habitat using the Agency of Natural Resources (ANR) Natural Resources Atlas. Bridge No. 26 is adjacent to forest blocks with highest priority landscape scale; However, bridges No. 25, 27, and 28 do not have and are not adjacent to any high or medium priority forest blocks. Wildlife connectivity and aquatic organism passage are unlikely to be a concern at this Project.

Rare, Threatened and Endangered Species (R/T/E):

Wildlife

The Project is located within the summer range of the federally and state endangered northern long-eared bat (*Myotis septentrionalis*) (Agency of Natural Resources, 2022). Suitable summer habitat for this species includes ≥ 3 inches in diameter that contain exfoliating or furrowed bark, cracks, crevices and/or cavities (U.S. Fish and Wildlife Service, 2021). The northern long-eared bat has also been documented roosting in structures with suitable microclimates (Vermont Fish and Wildlife Department, 2016). No suitable habitat was identified any of the bridges or in adjacent wooded areas. If the pedestrian path, which is located beneath bridge No. 27, is relocated and tree clearing is proposed, a habitat assessment and an acoustic survey may be required.

Botanical Species

The Northeastern bulrush (*Scirpus ancistrochaetus*) may also be located within the Project footprint.

Aquatic Organism

The Project also falls within the range of the federally and state endangered dwarf wedgemussel (*Alasmidonta heterodon*).

Insects

The monarch butterfly (*Danaus plexippus*), a species undergoing review for federal listing, may also occur in the Project area. No critical habitat has been designated for this species.

Agricultural Soils

According to a Natural Resource Atlas query, Prime Agricultural soil, Ninigret fine sandy loam, 0 to 8 percent slopes (9B), is adjacent to bridge No. 26. No mapped soils occur near the other bridges. No agricultural operations are practiced in the Project vicinity.

Summary

No potentially suitable bat habitat was identified at any of the bridges or in adjacent wooded areas. If the pedestrian path, which is located beneath bridge No. 27, is relocated and tree clearing is proposed, a habitat assessment and an acoustic survey for the northern long-eared bat may be required. A consultant will conduct formal wetland delineations at bridges 26 and 27, while concurrently conducting a botanical survey for the Northeastern bullrush, during the 2023 growing season. Field surveys and permitting for the dwarf wedgemussel may also be required for impacts to the Black River. The Project is not anticipated to have any impacts on the Monarch butterfly. Natural resource permitting that may be required, depending on scope, are a GP, VWP and Water Quality related permits.

References

Agency of Natural Resources, Natural Resource Atlas, viewed 2/16/2022,
<https://anrmaps.vermont.gov/websites/anra5/>.

Vermont Fish and Wildlife Department. 2016. Bats and Bridges Flow Chart. Provided by Alyssa Bennett, Small Mammals Biologist for the Vermont Fish and Wildlife Department.

Vermont Fish and Wildlife Department. 2017. Regulatory Review Guidance for Protecting the Northern Long-eared Bats and its Habitats,
[https://vtfishandwildlife.com/sites/fishandwildlife/files/documents/Conserve/RegulatoryReview/Guidelines/Regulatory_Review_Guidelines_for_Protecting_Northern_%20Long-eared_Bats_and_Their_Habitats_\(2-2017\).pdf](https://vtfishandwildlife.com/sites/fishandwildlife/files/documents/Conserve/RegulatoryReview/Guidelines/Regulatory_Review_Guidelines_for_Protecting_Northern_%20Long-eared_Bats_and_Their_Habitats_(2-2017).pdf).

Cc

Natural Resource Environmental File

Appendix M: Stormwater Resource ID Memo

State of Vermont
Environmental Section
219 North Main Street
Barre, Vermont 05641
Vtrans.vermont.gov

Agency of Transportation

[phone] 802-595-9143

To: Lee Goldstein VTrans Environmental Specialist
From: Jon Armstrong, Stormwater Management Engineer
Date: March 18, 2021
Subject: Springfield IM 091-1(83) Stormwater Resource ID Review

Project Description: I have reviewed the project area for stormwater related regulatory and water quality concerns. The project area involves Interstate 91 bridges 25 n/s, 26 n/s, 27 n/s, & 28 n/s including the area around the I-91 exit 7 interchange, and 600' along either side of the interstate along the Toonerville rail trail. The project scope is still ongoing, but it is anticipated that it will involve: Temp. I91 crossovers towards the South and North ends of the project will be installed, currently unscoped work on Bridges 25 n/s, superstructure replacement of Bridges 26 n/s, removal of Bridges 27 n/s, relocation of the Toonerville rail trail parallel along US5 and under Bridges 28 n/s and elimination of I91 Northbound exit cloverleaves to be replaced by diamond on and off ramps.

My evaluation has included the review of existing imagery and mapping (ANR Natural Resource Atlas, VTrans Operational Stormwater Permits) to capture existing stormwater features and existing drainage.

Regulatory Considerations

It is anticipated that an Operational Stormwater permit will be required for this project. There are no existing stormwater permits within the site area that will be impacted by the project. No formal stormwater treatment is located within the ROW.

The following are not noteworthy stormwater regulatory concerns at this time:

- This project site is not within a designated groundwater public water supply source protection area.
- The project site is not located within a stormwater impaired (303(d) list) watershed.

Existing Drainage

The project area largely consists of sheet flow to ditches, with some drainage pipes discharging to Spencer Brook and the Black River, both of which discharge to the Connecticut River.

Design Considerations

To the extent feasible, sheet flow through vegetation should be encouraged with the design. Soils in the project area are largely shown as hydrologic soil group A, which is well suited to infiltration practices with some areas of Hydrologic soil group C, which is likely not very well suited for infiltration practices.

As the conceptual and preliminary design progresses, please keep me and Heather Voisin, Green Infrastructure Engineer closely in the loop with respect to the anticipated drainage layout, stormwater treatment and permitting strategy. It will be helpful to have shaded plans and a project impact data form depicting the various categories of impervious surface when that is available.

Appendix N: Landscape Resource ID Memo



State of Vermont | Agency of Transportation
Environmental Section
219 North Main
Barre, VT 05641
Vtrans.vermont.gov

To: Project File
From: Bonnie Kirn Donahue, VTrans Landscape Architect
Date: January 7, 2022
Project: SPRINGFIELD IM 091-1(83) 12A574
Subject: Landscape (LA) Clearance for Resource ID

SUMMARY

I have reviewed the proposed area for **SPRINGFIELD IM 091-1(83) 12A574** dated 1/4/2022, and have determined that there will be major plant impacts occurring as a result of the proposed work:

- Eliminate clovers on Northbound exit side and install a traditional diamond like the Southbound Barrel.
- Relocate a piece of the rail trail parallel to US 5
- Remove Bridge 27 and relocate rail trail under new Bridge 28
- Bridge 25 – in scoping
 - Tree cutting may be needed
- Superstructure replacement along I-89 with potential access to piers
- Eliminate slip lane on southbound side
- Cross over on Spencer Brook
- Access to river needed at Bridge 26

DESCRIPTION OF IMPACT

Potential impacts from this project include:

- Disturbance to riparian buffers through work in and around rivers, including:
 - Connecticut River
 - Spencer Brook
- Disturbance to wetland and wetland buffers
- Tree clearing
 - Related to bridge work/construction
 - Relocation of a portion of Toonerville Rail Trail
 - Removal of clovers on Northbound exit and installation of traditional diamond.
- Other:
 - Altered pedestrian experience of relocation of a portion of Toonerville Rail Trail
 - Altered landscape on the Northbound exit and installation of traditional diamond.

Importance of Wetland and Riparian Buffers:

Riparian and wetland buffers serve an important purpose for the health of Vermont's water quality and wildlife. They prevent erosion on steep embankments, provide shade, food sources and woody debris for healthy aquatic habitat, and provide wildlife corridors along wetlands and streams. With a vegetated riparian buffer, sediment and pollutants like phosphorus are prevented from entering water bodies, keeping our rivers, ponds and lakes clear from algae and cool for fish and other aquatic species to thrive. Revegetating areas where riparian and wetland buffers are impacted establishes a connection between the newly completed project with the existing conditions. Selecting native plants that complement the character of the area will make projects more visually appealing and merge the transportation asset with its surroundings.

Using native trees and shrubs in addition to a seed mix speeds up natural succession, establishing an effective riparian buffer more quickly than using seed alone. Selecting plants that have already started to grow will also have a better chance of establishing before invasive plants have a chance to fill in.

Importance of Tree Protection:

Trees are living, breathing organisms and are sensitive to injury on their roots, trunk, and branches. Tree roots grow near the surface of the ground, extending to the outer edge of the tree's canopy. Disturbance to tree roots can occur from digging within the canopy (severing roots), driving heavy equipment within the canopy (compaction), storing heavy equipment or supplies within the tree canopy (compaction), and regrading or adding soil around existing trees (compaction & decreased oxygen). Trees can also be damaged by accidental wounds to trunks or branches, weakening the tree and inviting disease. Damage like the above can lead to the decline and eventual death of trees on any project.

For these reasons, it is important to protect existing healthy trees in the urban environment from damage during construction. Utilizing tree protection is a great way to ensure the health and safety of existing trees. See VTrans Standard Specs: 656.11 - TREE PROTECTION.

RECOMMENDATIONS

1. Riparian & Wetland Buffers: I recommend re-vegetating these disturbed areas with native trees and shrubs, willow fascines or live stakes (depending on soil conditions at the waters' edge) and a diverse pollinator seed mix.
2. Tree Protection: I recommend protecting as many existing, mature, and healthy trees as safe and possible in areas considered for tree clearing.
3. Alterations to Northbound Exit: I recommend revegetating these areas to jumpstart natural succession (in areas outside of the clear zone and sight lines) using native trees and shrubs, and a diverse pollinator seed mix.
4. Alterations to Toonerville Rail Trail: I recommend leaving space adjacent to the trail for strategic tree plantings. The type and number of plantings should be determined based on maintenance responsibility and capacity.

NOTES

1. I would be glad to assist with a plant list and plan (bonnie.donahue@vermont.gov).

Appendix O: Environmental Specialist Resource ID Memo

Date: May 6, 2022

Project: Springfield IM 091-1(83)-12A574

6(f) Properties:

There aren't any 6(f) Properties within the project area.

Hazardous Waste:

A known hazardous waste site is located in the proposed project general area, Hazardous Site #921304, for gasoline contamination. SMAC issued 07/16/2009. This project includes four sets of bridges; the possibility exists for lead paint. Therefore, although Urban Soil Background Areas are not mapped, there is a possibility for lead paint contamination to be encountered during excavation on this project, so coordination with the Hazard Waste coordinator is recommended.

Contaminated Soils:

There aren't any Urban Soil Background Areas mapped within the project area. See ANR Atlas map.

Wild Scenic Rivers:

There aren't any designated Wild Scenic Rivers within the project area.

Act 250 Permits:

There is one Act 250 Permit associated with the Toonerville Rail Trail within the project area. It has been determined that the permit was an amendment to an existing permit at a distant location and would not be impacted by this project.

FEMA Floodplains:

There are FEMA Floodplains mapped within the project area and a Flood Hazard Area/ River Corridor Permit may be required if there are impacts.

River Corridor:

There are River Corridors mapped within the project area and a Flood Hazard Area/ River Corridor Permit may be required if there are impacts.

Protected Lands:

There aren't any Protected Lands within the project area.

US Coast Guard:

There aren't any US Coast Guard navigable waterways within the project area.

Lakes and Ponds:

There aren't any lakes or ponds within the project area.

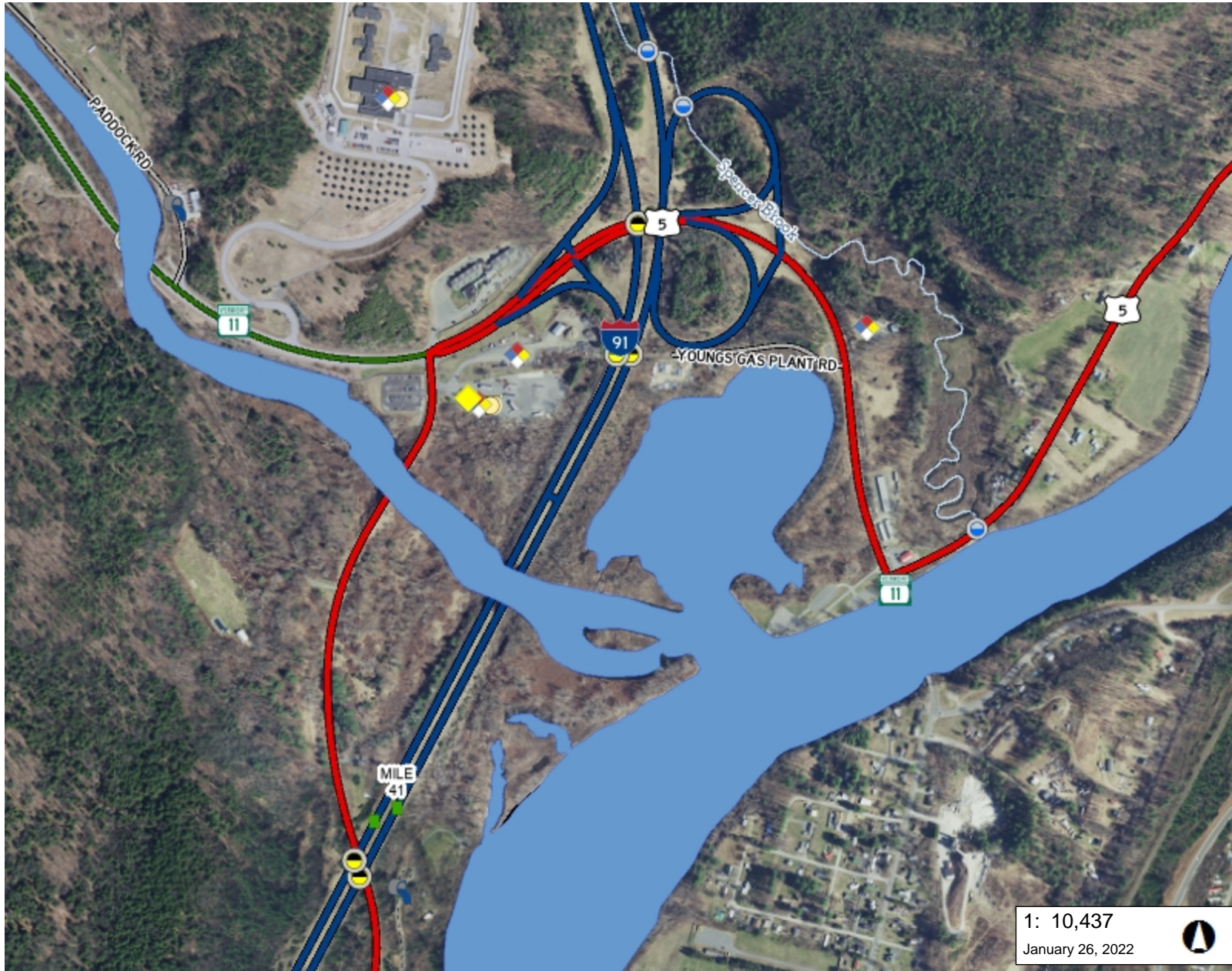
Scenic Highway/ Byway:

There are Scenic Highway/ Byways within the project area and further coordination with the Environmental Section may be required but unlikely.

Other:

The dwarf wedgemussel is mapped within the project area. Depending upon impacts, further action may be necessary.

Appendix P: Hazardous Waste Sites



LEGEND

- Hazardous Site
- Hazardous Waste Generators
- Aboveground Storage Tank
- Underground Storage Tank (w/...)
- Urban Soil Background Areas
- Highway Mile Markers
- River Area
- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Railroads
- Roads**
 - Interstate
 - US Highway; 1
 - State Highway
 - Town Highway (Class 1)
 - Town Highway (Class 2,3)
 - Town Highway (Class 4)
 - State Forest Trail
 - National Forest Trail
 - Legal Trail
 - Private Road/Driveway
 - Proposed Roads
- Stream/River**
 - Stream
 - Intermittent Stream

1: 10,437
January 26, 2022

NOTES

Map created 01/26/2022 using ANR's Natural Resources Atlas

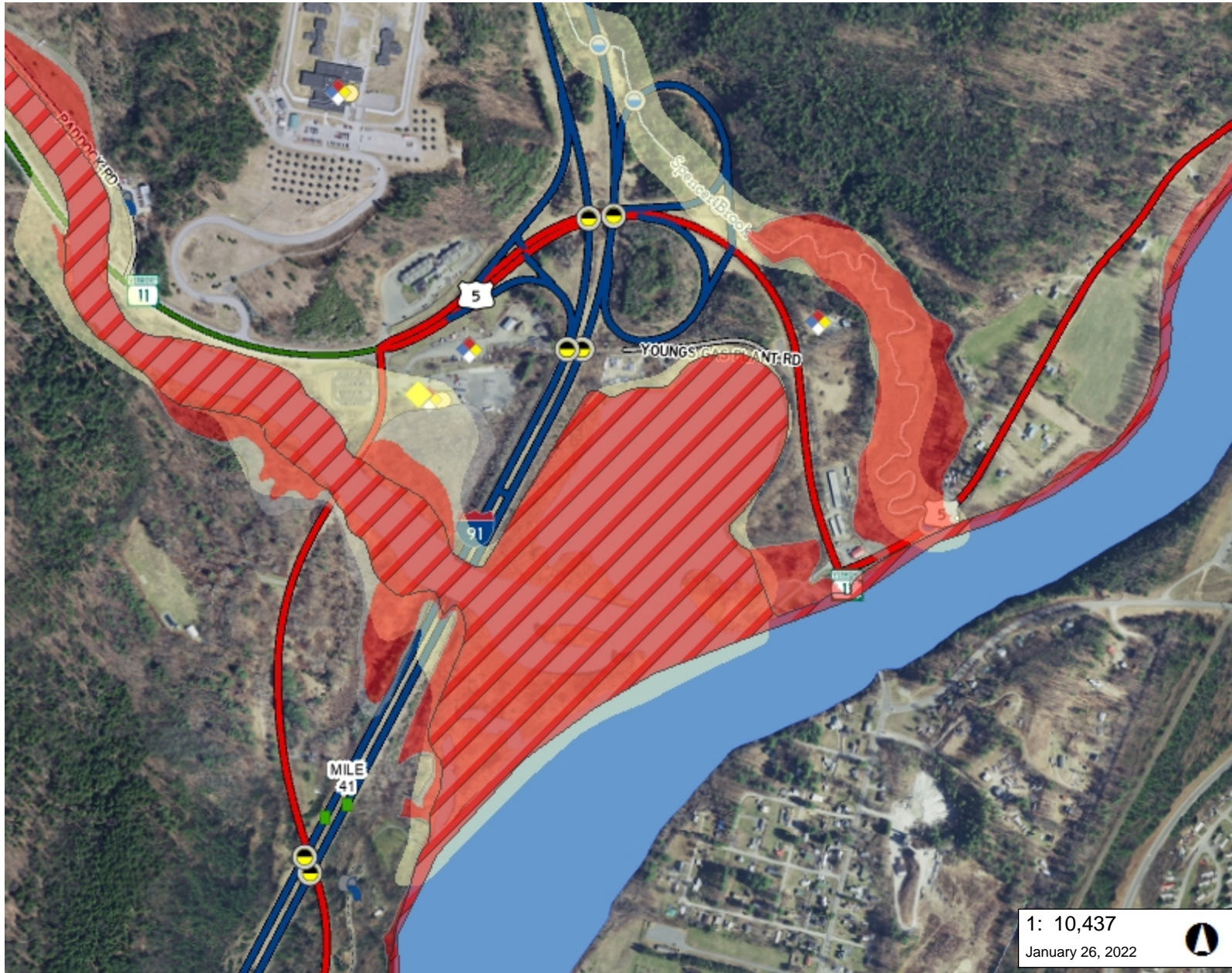
530.0 0 265.00 530.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 870 Ft. 1cm = 104 Meters

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Appendix Q: Floodplains Rivers Map



LEGEND

- DFIRM Floodways
- Flood Hazard Areas (Only FEM)**
- AE (1-percent annual chance flood)
- A (1-percent annual chance floodpl.)
- AO (1-percent annual chance zone feet)
- 0.2-percent annual chance flood ha
- River Corridors (Aug 27, 2019)
- .5 - 2 sqmi.
- .25-.5 sqmi.
- Hazardous Site
- Hazardous Waste Generators
- Aboveground Storage Tank
- Underground Storage Tank (w/)
- Urban Soil Background Areas
- Highway Mile Markers
- River Area
- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Railroads
- Roads**
- Interstate
- US Highway; 1
- State Highway
- Town Highway (Class 1)
- Town Highway (Class 2,3)

1: 10,437
January 26, 2022



NOTES

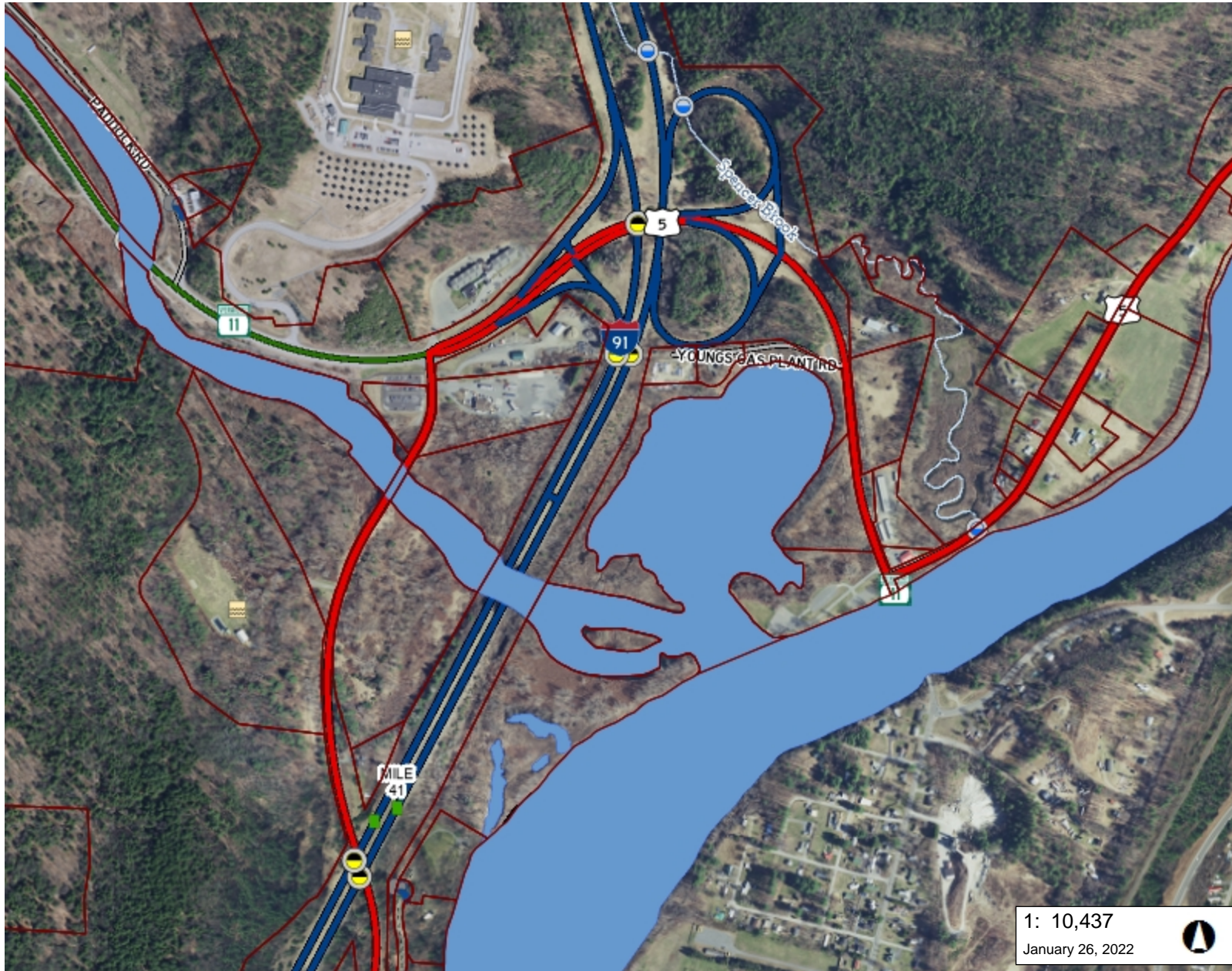
Map created 01/26/2022 using ANR's Natural Resources Atlas

530.0 0 265.00 530.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 870 Ft. 1cm = 104 Meters
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Appendix R: Other Resource Map



LEGEND

- Protected Lands**
 - Private Organizations
 - Vermont Municipalities
 - State
 - Federal
- Parcels (standardized)
- Highway Mile Markers
- River Area
- Act250 Permits ****INCOMPLET**
- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Railroads
- Roads**
 - Interstate
 - US Highway; 1
 - State Highway
 - Town Highway (Class 1)
 - Town Highway (Class 2,3)
 - Town Highway (Class 4)
 - State Forest Trail
 - National Forest Trail
 - Legal Trail
 - Private Road/Driveway
 - Proposed Roads
- Waterbody

1: 10,437
January 26, 2022



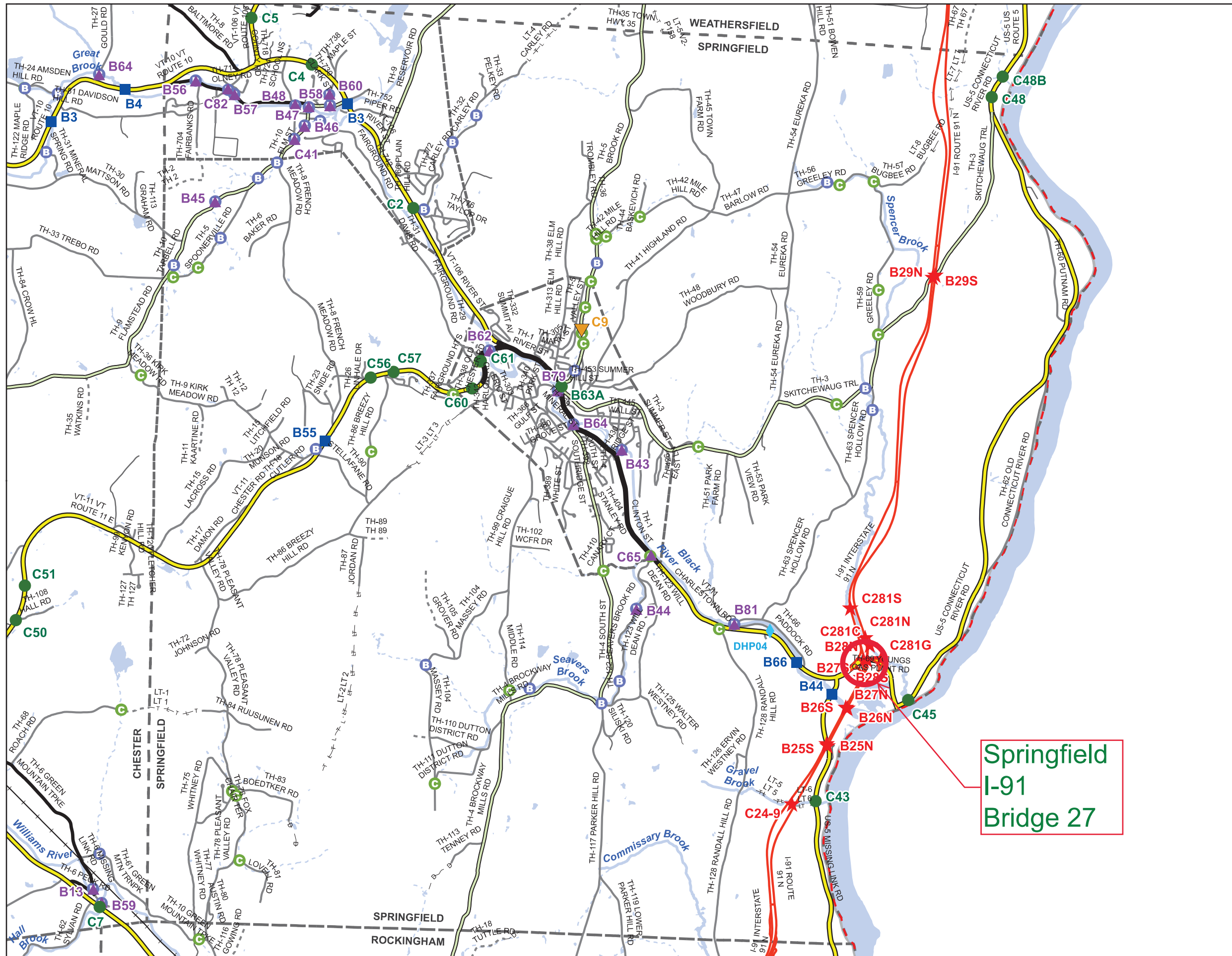
NOTES

Map created 01/26/2022 using ANR's Natural Resources Atlas

530.0 0 265.00 530.0 Meters
 WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 870 Ft. 1cm = 104 Meters
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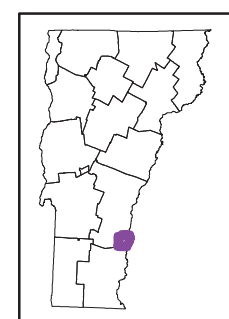
Appendix S: Town Map



- Scale: 1:49,340
- ★ INTERSTATE
 - STATE LONG
 - STATE SHORT
 - ▲ TOWN LONG
 - ▼ FAS/FAU
 - ◆ BIKE PATH
 - INTERSTATE
 - STATE HIGHWAY
 - CLASS 1
 - CLASS 2
 - CLASS 3
 - CLASS 4
 - - - LEGAL TRAIL
 - - - PRIVATE
 - - - DISCONTINUED
 - FAS/FAU HWY
 - MAINTENANCE DISTRICT
 - POLITICAL BOUNDARY
 - VTRANS REGION BOUNDARY
 - NAMED RIVER-STREAM
 - - - UNNAMED RIVER-STREAM
 - Ⓟ Point from Local Bridge Data *
 - Ⓞ Point from Local Culvert Data *

* Points are from local town bridge and culvert inventories. Some points may overlap where VTrans has also conducted an inventory on the Town highway.
Data source: VOBICIT aka VTCulverts

Produced by:
Mapping Section
Division of Policy, Planning and
Intermodal Development
Vermont Agency of Transportation
May 2017



SPRINGFIELD
COUNTY-TOWN CODE: 1418-0
WINDSOR COUNTY
DISTRICT # 2
District Long Name: Dummerston District
VTrans Four Region: Southeast

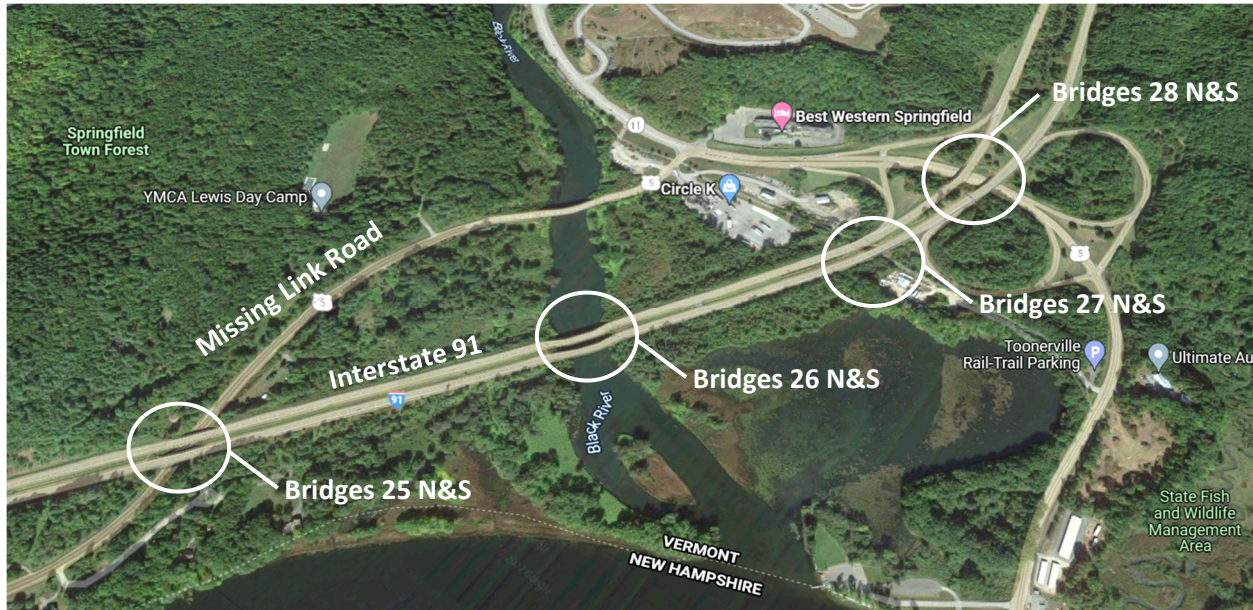
This map was funded in part through grants from the Federal Highway Administration, U.S. Department of Transportation. The representation of the authors expressed herein do not necessarily state or reflect those of the U. S. Department of Transportation.

Appendix T: Local Input

Local & Regional Input Questionnaire

Project Summary

This project, IM 091-1(83), includes improvements to four pair of bridges (eight total) along an approximate half mile section of Interstate 91 in Springfield, Vermont. Two bridges are located at the Exit 7 interchange, two over the Toonerville Rail Trail immediately south of Exit 7, two over the Black River slightly further to the south, and two over Route 5 (Missing Link Road). Please refer to the following map for clarity.



Questionnaires, similar to this one, were previously distributed to the Town in 2016 and 2020 to specifically inquire about the river and interchange bridges. Although the project has grown to encompass eight total bridges, this questionnaire is specific to the two I-91 bridges over Missing Link Road (Bridges 25 N&S) and over the Toonerville Rail Trail (Bridges 27 N&S).

Bridges 25 N&S are in fair to satisfactory condition. The evaluations at this site will focus on improvements to the bridges that address current needs, improve conditions, and align maintenance needs with other bridges within the project.

Bridges 27 N&S are in satisfactory to good condition. Beneath the bridges, and following the trail, there are metal bin retaining walls that are deteriorating and have failed significantly in one location. The focus of the project will be to identify improvements to the bridge and walls that can be incorporated simultaneously with work happening at the bridges adjacent to the north and south.

Potential options being considered for each bridge include major rehabilitation, deck replacement, and replacement with a new bridge. It is possible that VTrans will recommend a road closure and detour traffic off of the interstate for the duration or portion of the work. Efforts will be made to limit the detour to State roads.

If individual responses to the following questions have been provided by previous questionnaires and remain true, please simply state "Previously answered".

Local & Regional Input Questionnaire

Community Considerations

1. Are there regularly scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians), or may be difficult to stage if the bridge is closed during construction? Examples include annual bike races, festivals, parades, cultural events, weekly farmers market, concerts, etc. that could be impacted? If yes, please provide approximate date, location and event organizers' contact info.

Any restrictions on Missing Link Road (Route 5) will primarily affect residents and local delivery traffic. Restrictions on thru access of the Toonerville Trail would have an impact on seasonal use such as by Mainly Marathons, who regularly use the Trail for their events in June and September.

2. Is there a "slow season" or period of time from May through October where traffic is less, or no events are scheduled?

Traffic on Missing Link Road is fairly regular. Unfortunately the Toonerville Trail is highly used May-October.

3. Please describe the location of the Town garage, emergency responders (fire, police, ambulance) and emergency response routes that might be affected by the closure of the bridge, one-way traffic, or lane closures and provide contact information (names, address, email addresses, and phone numbers).

Police: (802) 885-2113 Rich Stillings, Administrative Assistant Richard.Stillings@vermont.gov

Fire/Ambulance (802) 885-4546 Paul Stagner, Deputy Chief pstagner@springfieldvtfire.org

Public Works: (802) 886-2208 Lois Smith, Office Manager pwwa@vermontel.net

4. Are there businesses (including agricultural operations and industrial parks) or delivery services (fuel or goods) that would be adversely impacted either by a detour or due to work zone proximity?

Exit 7 services nearby include a large truck stop, a Best Western motel, and a Park-and-Ride lot. These are close to the Toonerville Trail underpasses. The bridges over Missing Link Road are somewhat further away from the services noted above.

5. Are there important public buildings (town hall, community center, senior center, library) or community facilities (recreational fields, town green, etc.) close to the project?

None

6. What other municipal operations could be adversely affected by a road/bridge closure or detour?

None apart from emergency services.

7. Are there any town highways that might be adversely impacted by traffic bypassing the construction on other local roads? Please indicate which roads may be affected and their condition (paved/unpaved, narrow, weight-limited bridges, etc.), including those that may be or go into other towns.

Unfortunately, bridge work on I-91 over Missing Link Road/Route 5 will impact both the interstate highway and Route 5 southbound which would be the alternate local route between Exit 6 and Exit 7.

Local & Regional Input Questionnaire

Until recently travelers between those exits also had NH Route 12 as another detour around construction areas but I'm sure you're aware that NHDOT has had challenges with slope stability on Route 12.

8. Is there a local business association, chamber of commerce, regional development corporation, or other downtown group that we should be working with? If known, please provide name, organization, email, and phone number.

Springfield Regional Chamber of Commerce, Alice Page, Administrative Director 802-885-2779
alice@springfieldvt.com

Springfield Regional Development Corp., Bob Flint, Executive Director 802-885-3061
bobf@springfielddevelopment.org

9. Are there any public transit services or stops that use the bridge or transit routes in the vicinity that may be affected if they become the detour route?

No, although Southeast Vermont Transit/The Moover operations may be impacted by bridge restrictions. 888-869-6287 <https://www.moover.com/>

Schools

1. Where are the schools in your community and what are their yearly schedules (example: first week in September to third week in June)?

Springfield schools are located downtown and follow a September-June schedule. It is possible that any bus routes on Missing Link Road could be affected by construction.

Springfield School District, Administrative Assistant: Colleen Amaya – 802-885-5109

2. Is this project on specific routes that school buses or students use to walk to and from school?

Above

3. Are there recreational facilities associated with the schools nearby (other than at the school)?

Meeting Waters YMCA camp is located immediately north of the Missing Link Road bridge project.
<https://meetingwatersymca.org/programs/camps/day-camp>

Pedestrians and Bicyclists

1. Is pedestrian and bicycle traffic heavy enough on the Toonerville Rail Trail that it should be accommodated during construction?

In my opinion, yes, except for sporadic closures relating to the movement of equipment and material.

2. Does the Town have plans to construct trail extensions further to the east (e.g.: into New Hampshire) beyond the current limits? Please provide any planning documents demonstrating this (scoping study, master plan, corridor study, town or regional plan).

No. Hoyt's Landing on the Connecticut River is the terminus of the Toonerville Trail.

Local & Regional Input Questionnaire

3. In the vicinity of the bridge, is there a land use pattern, existing generators of pedestrian and/or bicycle traffic, or zoning that will support development that is likely to lead to significant levels of walking and bicycling?

No. The Toonerville Trail is regularly used by persons coming from many areas.

4. Would there be negative impacts to permanently closing the trail directly beneath I-91 and along Young's Road to the east of I-91?

Yes, absolutely. There's no safe, scenic alternative to the Toonerville Trail in that area. Young's Road itself is underutilized except by pedestrians and bicyclists. There's already a small parking lot at the beginning of Young's Road dedicated to the Toonerville Trail. Disconnecting it and the Trail would be disruptive, dangerous, and not in keeping with the Town's goal of fostering non-motorized recreational access to the Black River. As an indication of the importance of the Toonerville Trail it will be extended from its Clinton Street trailhead to Bridge Street at the Edgar May Health Center, closer to downtown, in the next 18-24 months.

Design Considerations

1. Are there any concerns with the alignment of the existing bridge? For example, if the bridge is located on a curve, has this created any problems that we should be aware of?

None that the Town is aware of.

2. Are there any concerns with the width of the existing bridge?

None that the Town is aware of.

3. Are there any special aesthetic considerations we should be aware of?

The new retaining walls bordering the Toonerville Trail should be durable and decorative within the limits of the project budget. Transportation personnel can see that the Town has moved away from galvanized steel coffer retaining wall designs of years past towards stamped concrete or precast retaining walls. Examples would be found along River Street above Main Street, and near the Vermont State Office Building at 100 Mineral Street.

4. Are there any known Hazardous Material Sites near the project site?

Young's Propane/Amerigas maintains a depot at the end of Young's Road.

5. Are there any known historic, archeological and/or other environmental resource issues near the project site?

Not that the Town is aware of.

6. Are there any utilities (water, sewer, communications, power) attached to the existing bridge? Please provide any available documentation.

Local & Regional Input Questionnaire

The Best Western obtains its water from Charlestown, NH. That water line would need to be located. Also, the sewer from the truck stop is pumped over to the sewer service line for the Best Western.

7. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc.) near the project that should be considered?

None that have been filed.

8. Are there any other issues that are important for us to understand and consider?

The Toonerville Trail is heavily used and is an important contributor to the rural economy that the Town is trying to enhance.

Land Use & Zoning

1. Please provide a copy of your existing and future land use map or zoning map, if applicable.

****Renee****

2. Are there any existing, pending or planned development proposals that would impact future transportation patterns near the bridge? If so, please explain.

None that have been presented to the Town

3. Is there any planned expansion of public transit or intercity transit service in the project area? Please provide the name and contact information for the relevant public transit provider.

Communications

1. Please identify any local communication outlets that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Facebook, Front Page Forum, etc. Also include any unconventional means such as local low-power FM.

[Eagle Times](#)

Springfield Reporter, Rod Arnold, Editor reporter@vermontel.net

[Springfield Area Public Access Television](#) Asah Cramer, Executive Director, asah@sapatv.org

[Vermont Journal/Shopper](#)

[WCRF Radio 106.5 FM](#)

[Town of Springfield website](#) Brian Benoit, tosmanerasst@vermontel.net

[Town of Springfield Facebook page](#) Brian Benoit, tosmanerasst@vermontel.net

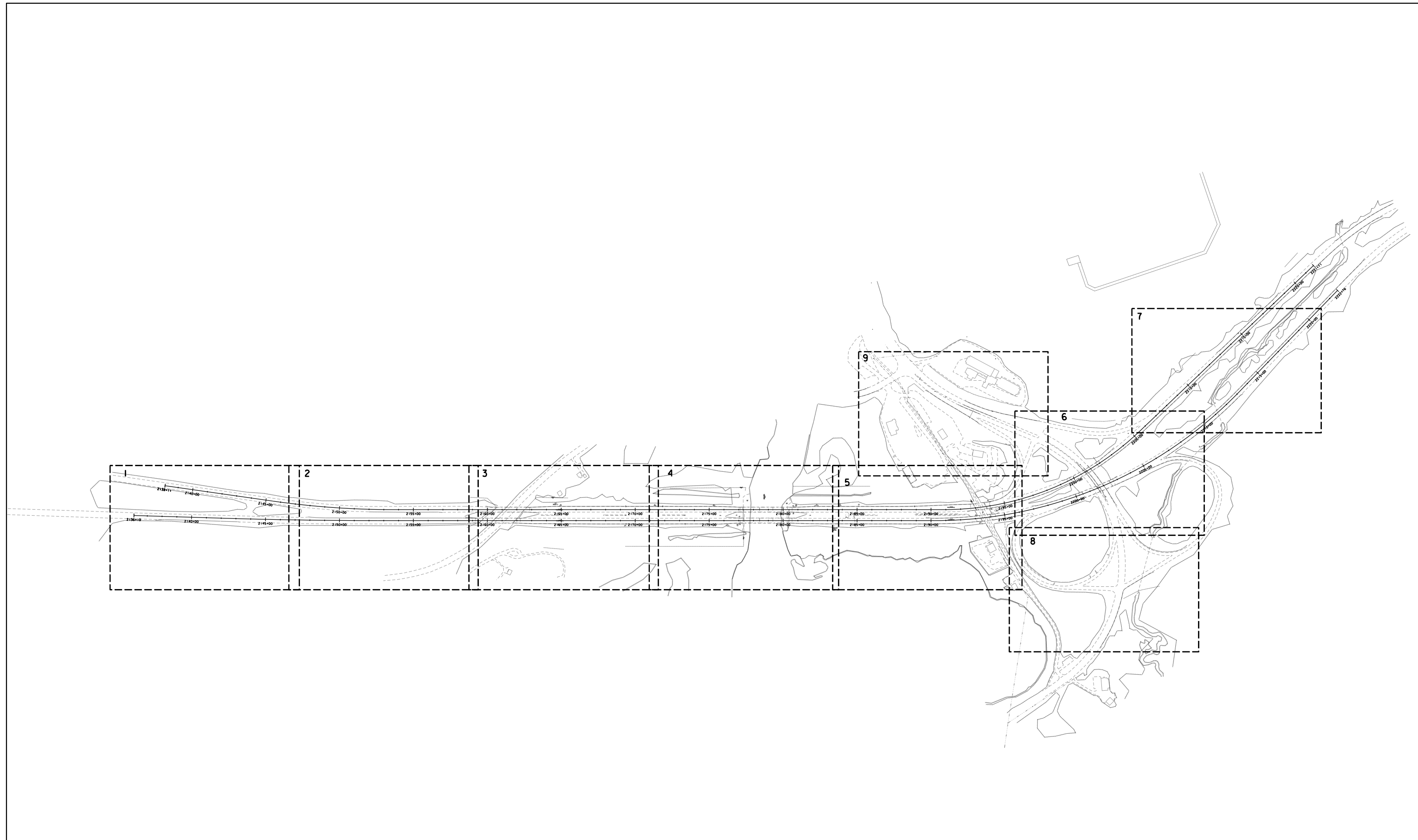
2. Other than people/organizations already referenced in this questionnaire, are there any others who should be kept in the loop as the project moves forward?

- For Exit 7 impacts generally: <http://www.alvawaste.com/> Trucking business nearby on Charlestown Road

Local & Regional Input Questionnaire

- Southern State Correctional Facility <http://doc.vermont.gov/correctional-facilities/sscf-springfield> Prison near Exit 7 & Route 5
- Circle K/Irving <https://www.circlek.com/store-locator/US/springfield/14-missing-link-rd/M7405> are installing electric vehicle charging stations soon, very close to project area.

Appendix U: Plans

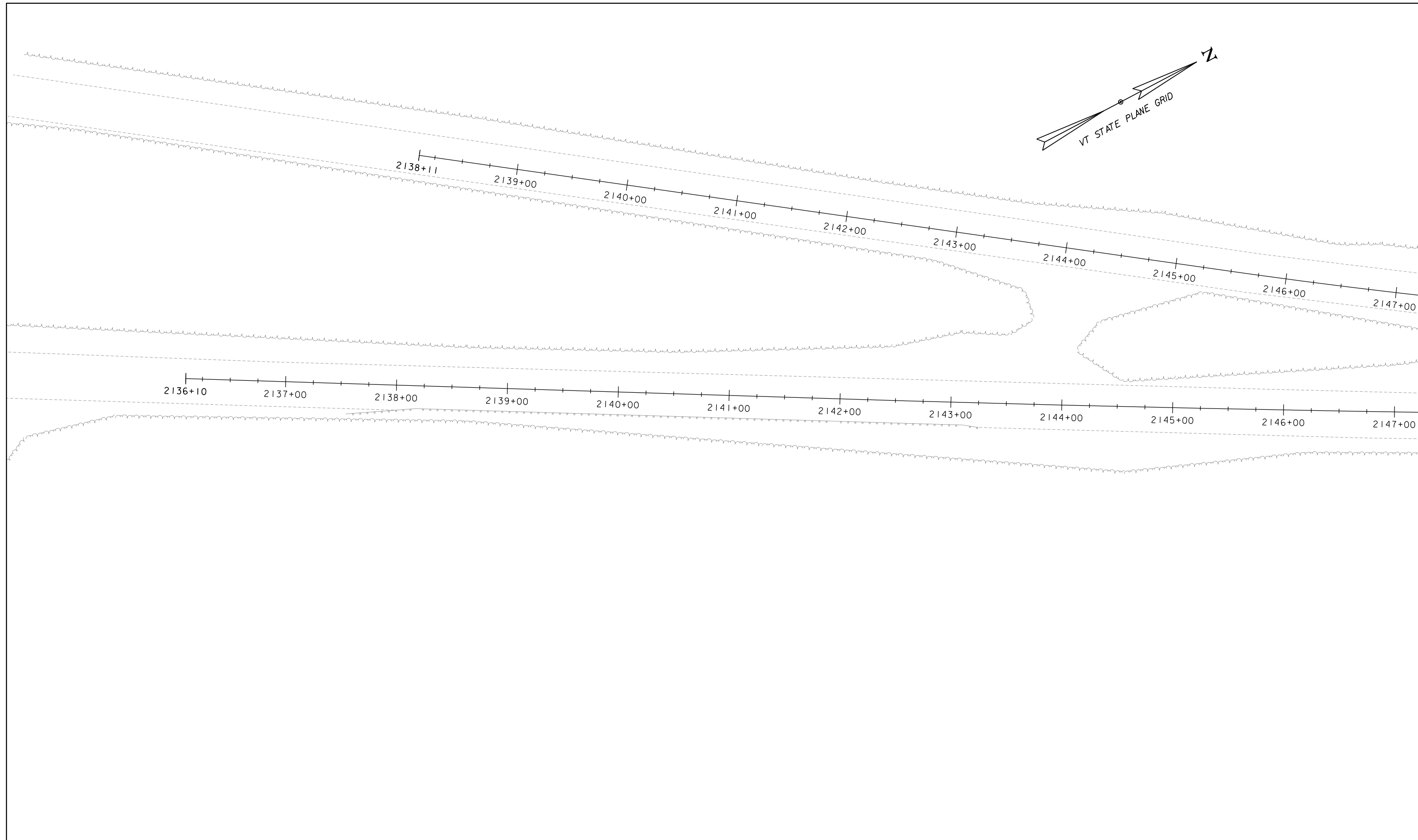
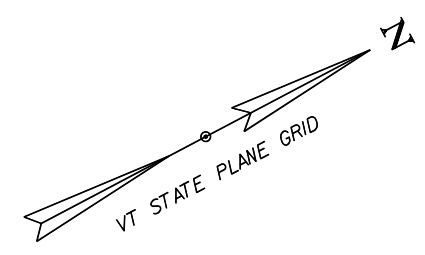


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PROJECT LEADER: J. OLUND	DRAWN BY: C. HELMICK
DESIGNED BY: C. HELMICK	CHECKED BY: L. DRISCOLL
KEY PLAN	SHEET 1 OF 56

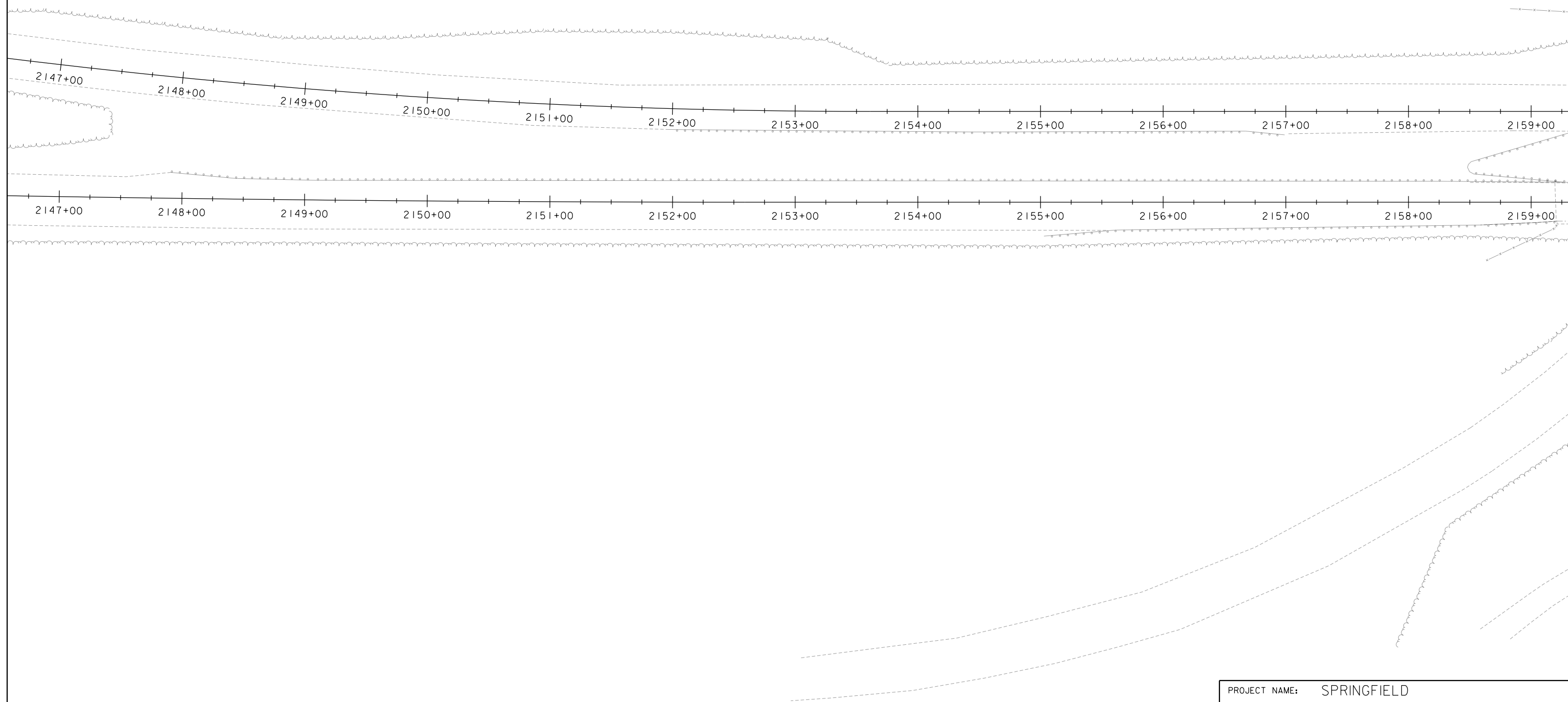
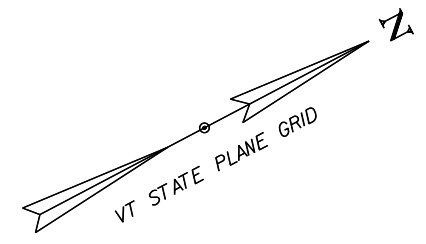


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PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574bdr.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 2 OF 56
DESIGNED BY: C. HELMICK	LAYOUT SHEET 1

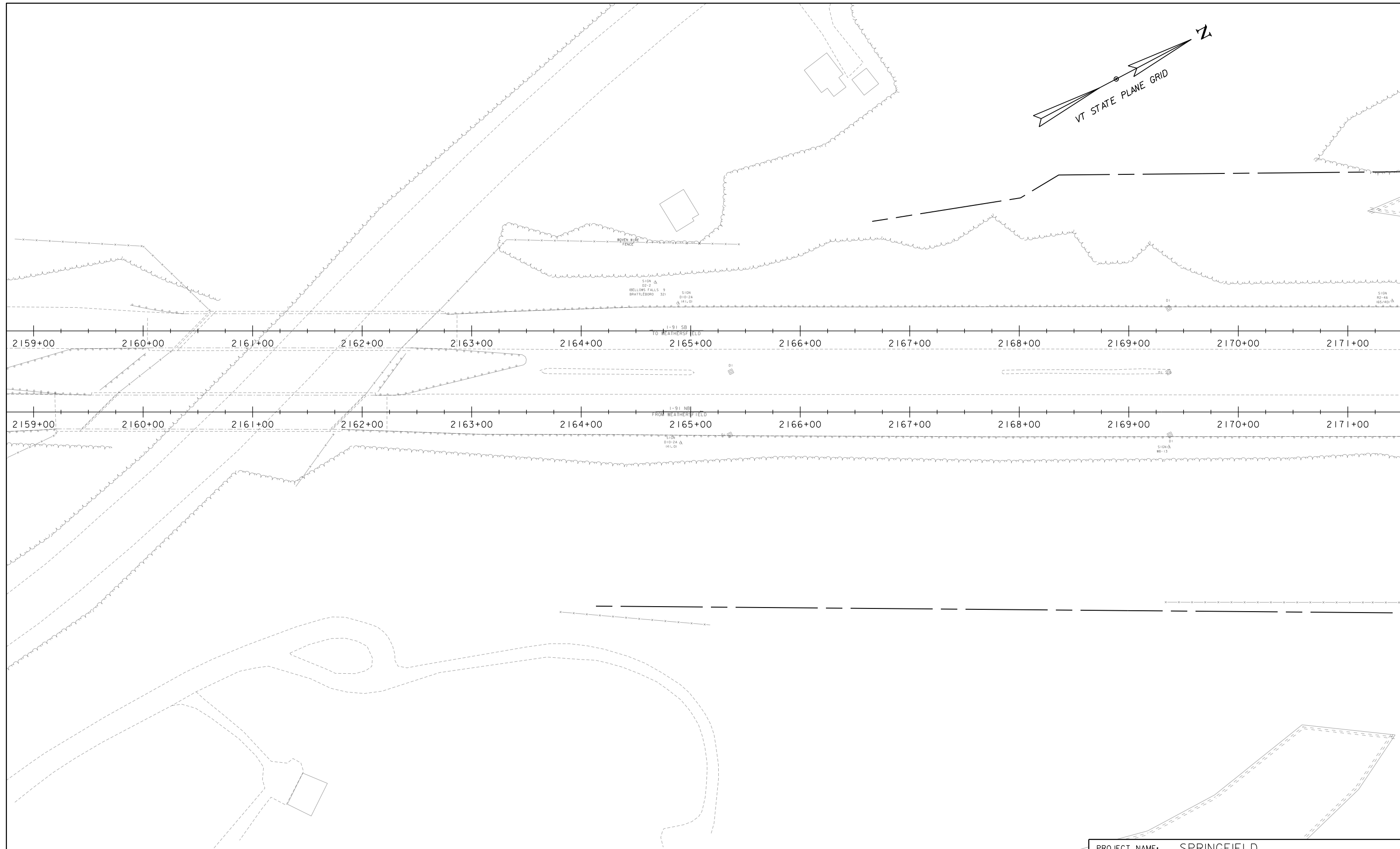
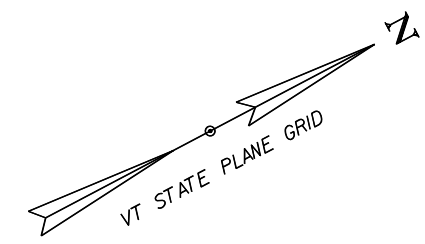


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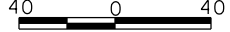


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FILE NAME: z12a574bdr.dgn	PLOT DATE: 2/2/2022
PROJECT LEADER: J. OLUND	DRAWN BY: C. HELMICK
DESIGNED BY: C. HELMICK	CHECKED BY: L. DRISCOLL
LAYOUT SHEET 2	SHEET 3 OF 56



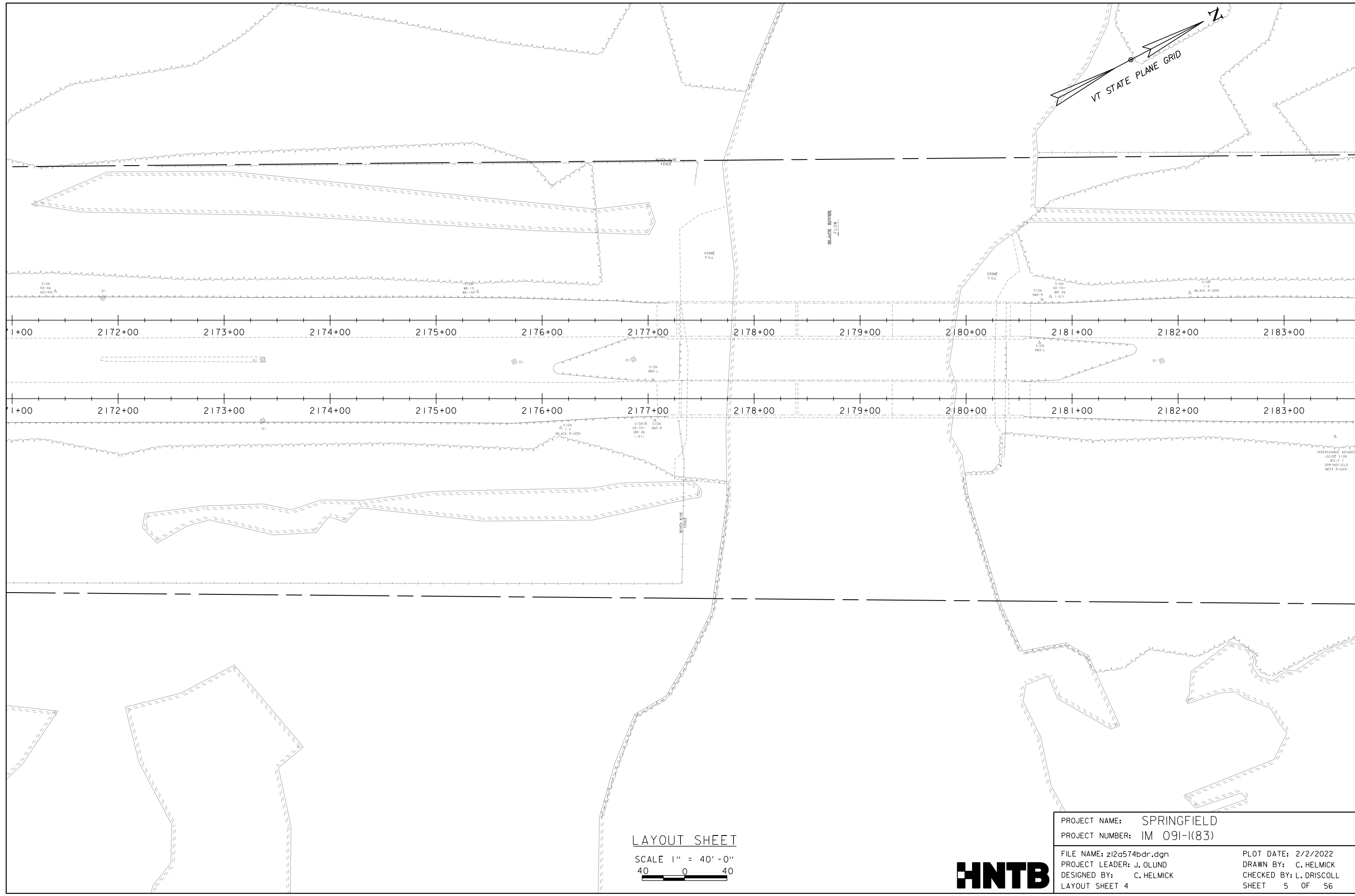
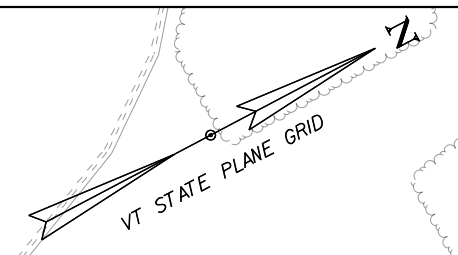
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FILE NAME: z12a574bdr.dgn	PLOT DATE: 2/2/2022
PROJECT LEADER: J. OLUND	DRAWN BY: C. HELMICK
DESIGNED BY: C. HELMICK	CHECKED BY: L. DRISCOLL
LAYOUT SHEETS: 6	SHEET 4 OF



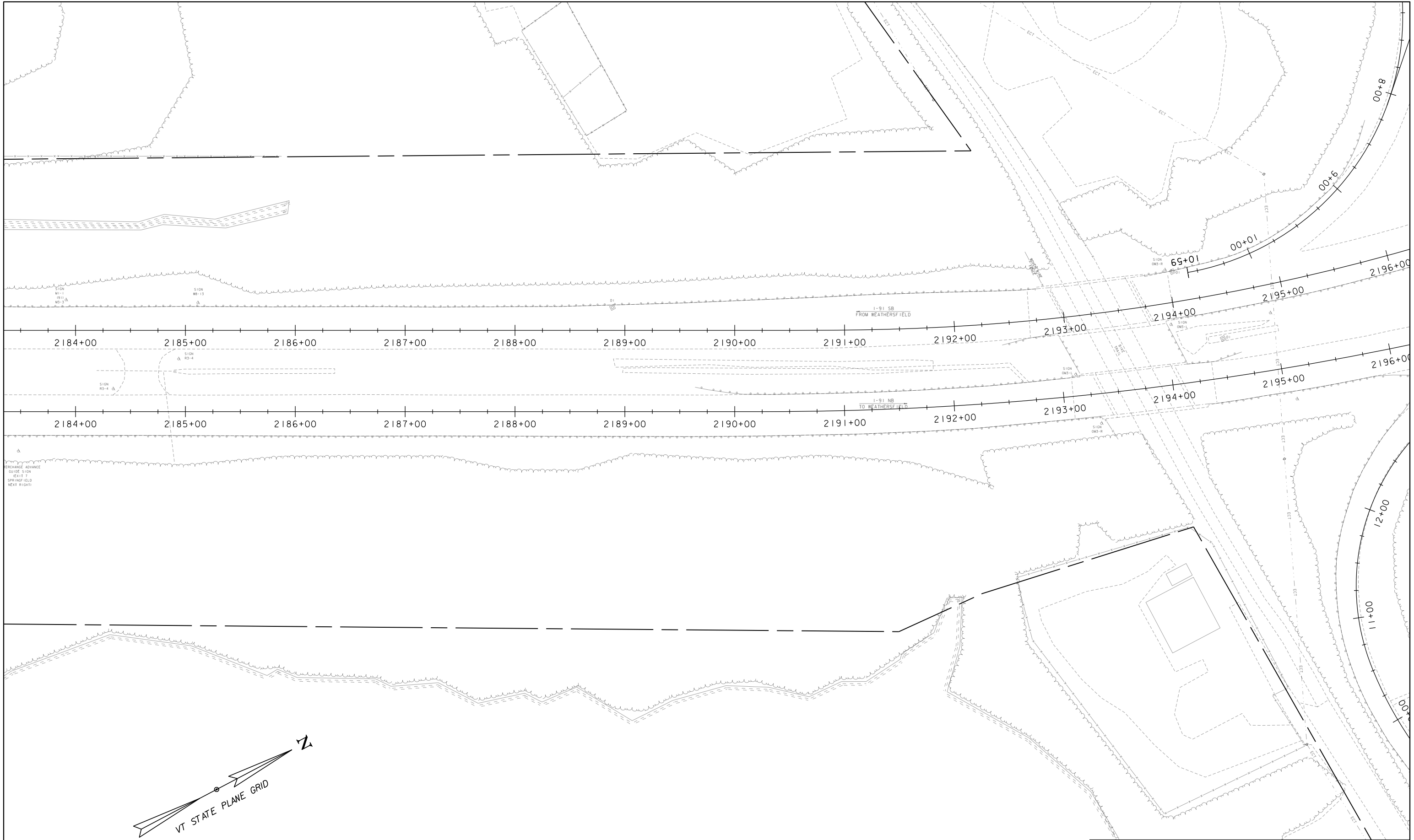


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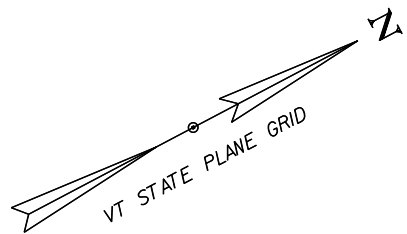
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PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574bdr.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 5 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 4	





PERCHANCE ADVANCE
 GUIDE SIGN
 EX 11.7
 SPRINGFIELD
 NEXT RIGHT

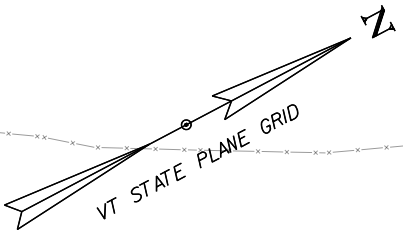
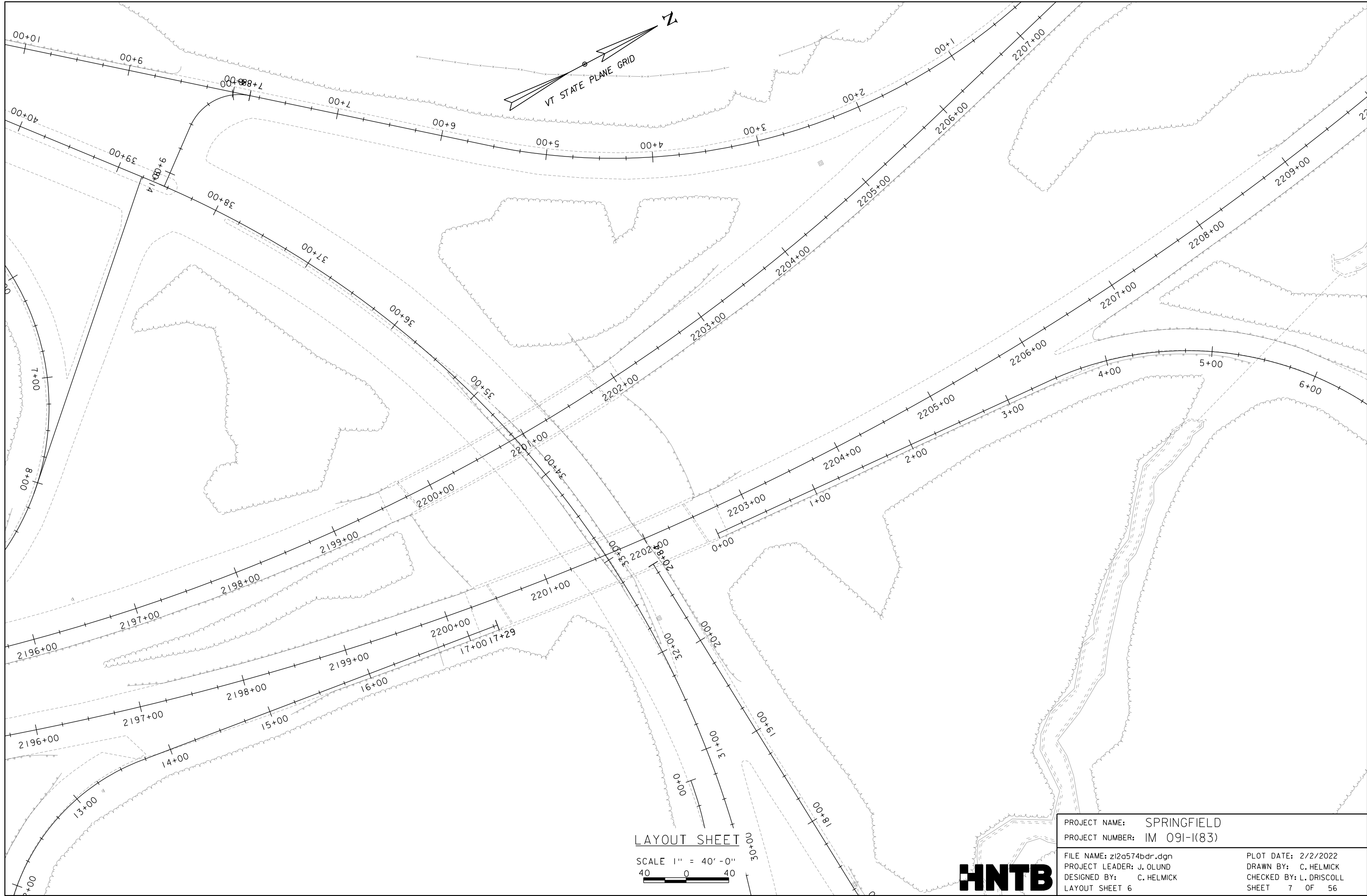


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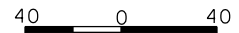
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PROJECT NUMBER: IM 091-1(83)		DRAWN BY: C. HELMICK	
FILE NAME: z12a574bdr.dgn	DESIGNED BY: C. HELMICK	CHECKED BY: L. DRISCOLL	SHEET 6 OF 56
LAYOUT SHEET 5			





LAYOUT SHEET

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PROJECT NAME: SPRINGFIELD

PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574bdr.dgn

PROJECT LEADER: J. OLUND

DESIGNED BY: C. HELMICK

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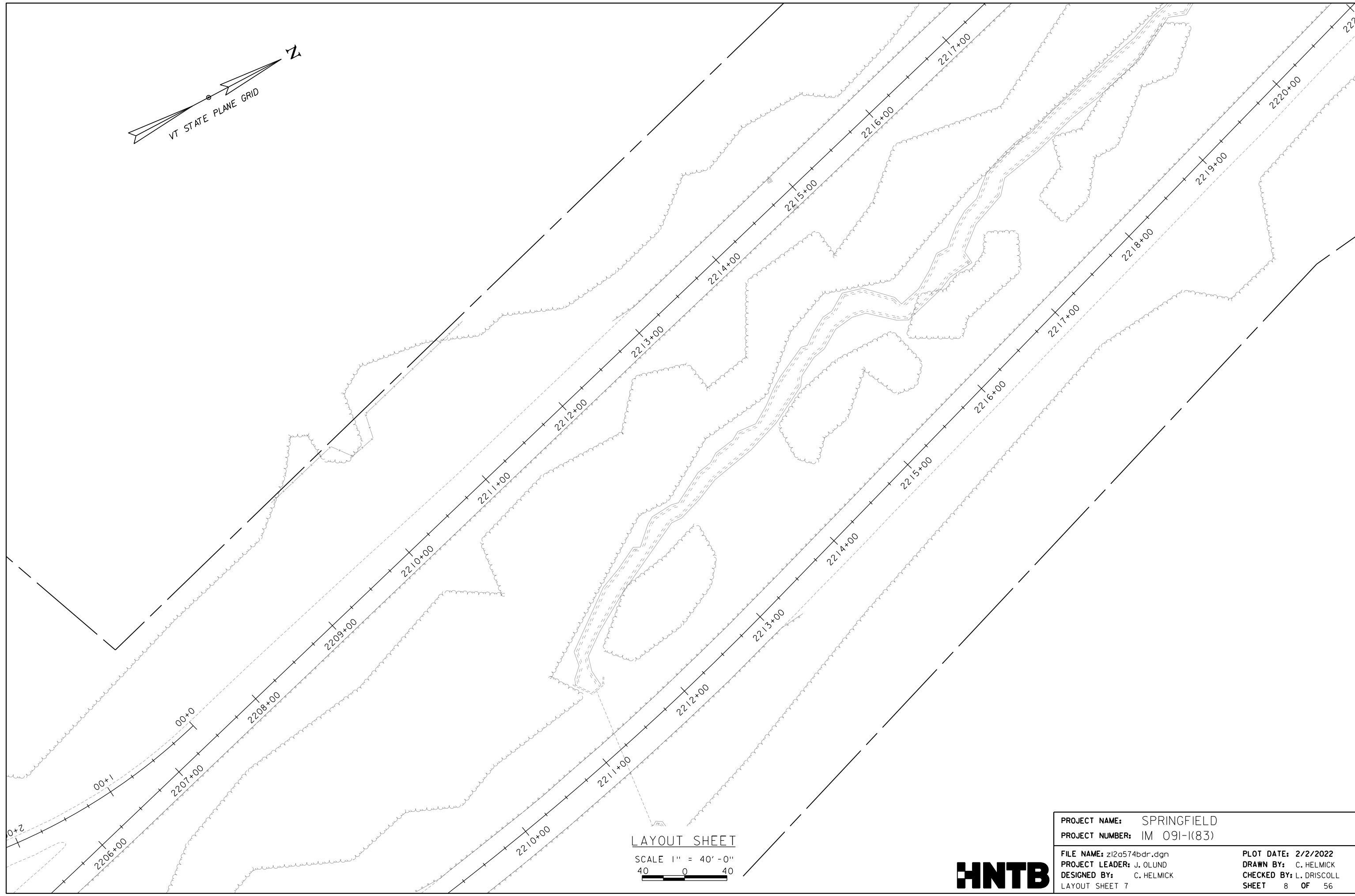
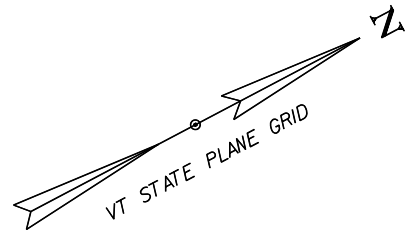
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DRAWN BY: C. HELMICK

CHECKED BY: L. DRISCOLL

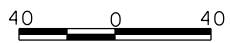
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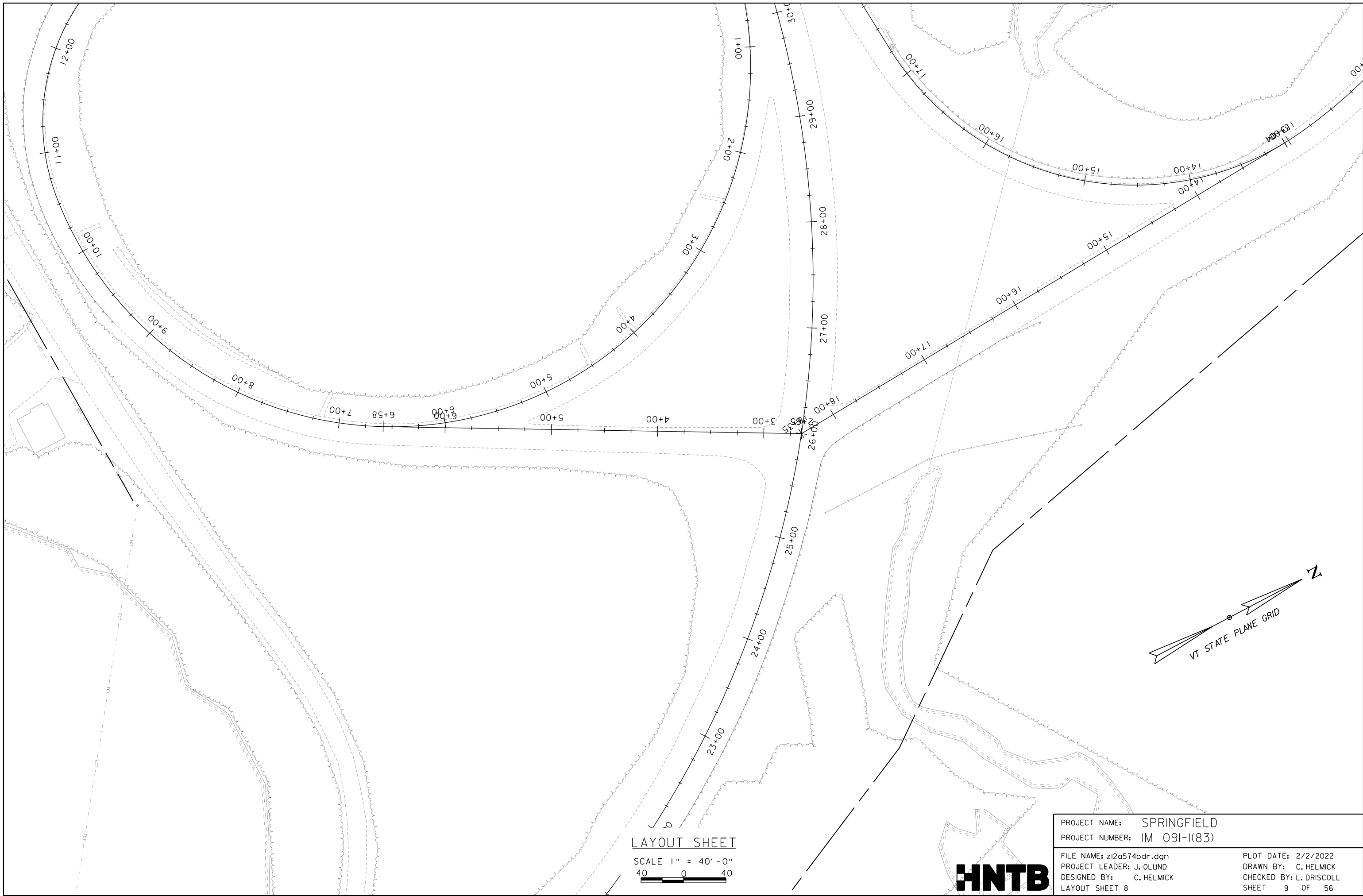
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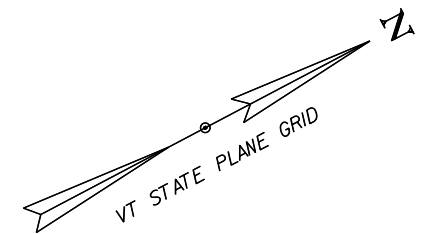
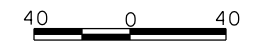
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PROJECT LEADER:	J. OLUND	LAYOUT SHEET	7
DESIGNED BY:	C. HELMICK	SHEET	8 OF 56





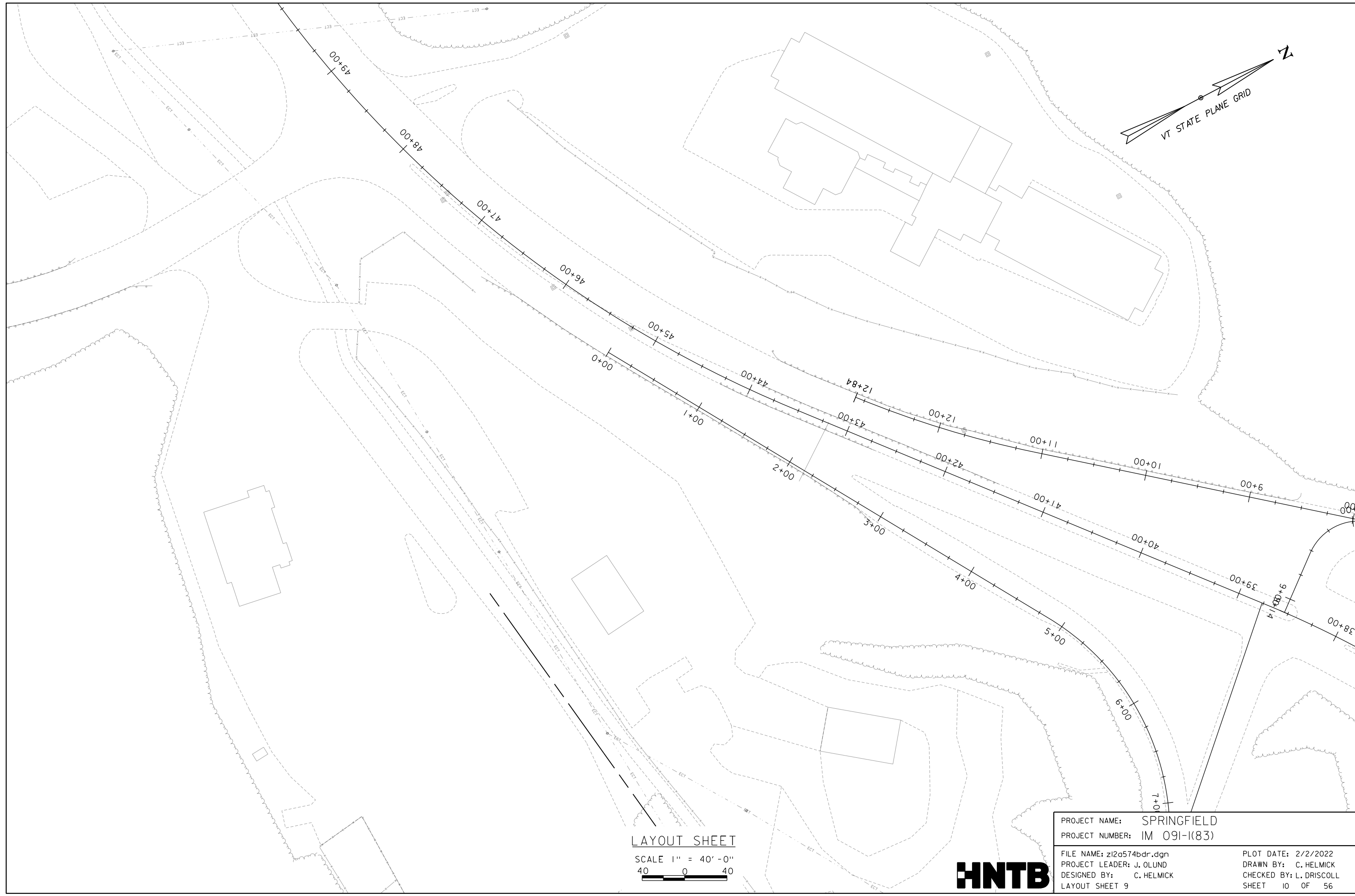
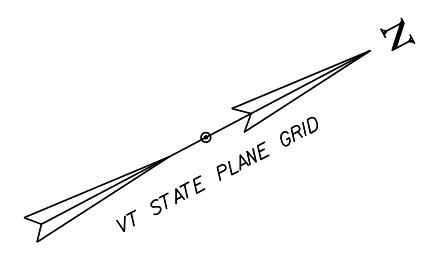
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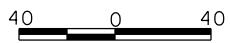
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PROJECT NUMBER:	IM 091-1(83)	DRAWN BY:	C. HELMICK
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PROJECT LEADER:	J. OLUND	LAYOUT SHEET	8
DESIGNED BY:	C. HELMICK	SHEET	9 OF 56





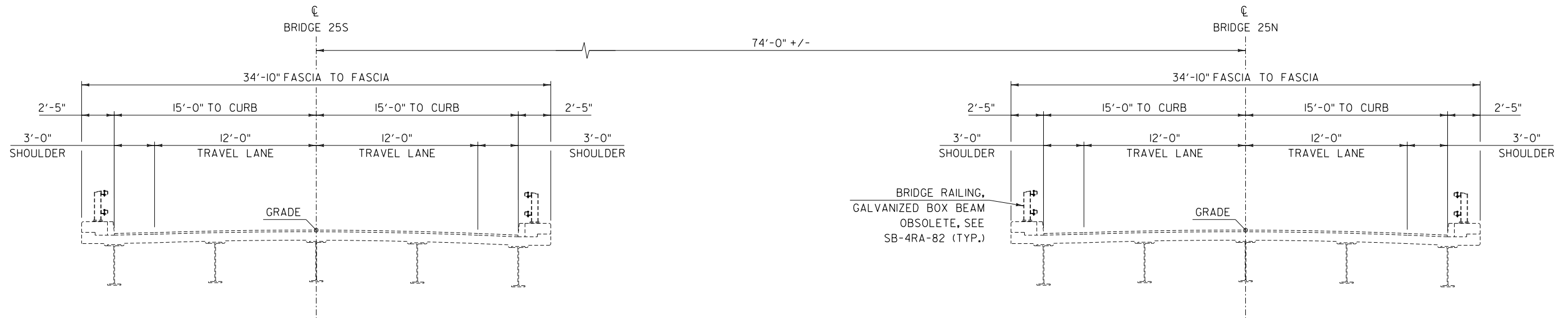
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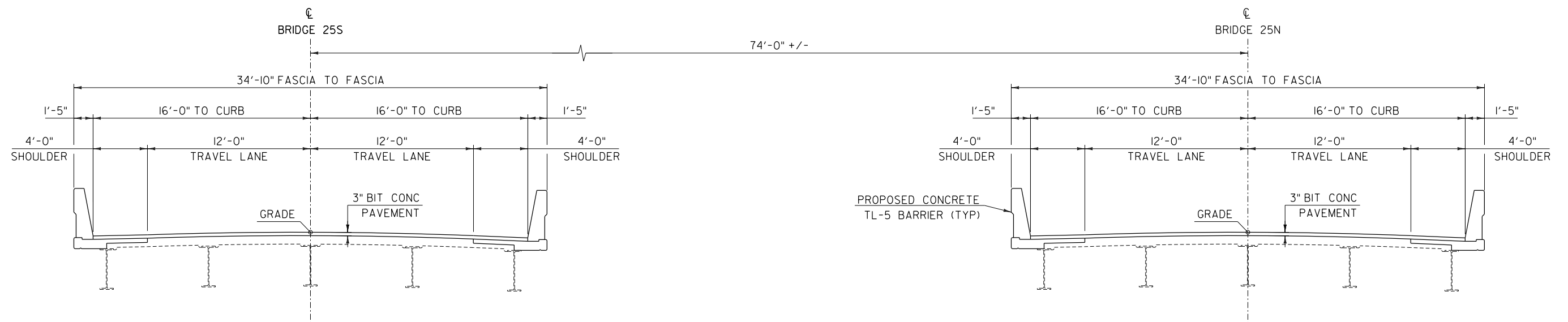
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PROJECT LEADER:	J. OLUND	SHEET	10 OF 56
DESIGNED BY:	C. HELMICK	LAYOUT SHEET	9





EXISTING BRIDGE 25 N/S TYPICAL SECTION

SCALE 1/4" = 1'-0"



BRIDGE 25 N/S TYPICAL SECTIONS - REHABILITATION

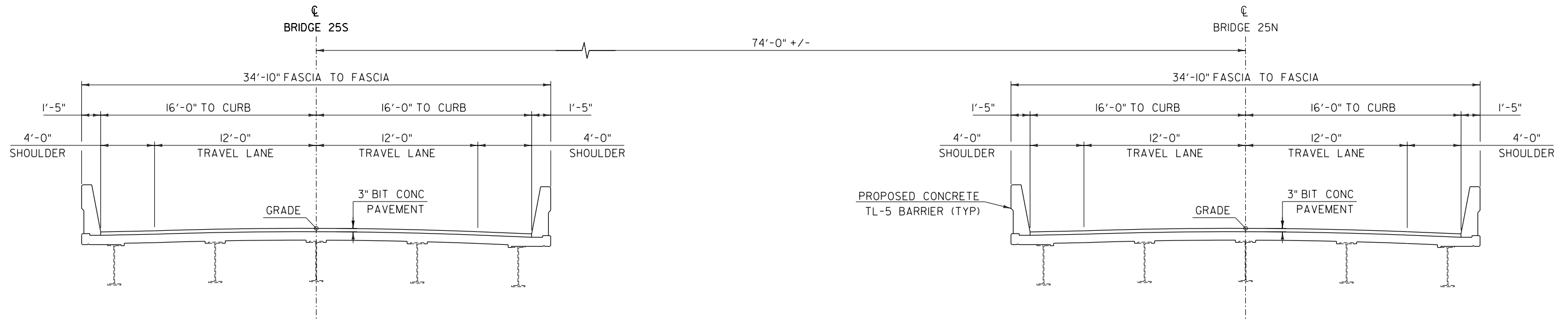
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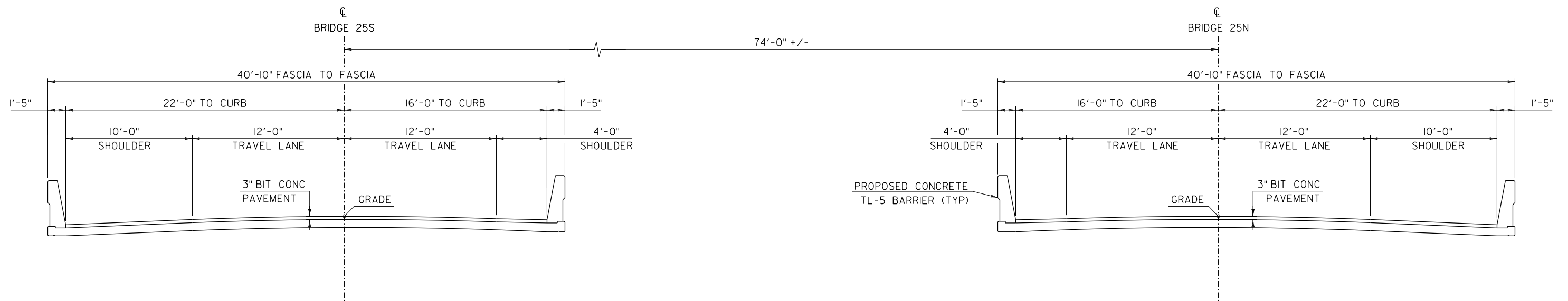
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PROJECT LEADER: J. OLUND
DESIGNED BY: T. POULIN
BRIDGE 25 TYPICAL SECTIONS I

PLOT DATE: 2/2/2022
DRAWN BY: J. MCCAULEY
CHECKED BY: J. OLUND
SHEET II OF 56





BRIDGE 25 N/S TYPICAL SECTION - DECK REPLACEMENT
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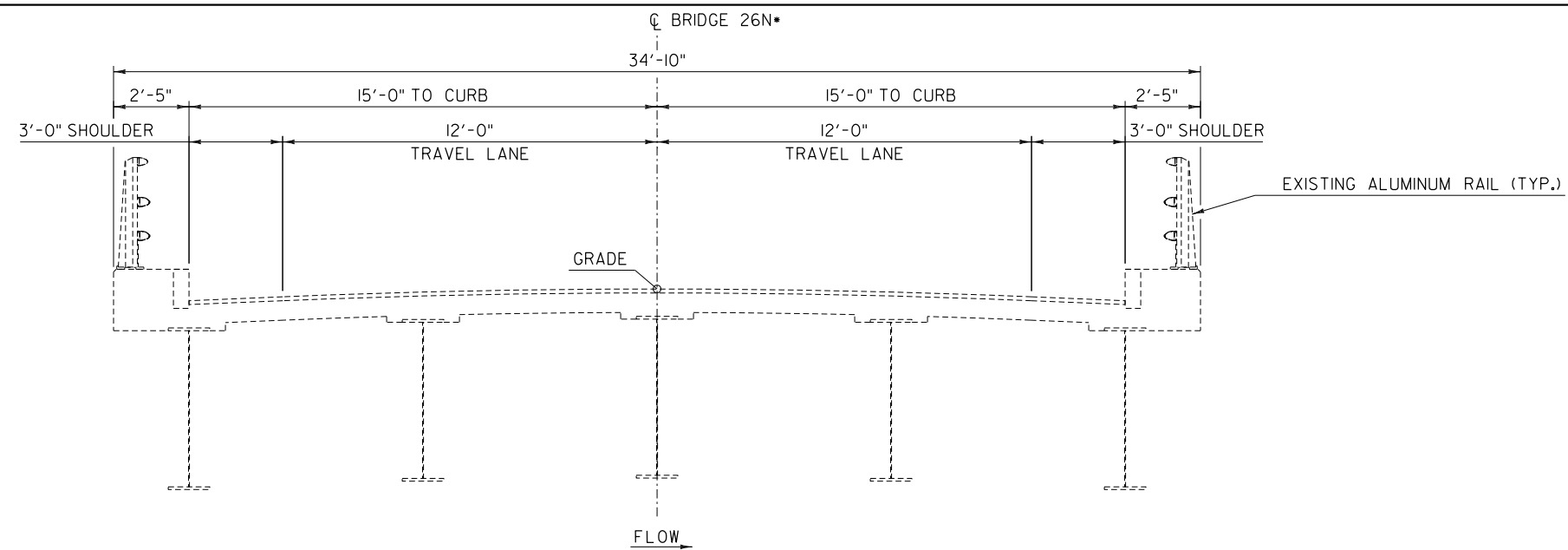
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PROJECT LEADER: J. OLUND
DESIGNED BY: T. POULIN
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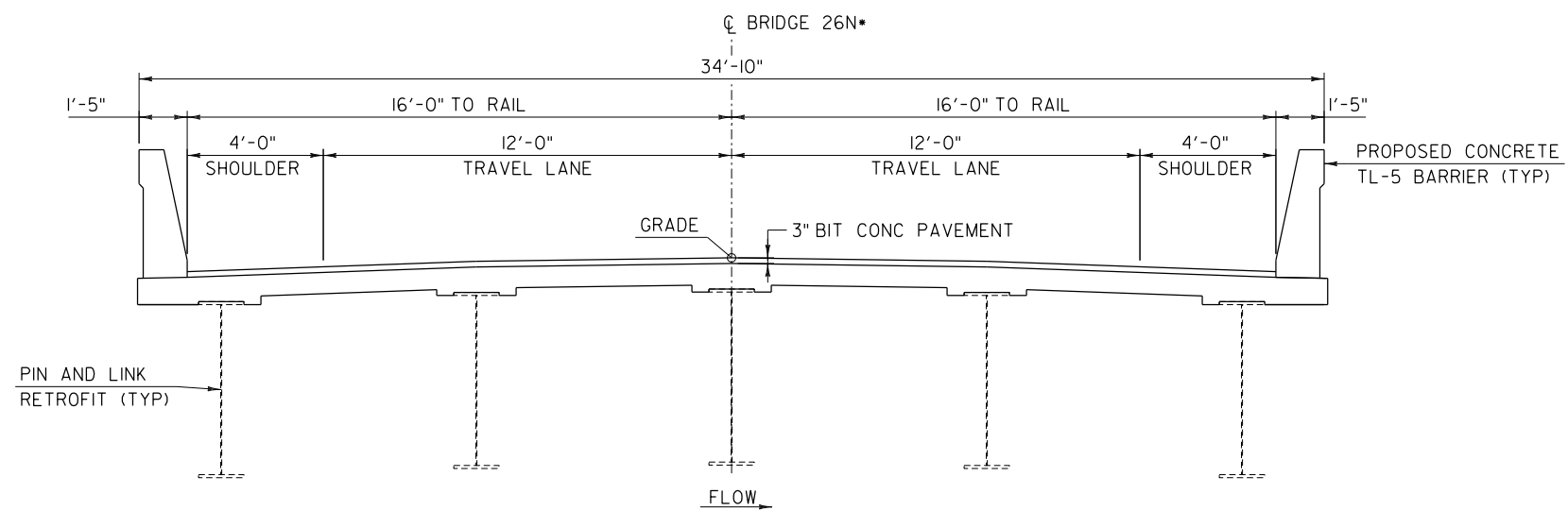
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CHECKED BY: J. OLUND
SHEET 12 OF 56





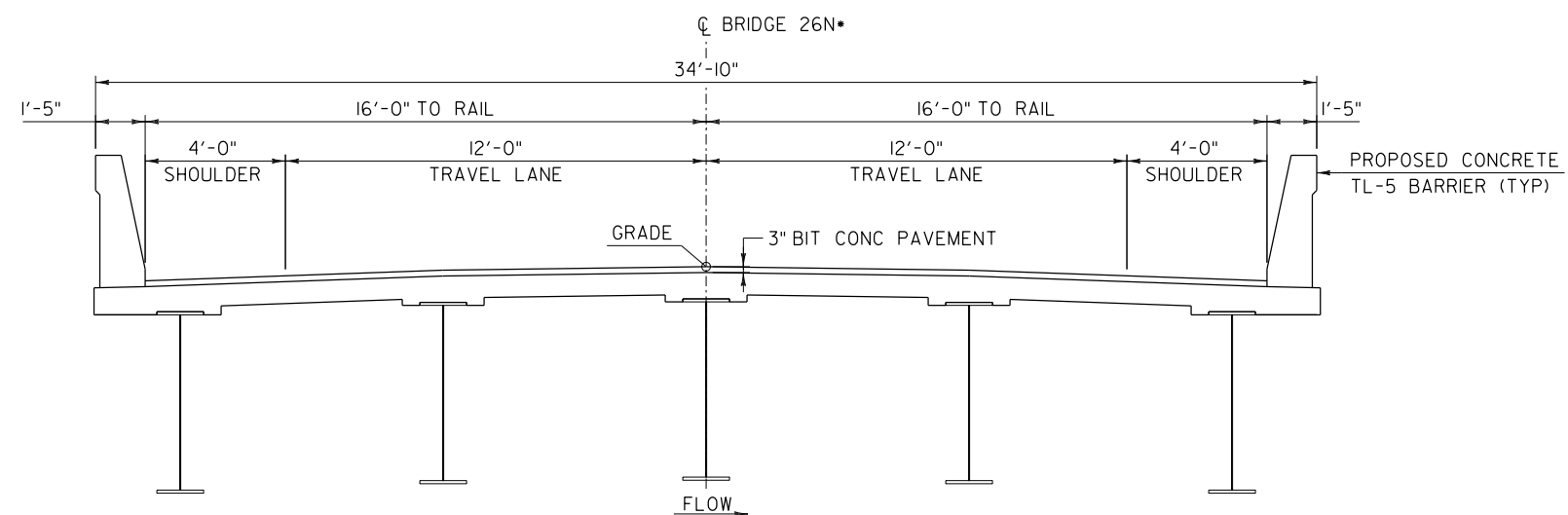
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BRIDGE 26 N TYPICAL SECTION - DECK REPLACEMENT AND STEEL RETROFIT

SCALE: $\frac{3}{8}$ " = 1'-0"



BRIDGE 26 N TYPICAL SECTION - SUPERSTRUCTURE REPLACEMENT

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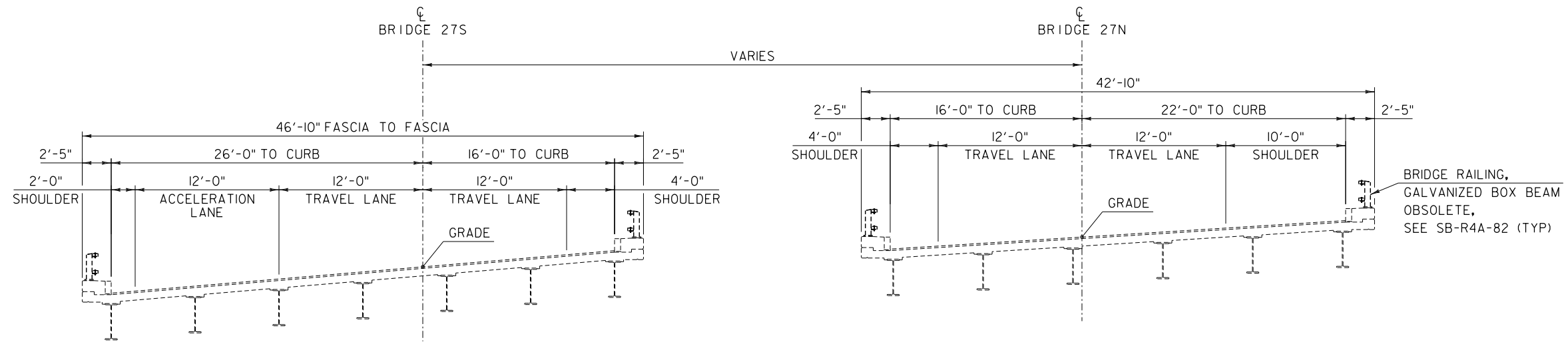
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PROJECT LEADER: J. OLUND
DESIGNED BY: T. POULIN
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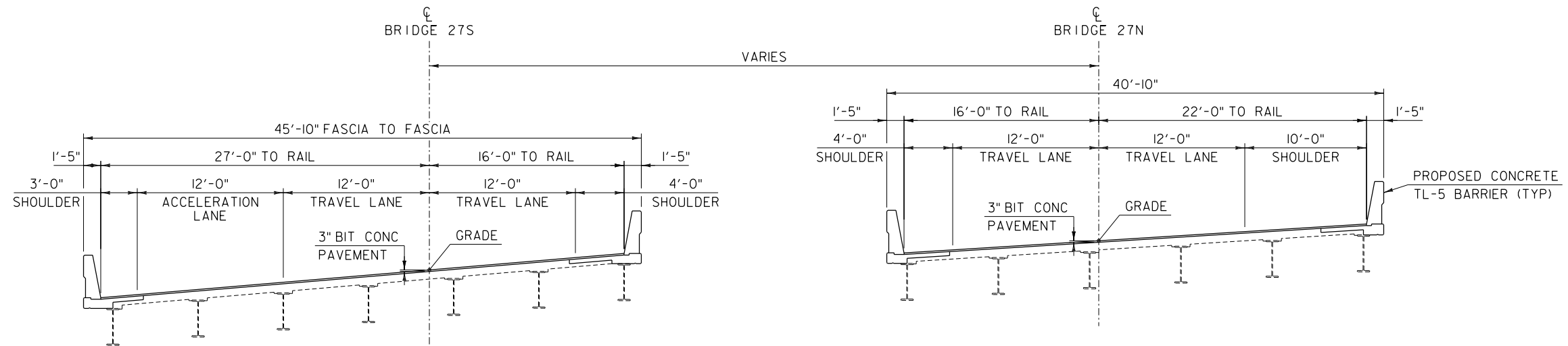
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DRAWN BY: P. BISHOP
CHECKED BY: J. OLUND
SHEET 13 OF 56





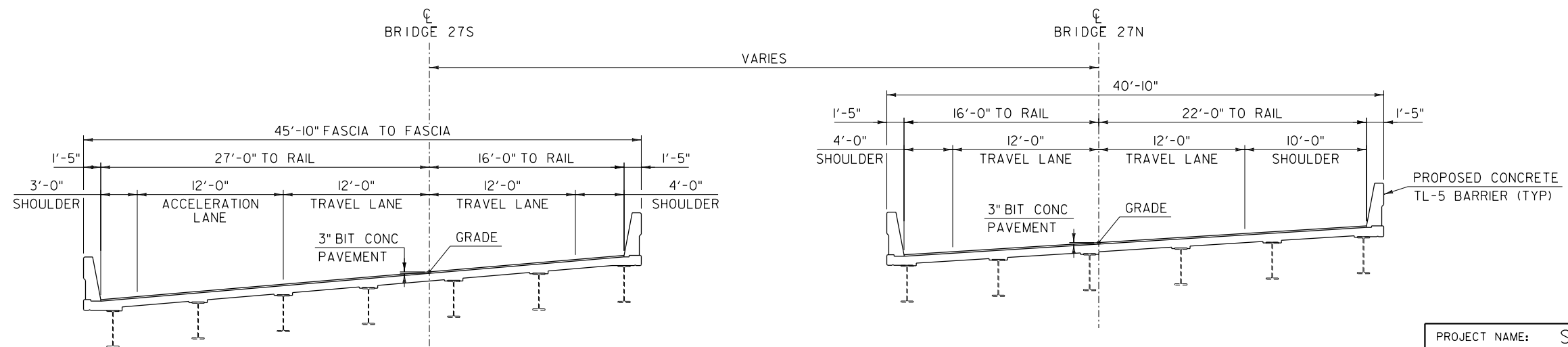
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BRIDGE 27 N/S TYPICAL SECTION - REHABILITATION

SCALE 3/16" = 1'-0"



BRIDGE 27 N/S TYPICAL SECTION - DECK REPLACEMENT

SCALE 3/16" = 1'-0"

PROJECT NAME: SPRINGFIELD

PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574fyp.dgn

PROJECT LEADER: J. OLUND

DESIGNED BY: T. POULIN

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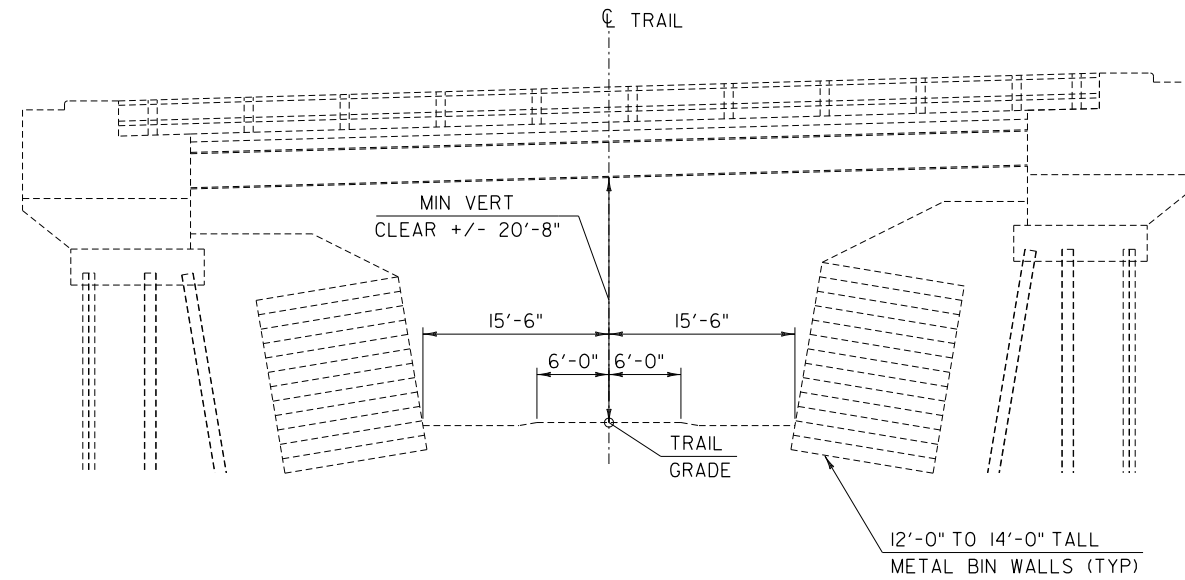
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DRAWN BY: P. BISHOP

CHECKED BY: J. OLUND

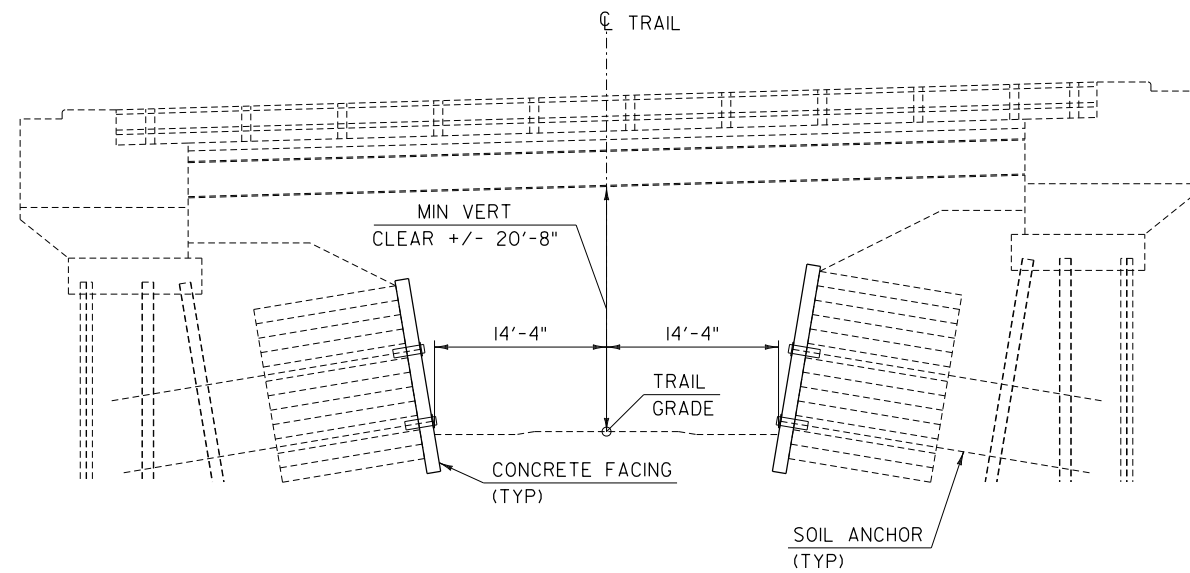
SHEET 14 OF 56





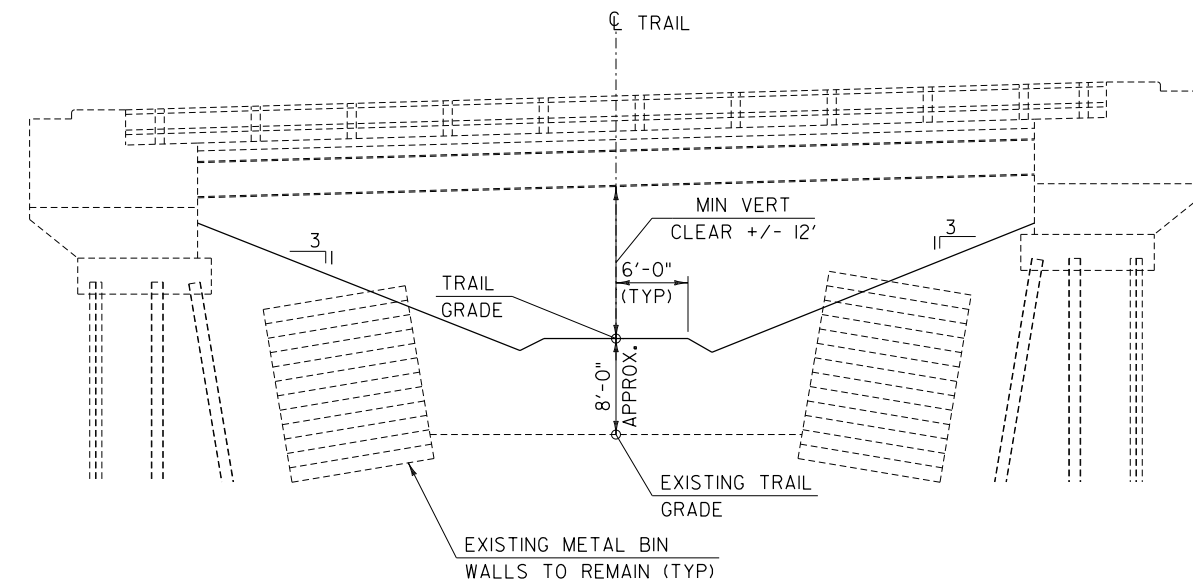
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TRAIL TYPICAL SECTION - WALL REHABILITATION

SCALE 1/8" = 1'-0"



TRAIL TYPICAL SECTION - TRAIL RAISE

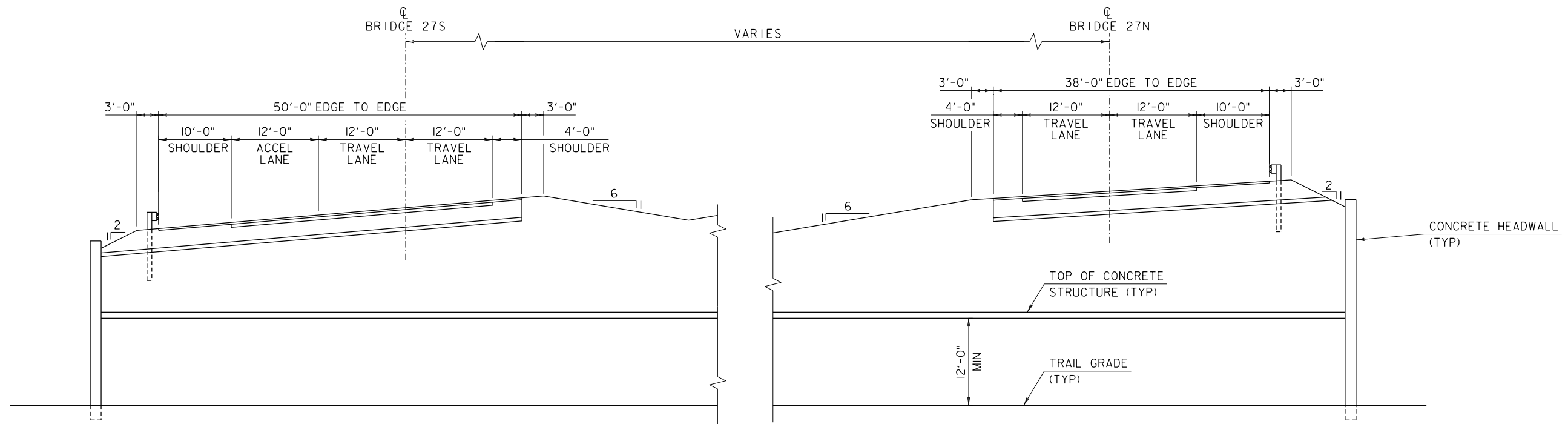
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DESIGNED BY: T. POULIN
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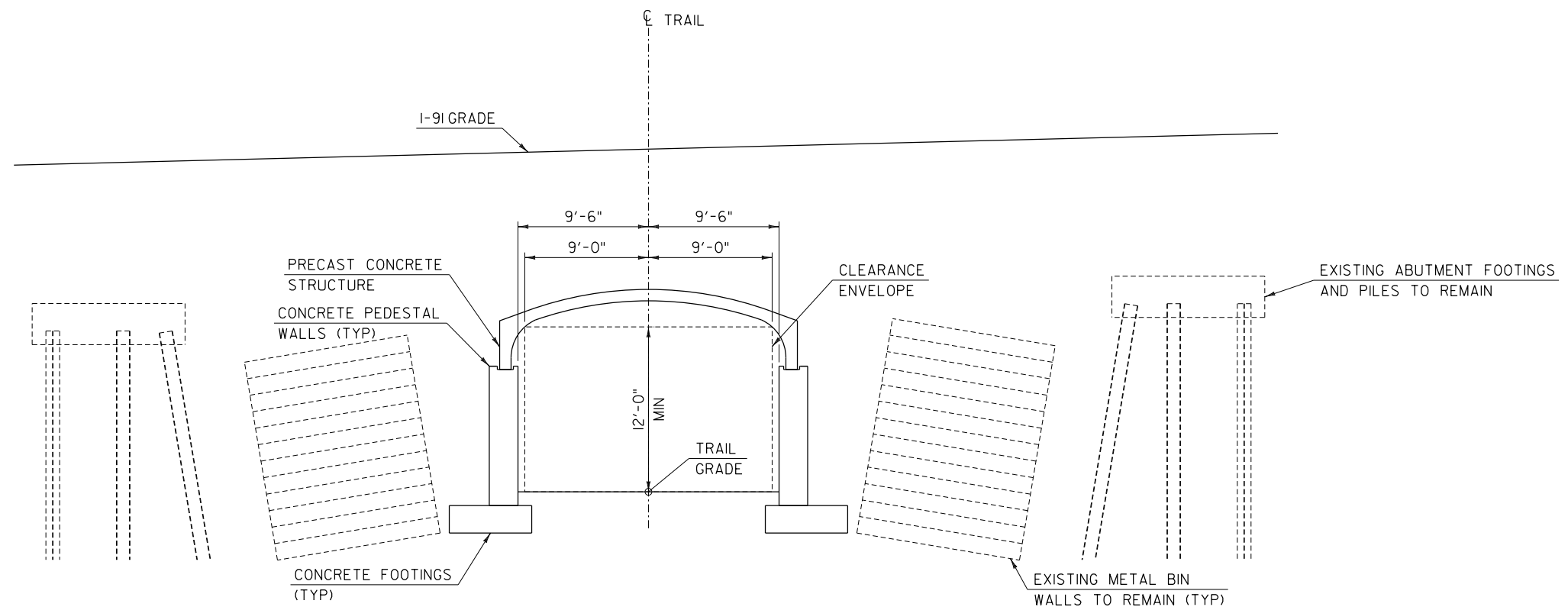
PLOT DATE: 2/2/2022
DRAWN BY: P. BISHOP
CHECKED BY: J. OLUND
SHEET 15 OF 56





27 N/S TYPICAL SECTION - BURIED STRUCTURE

SCALE 1/8" = 1'-0"



TRAIL TYPICAL SECTION - BURIED STRUCTURE

SCALE 3/16" = 1'-0"

PROJECT NAME: SPRINGFIELD

PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574fyp.dgn

PROJECT LEADER: J. OLUND

DESIGNED BY: T. POULIN

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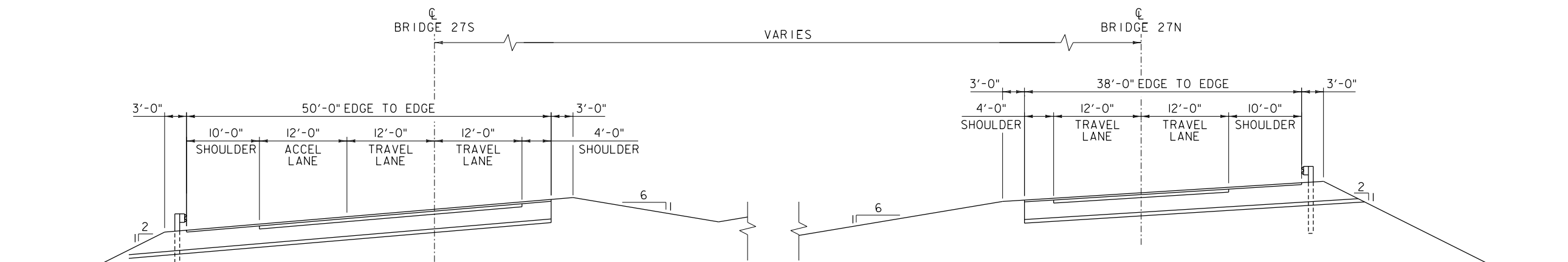
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DRAWN BY: P. BISHOP

CHECKED BY: J. OLUND

SHEET 16 OF 56





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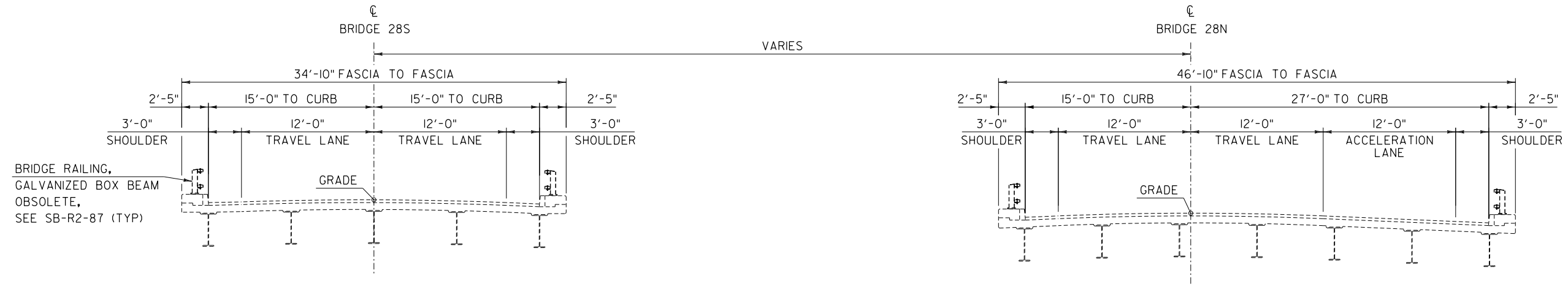
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 DESIGNED BY: T. POULIN
 BRIDGE 27 TYPICAL SECTIONS 4

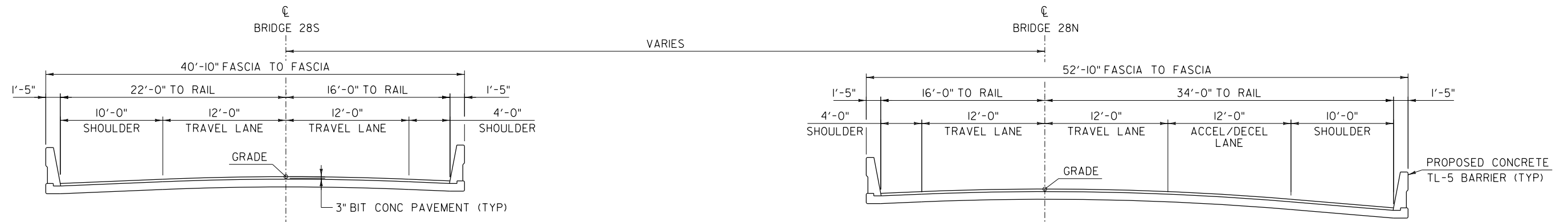
PLOT DATE: 2/2/2022
 DRAWN BY: P. BISHOP
 CHECKED BY: J. OLUND
 SHEET 17 OF 56





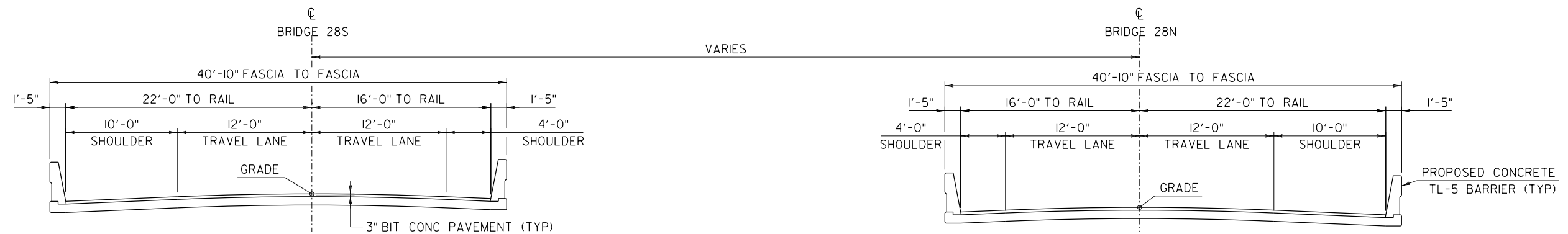
EXISTING BRIDGE 28 N/S TYPICAL SECTION

ALL DIMENSIONS ARE RADIAL UNLESS OTHERWISE NOTED
SCALE 3/16" = 1'-0"



BRIDGE 28 N/S TYPICAL SECTIONS - BRIDGE REPLACEMENT (CLOVER)

ALL DIMENSIONS ARE RADIAL UNLESS OTHERWISE NOTED
SCALE 3/16" = 1'-0"



BRIDGE 28 N/S TYPICAL SECTION - BRIDGE REPLACEMENT (DIAMOND)

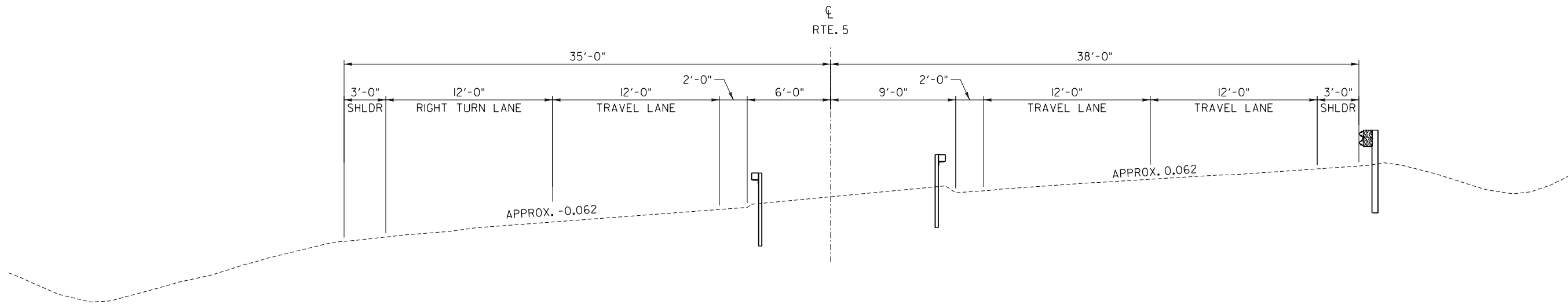
ALL DIMENSIONS ARE RADIAL UNLESS OTHERWISE NOTED
SCALE 3/16" = 1'-0"

PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

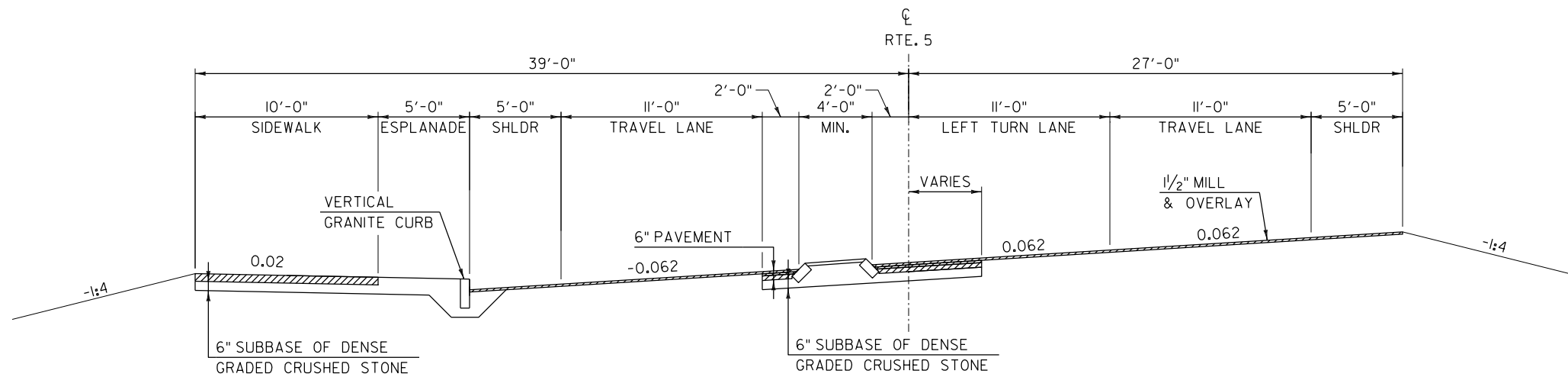
FILE NAME: z12a574typ.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: T. POULIN
BRIDGE 28 TYPICAL SECTIONS

PLOT DATE: 2/2/2022
DRAWN BY: P. BISHOP
CHECKED BY: J. OLUND
SHEET 18 OF 56





EXISTING ROUTE 5 TYPICAL SECTION
SCALE: 1/4" = 1'-0"



PROPOSED ROUTE 5 TYPICAL SECTION WITH TRAIL
SCALE: 1/4" = 1'-0"

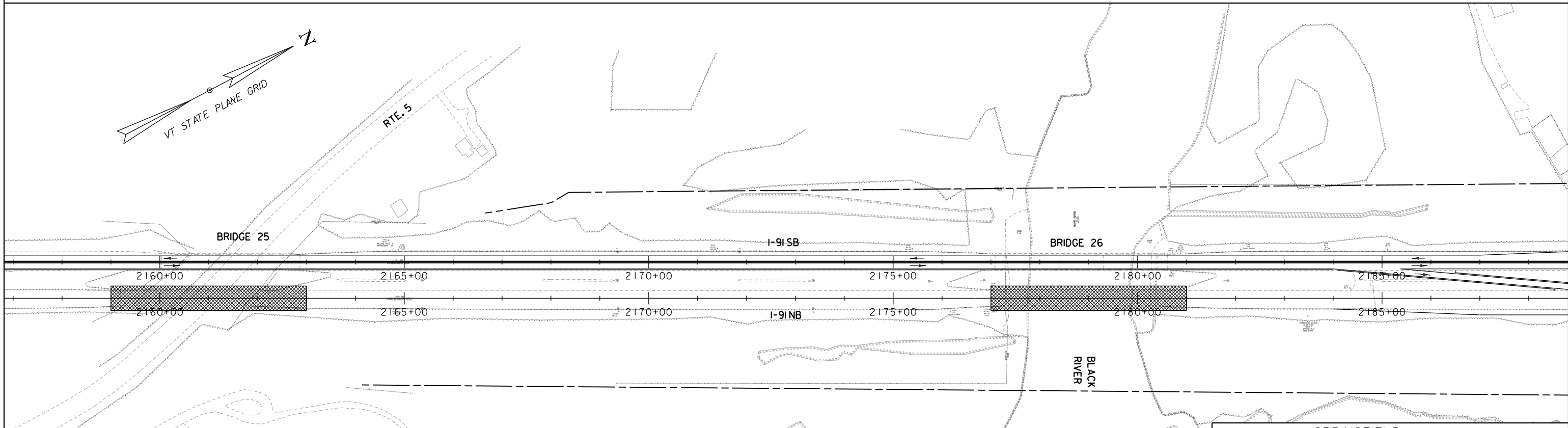
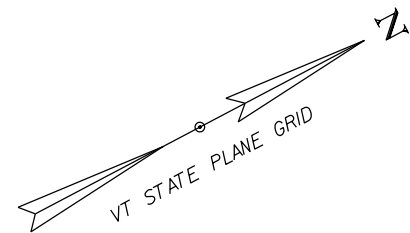
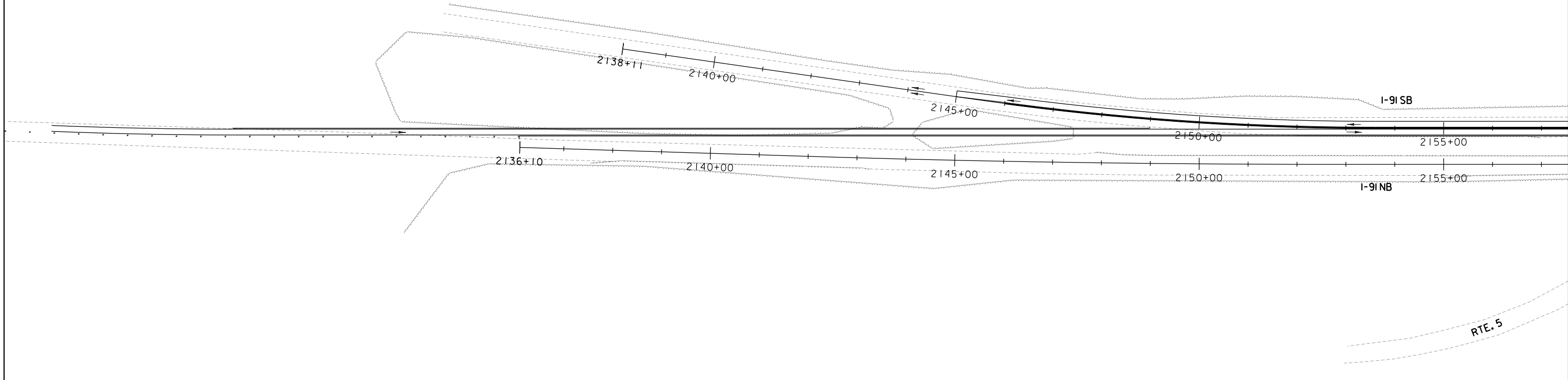
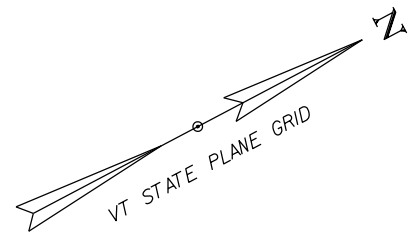
PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574typ.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
ROUTE 5 TYPICAL SECTION

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 19 OF 56



BRIDGE 25 & BRIDGE 26 CROSSOVER
NB CONSTRUCTION



NOTE:
CROSSOVER LOCATIONS AND PHASING NORTH OF BRIDGE 26 VARY BASED ON EACH ALTERNATIVE. THE ORDER OF CONSTRUCTION BETWEEN BRIDGE 25N & 26N OR 25S & 26S MAY ALSO VARY DEPENDING ON THE ALTERNATIVE. THE BRIDGE 25 & 26 PLANS ARE INTENDED ONLY TO SHOW THE SOUTHERN EXTENTS OF CROSSOVER CONSTRUCTION AND THE LOCATION OF TRAFFIC DURING EACH STAGE OF BRIDGE 25 & 26 CONSTRUCTION.

LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

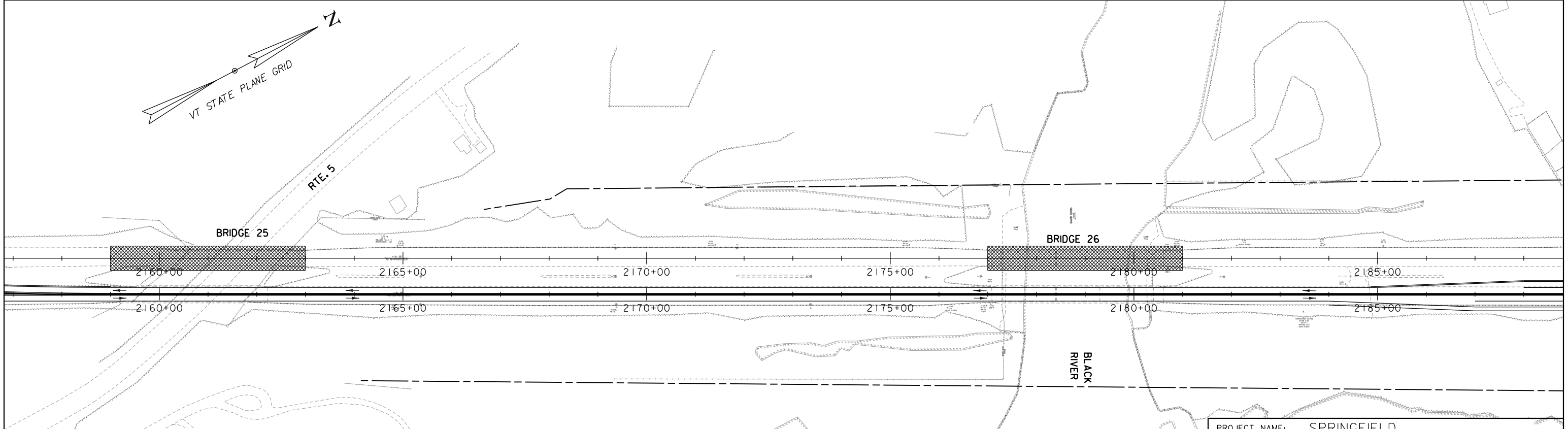
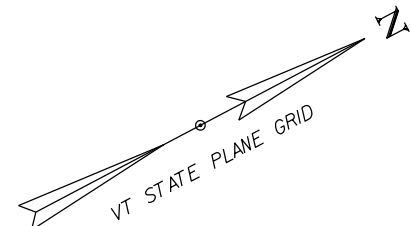
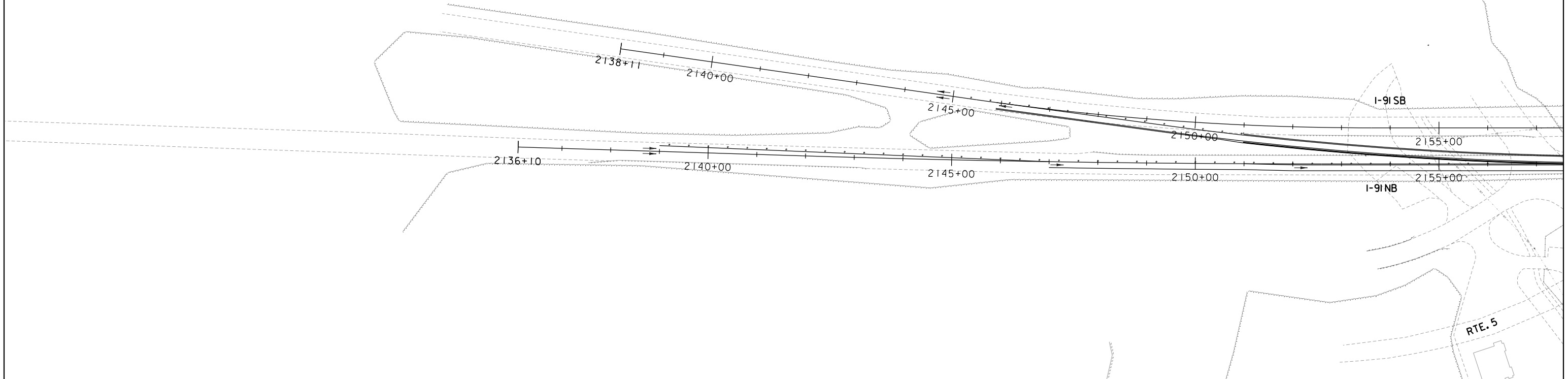
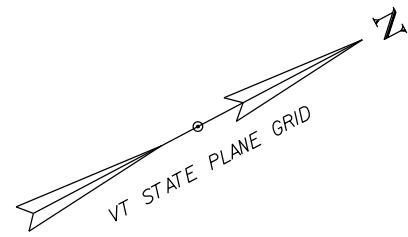
PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Br25.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET BR. 25 & 26 I

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 20 OF 56



BRIDGE 25 & BRIDGE 26 CROSSOVER
SB CONSTRUCTION



NOTE:
CROSSOVER LOCATIONS AND PHASING NORTH OF BRIDGE 26 VARY BASED ON EACH ALTERNATIVE. THE ORDER OF CONSTRUCTION BETWEEN BRIDGE 25N & 26N OR 25S & 26S MAY ALSO VARY DEPENDING ON THE ALTERNATIVE. THE BRIDGE 25 & 26 PLANS ARE INTENDED ONLY TO SHOW THE SOUTHERN EXTENTS OF CROSSOVER CONSTRUCTION AND THE LOCATION OF TRAFFIC DURING EACH STAGE OF BRIDGE 25 & 26 CONSTRUCTION.

LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

PROJECT NAME: SPRINGFIELD

PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Br25.dgn

PROJECT LEADER: J. OLUND

DESIGNED BY: C. HELMICK

LAYOUT SHEET BR. 25 & 26 2

PLOT DATE: 2/2/2022

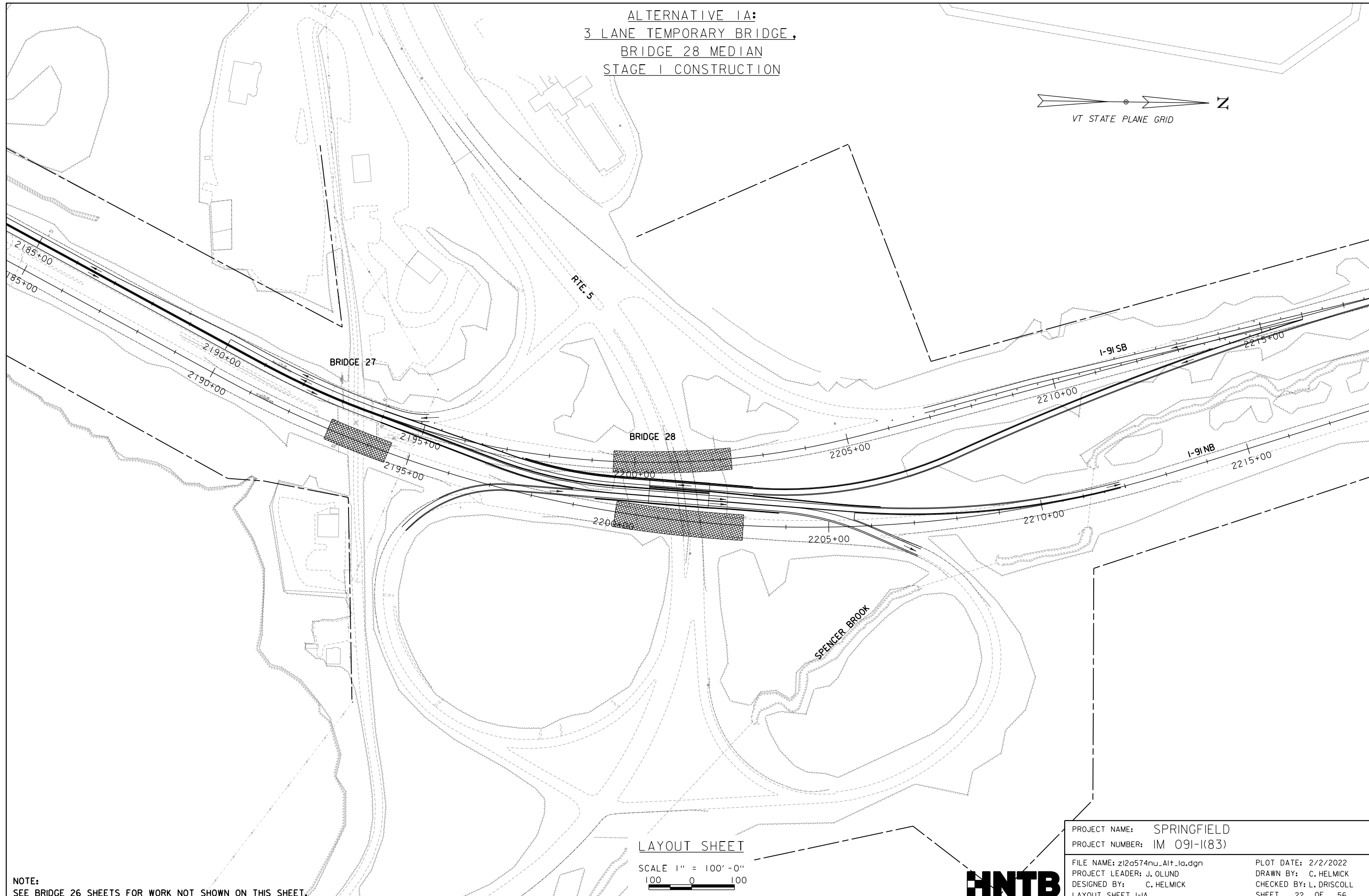
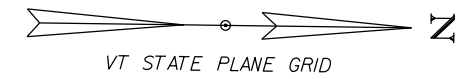
DRAWN BY: C. HELMICK

CHECKED BY: L. DRISCOLL

SHEET 21 OF 56



ALTERNATIVE 1A:
3 LANE TEMPORARY BRIDGE,
BRIDGE 28 MEDIAN
STAGE I CONSTRUCTION



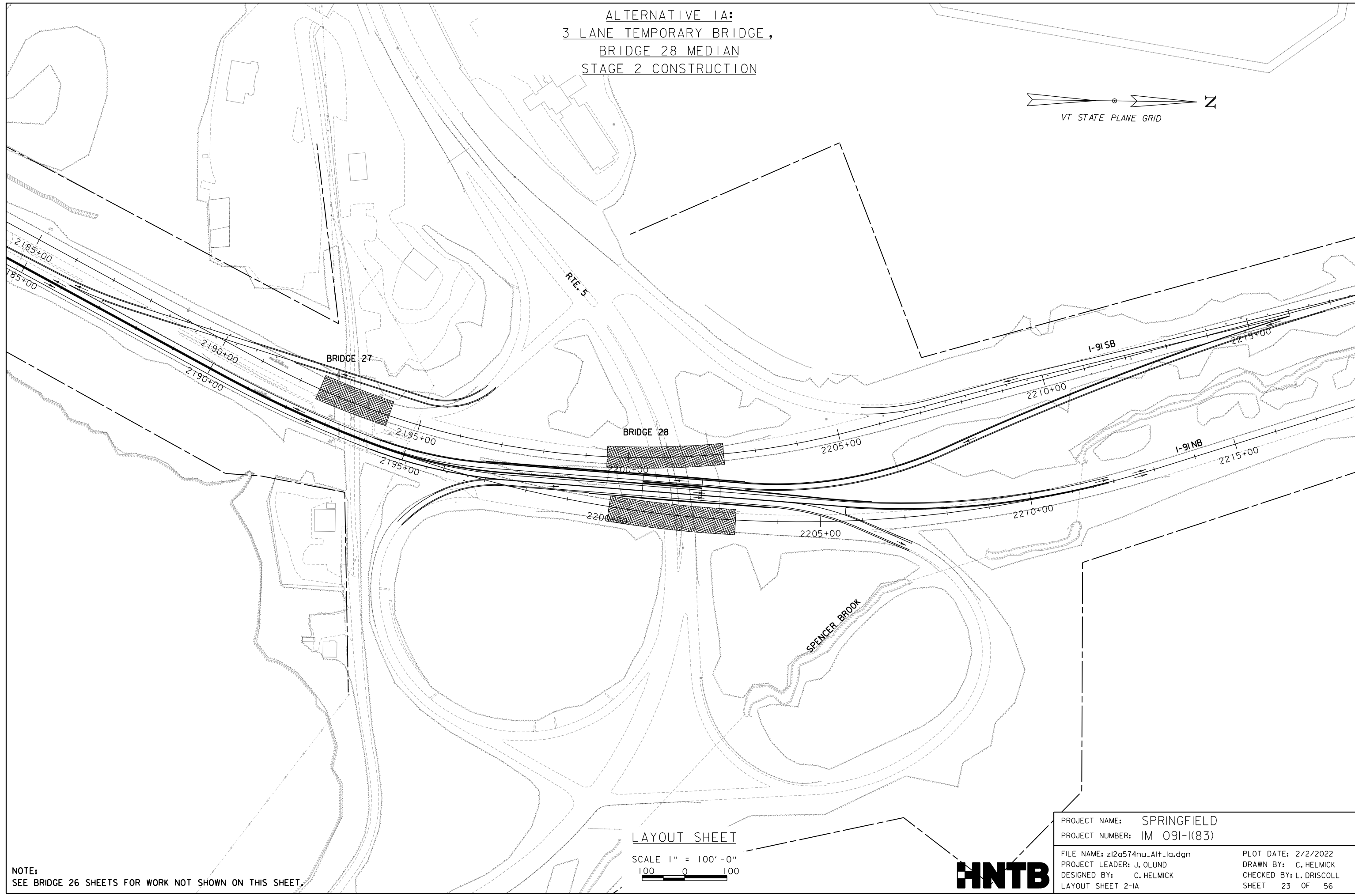
NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET
SCALE 1" = 100' -0"
100 0 100

PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-I(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_1a.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 22 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET I-IA	



ALTERNATIVE 1A:
3 LANE TEMPORARY BRIDGE,
BRIDGE 28 MEDIAN
STAGE 2 CONSTRUCTION



NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET

SCALE 1" = 100' -0"
100 0 100

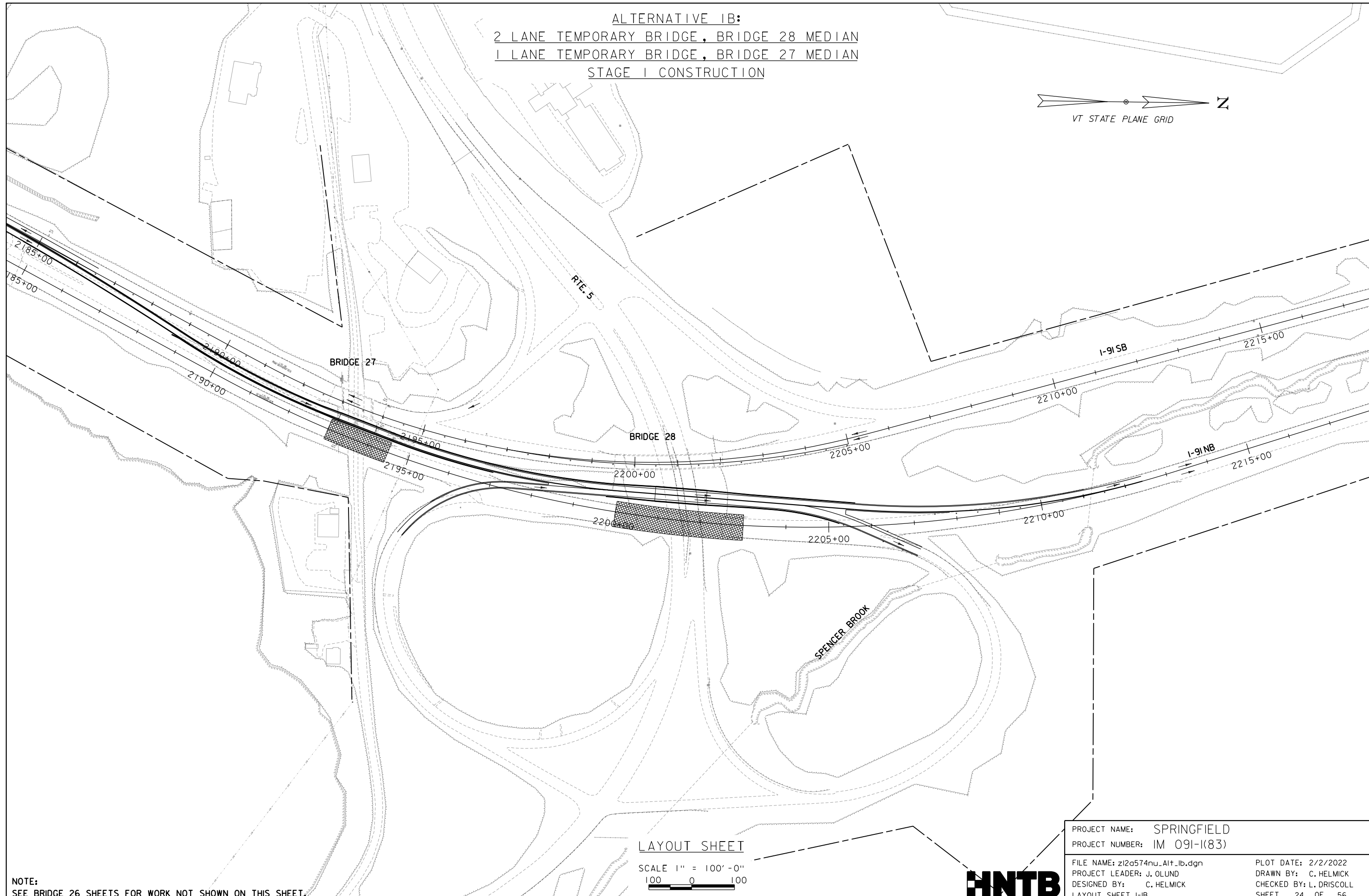
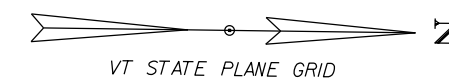
PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Alt_1a.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 2-1A

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 23 OF 56



ALTERNATIVE 1B:
2 LANE TEMPORARY BRIDGE, BRIDGE 28 MEDIAN
1 LANE TEMPORARY BRIDGE, BRIDGE 27 MEDIAN
STAGE I CONSTRUCTION



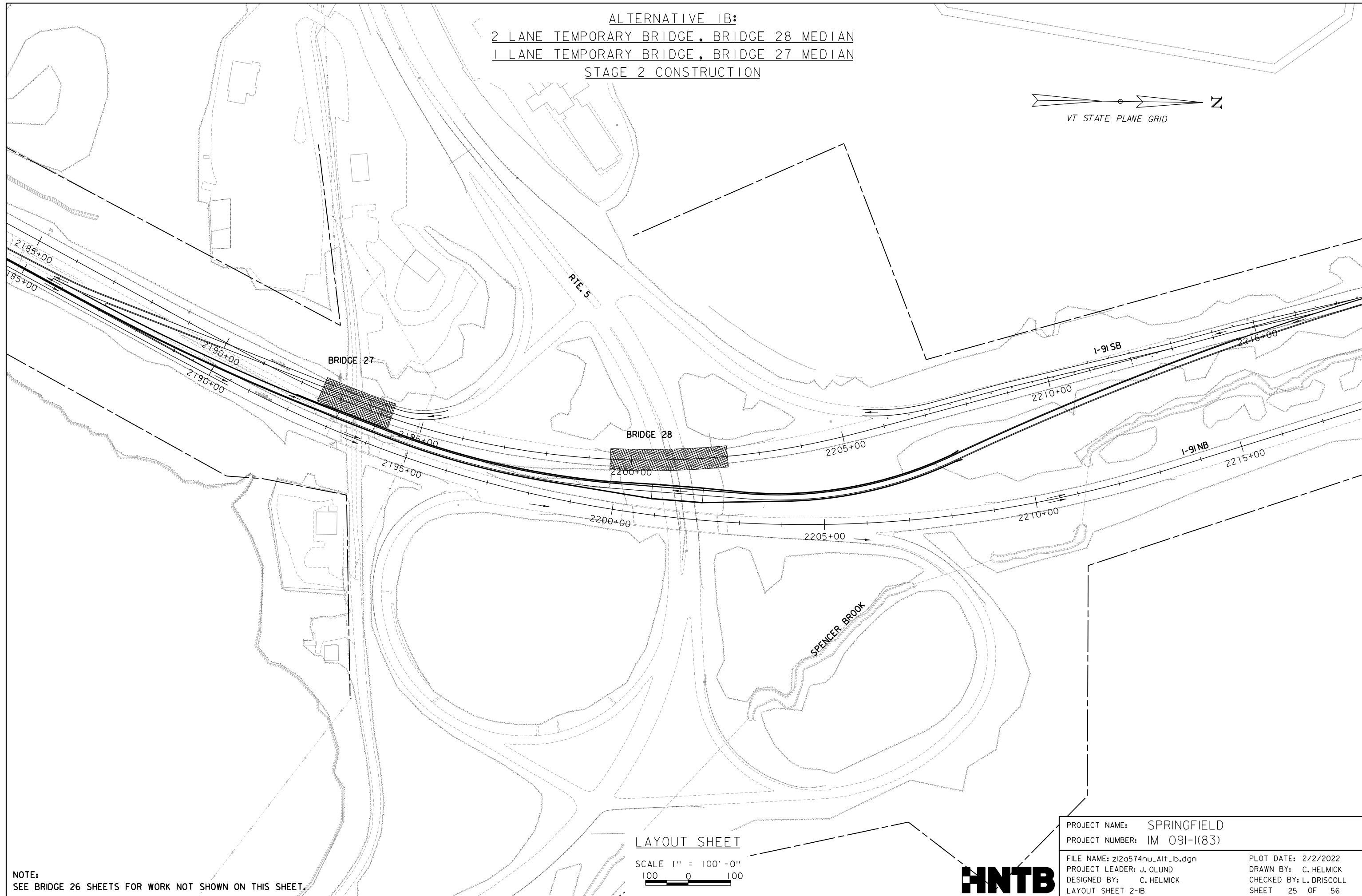
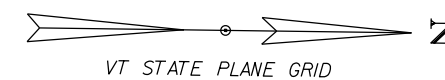
NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET
SCALE 1" = 100' - 0"
100 0 100

PROJECT NAME:	SPRINGFIELD	PLOT DATE:	2/2/2022
PROJECT NUMBER:	IM 091-I(83)	DRAWN BY:	C. HELMICK
FILE NAME:	z12a574nu_Alt_ib.dgn	CHECKED BY:	L. DRISCOLL
PROJECT LEADER:	J. OLUND	SHEET	24 OF 56
DESIGNED BY:	C. HELMICK		
LAYOUT SHEET I-IB			



ALTERNATIVE 1B:
2 LANE TEMPORARY BRIDGE, BRIDGE 28 MEDIAN
1 LANE TEMPORARY BRIDGE, BRIDGE 27 MEDIAN
STAGE 2 CONSTRUCTION



NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET

SCALE 1" = 100' -0"
100 0 100

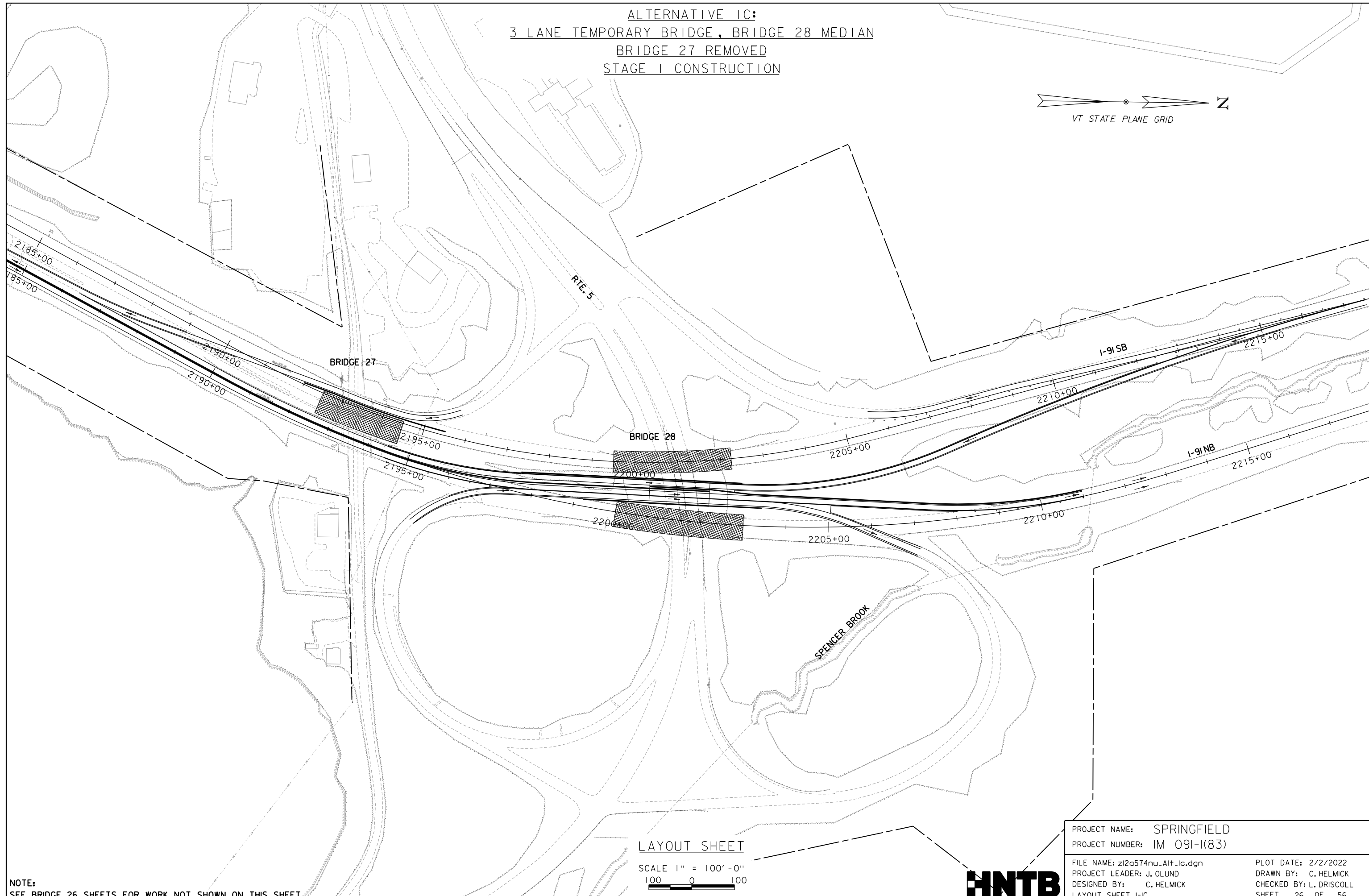
PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Alt_ib.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 2-1B

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 25 OF 56



ALTERNATIVE 1C:
 3 LANE TEMPORARY BRIDGE, BRIDGE 28 MEDIAN
 BRIDGE 27 REMOVED
 STAGE I CONSTRUCTION



NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET

SCALE 1" = 100' - 0"
 100 0 100

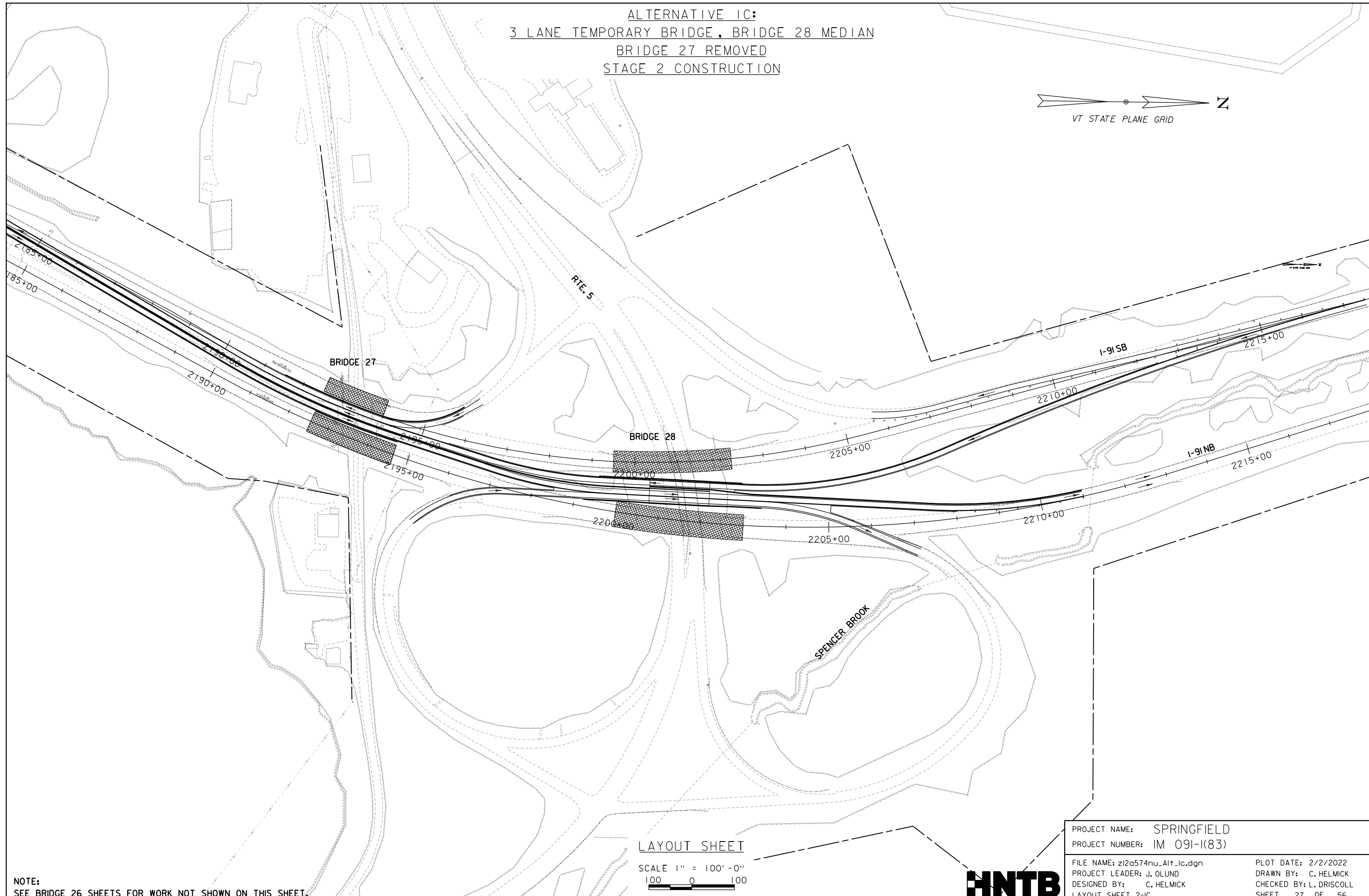
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 PROJECT NUMBER: IM 091-I(83)

FILE NAME: z12a574nu_Alt_1c.dgn
 PROJECT LEADER: J. OLUND
 DESIGNED BY: C. HELMICK
 LAYOUT SHEET I-IC

PLOT DATE: 2/2/2022
 DRAWN BY: C. HELMICK
 CHECKED BY: L. DRISCOLL
 SHEET 26 OF 56



ALTERNATIVE 1C:
 3 LANE TEMPORARY BRIDGE, BRIDGE 28 MEDIAN
 BRIDGE 27 REMOVED
 STAGE 2 CONSTRUCTION



NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET

SCALE 1" = 100' -0"
 100 0 100

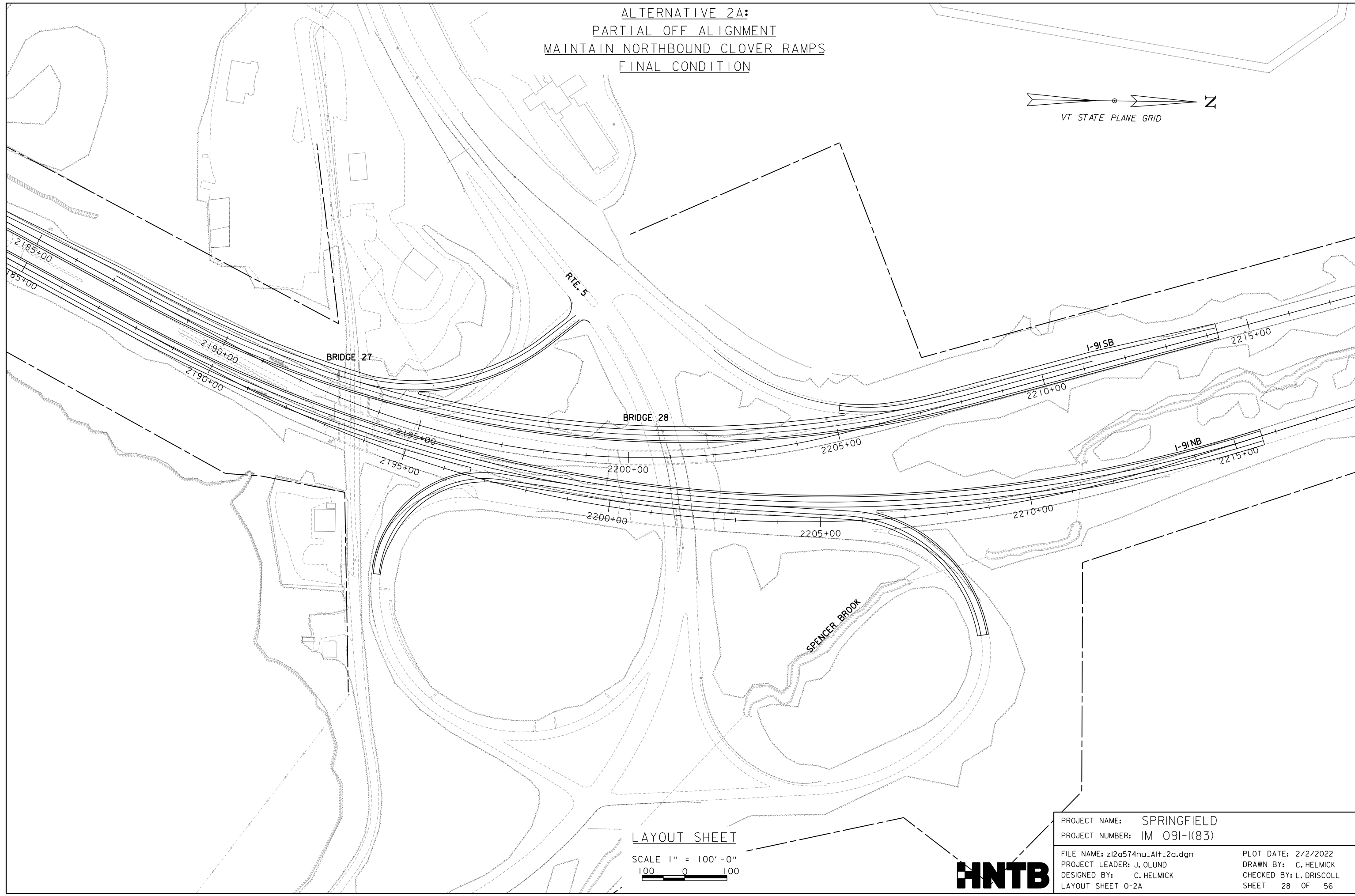
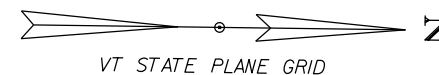
PROJECT NAME: SPRINGFIELD
 PROJECT NUMBER: IM 091-I(83)

FILE NAME: z12a574nu_Alt_1c.dgn
 PROJECT LEADER: J. OLUND
 DESIGNED BY: C. HELMICK
 LAYOUT SHEET 2-1C

PLOT DATE: 2/2/2022
 DRAWN BY: C. HELMICK
 CHECKED BY: L. DRISCOLL
 SHEET 27 OF 56



ALTERNATIVE 2A:
PARTIAL OFF ALIGNMENT
MAINTAIN NORTHBOUND CLOVER RAMPS
FINAL CONDITION



LAYOUT SHEET

SCALE 1" = 100' -0"
100 0 100

PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-I(83)

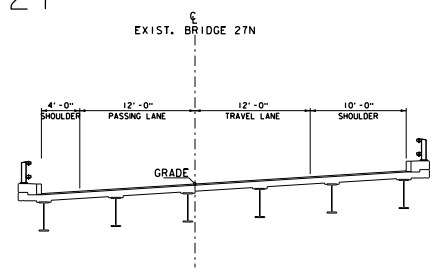
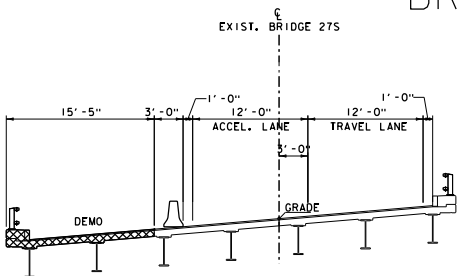
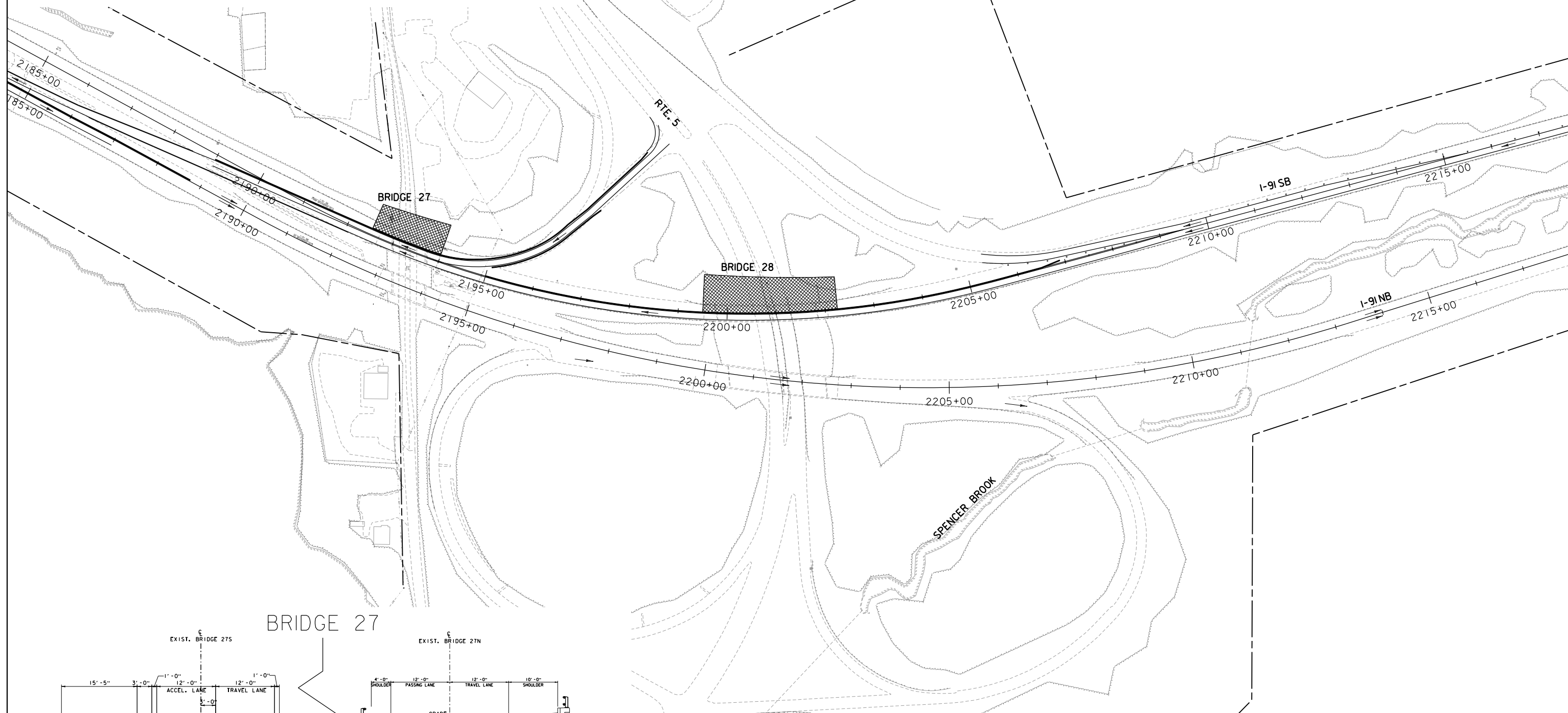
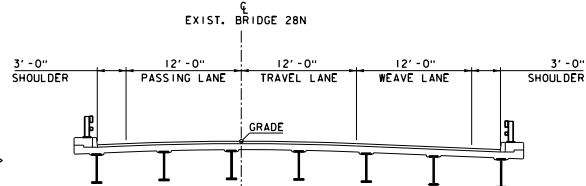
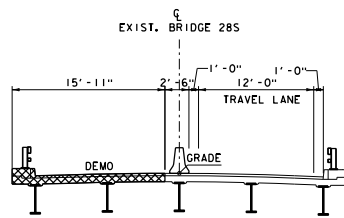
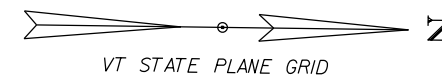
FILE NAME: z12a574nu_Alt_2a.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 0-2A

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 28 OF 56



BRIDGE 28

ALTERNATIVE 2A:
PARTIAL OFF ALIGNMENT
MAINTAIN NORTHBOUND CLOVER RAMP
STAGE I CONSTRUCTION



BRIDGE 27

LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

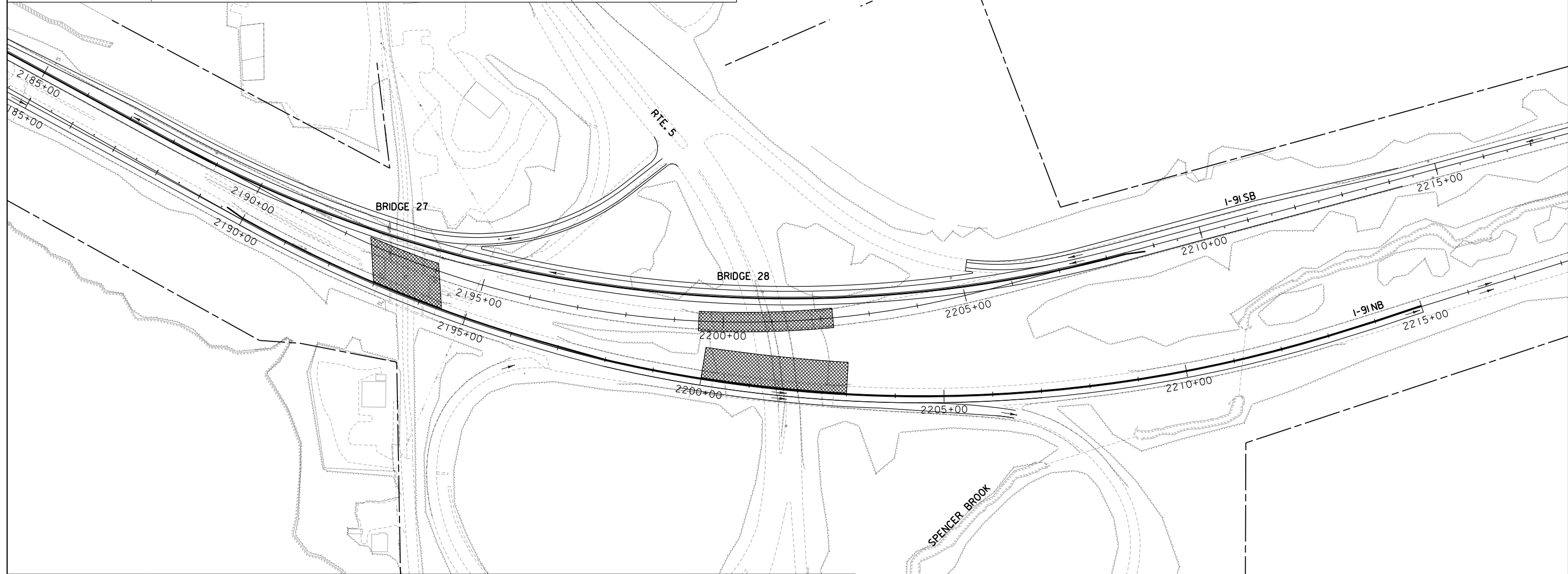
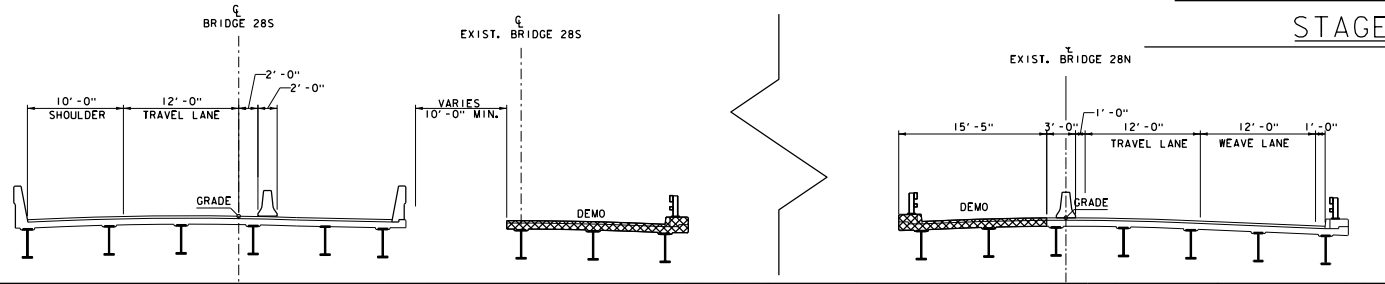
NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.



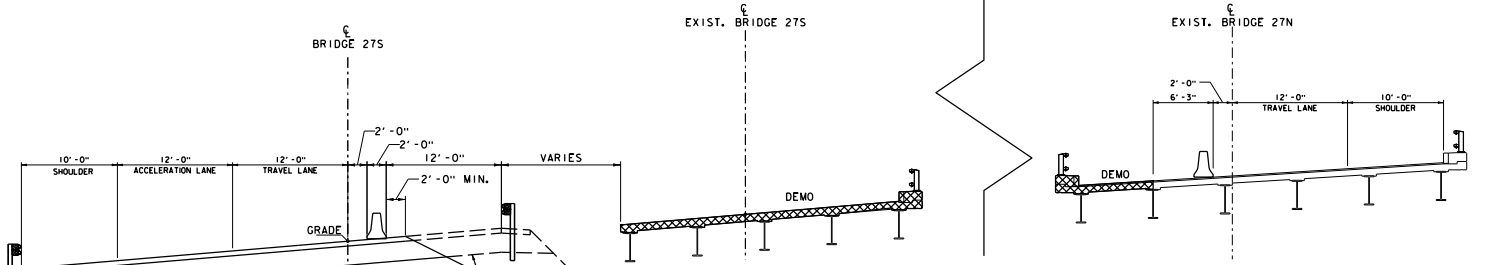
PROJECT NAME: SPRINGFIELD		PLOT DATE: 2/2/2022	
PROJECT NUMBER: IM 091-I(83)		DRAWN BY: C. HELMICK	
FILE NAME: z12a574nu_Alt_2a.dgn	DESIGNED BY: C. HELMICK	CHECKED BY: L. DRISCOLL	SHEET 29 OF 56
LAYOUT SHEET I-2A			

BRIDGE 28

ALTERNATIVE 2A: PARTIAL OFF ALIGNMENT MAINTAIN NORTHBOUND CLOVER RAMP STAGE 2 CONSTRUCTION



BRIDGE 27



LAYOUT SHEET

SCALE 1" = 100'-0"
100 0 100

NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

DASHED SECTION MAY BE CONSTRUCTED
IN STAGE 2A INSTEAD OF STAGE 1 IF
ADDITIONAL ROOM FOR BRIDGE DEMO IS DESIRED

PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

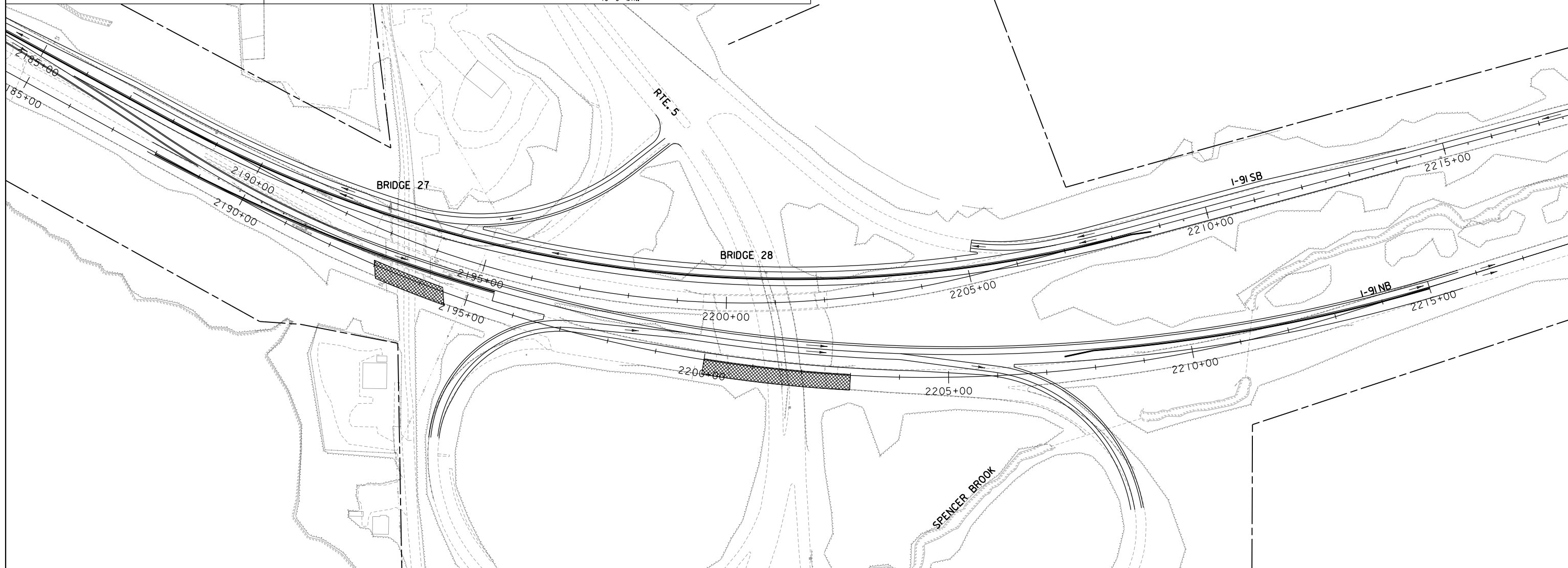
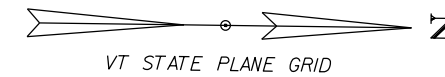
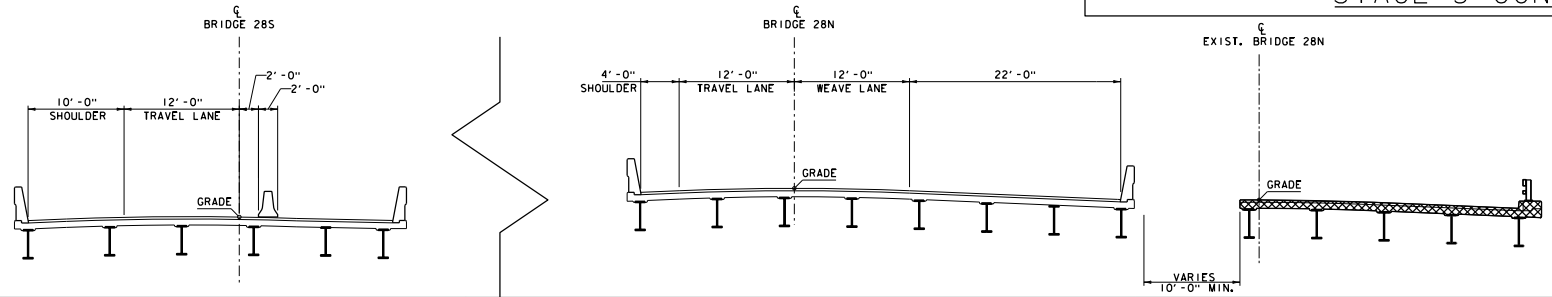
FILE NAME: z12a574nu_Alt_2a.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 2-2A

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 30 OF 56

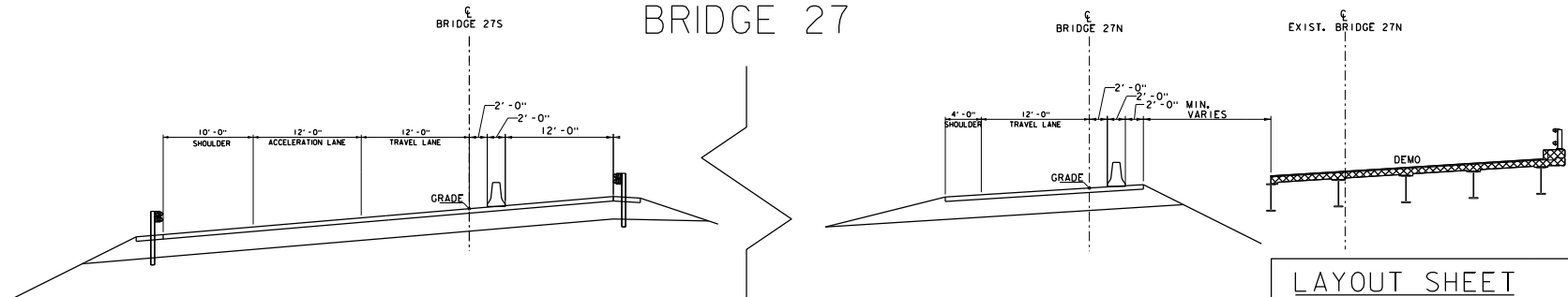


ALTERNATIVE 2A:
PARTIAL OFF ALIGNMENT
MAINTAIN NORTHBOUND CLOVER RAMPS
STAGE 3 CONSTRUCTION

BRIDGE 28



BRIDGE 27



LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

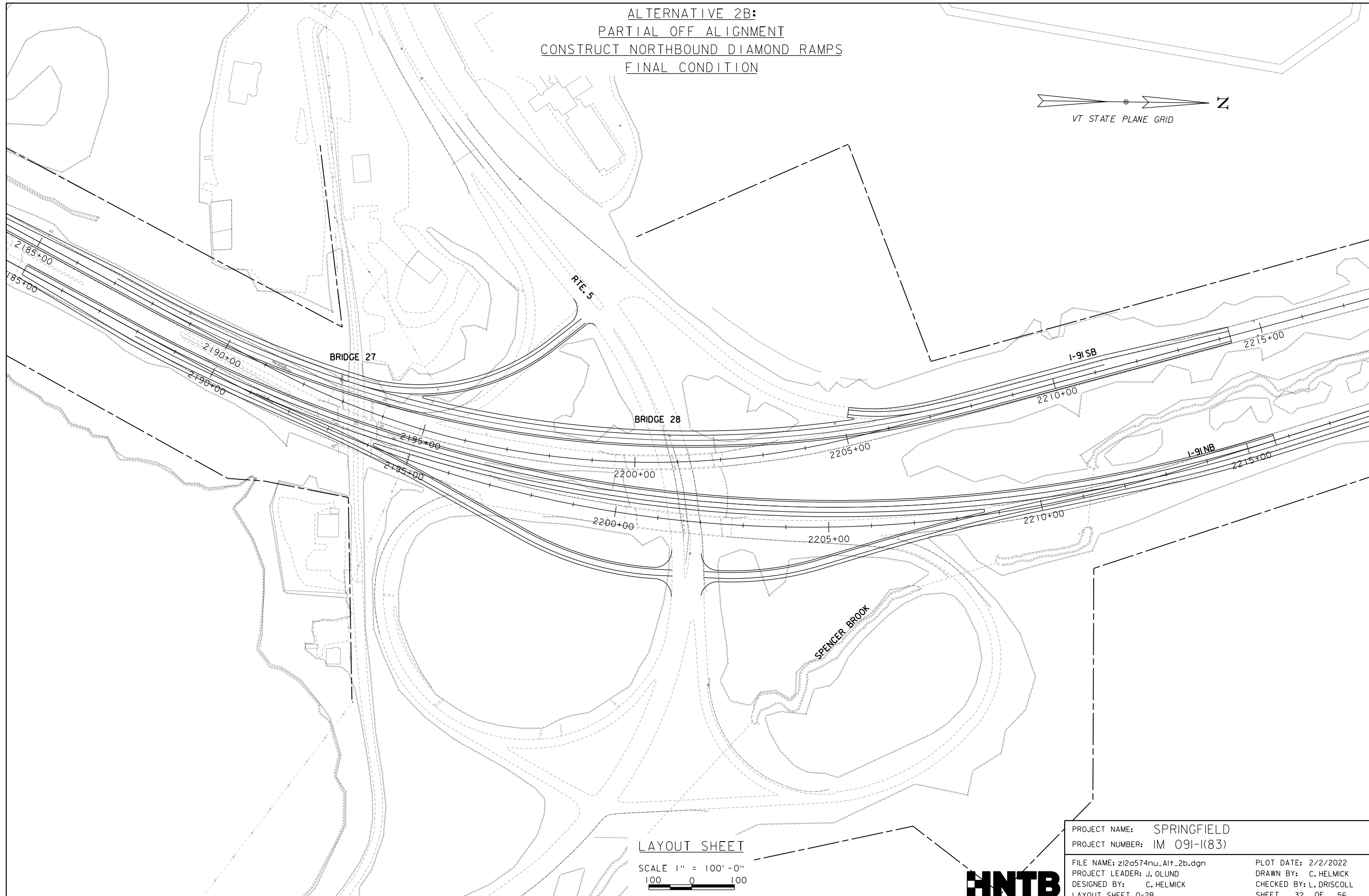
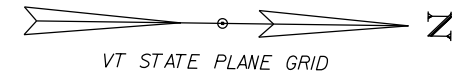


PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Alt_2a.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 3-2A

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 31 OF 56

ALTERNATIVE 2B:
PARTIAL OFF ALIGNMENT
CONSTRUCT NORTHBOUND DIAMOND RAMP
FINAL CONDITION



LAYOUT SHEET

SCALE 1" = 100' -0"
100 0 100

PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

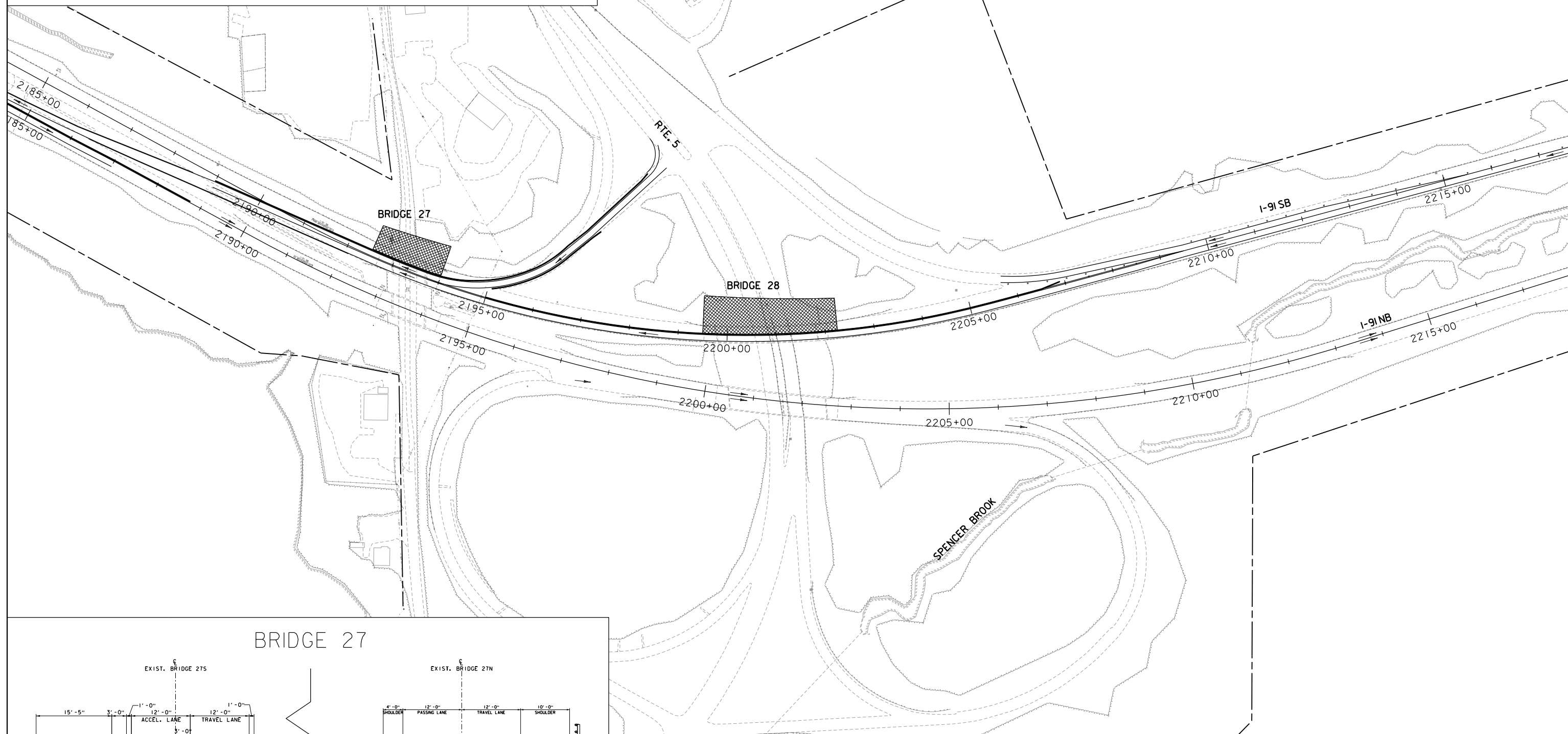
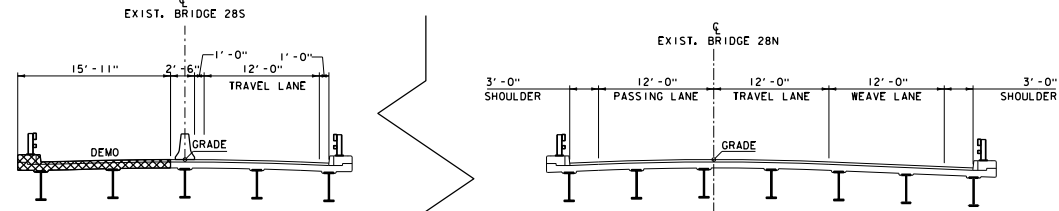
FILE NAME: z12a574nu_Alt_2b.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 0-2B

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 32 OF 56

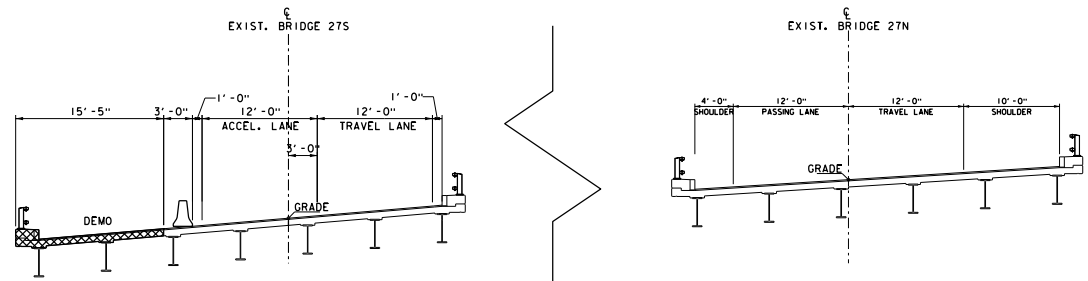


ALTERNATIVE 2B:
 PARTIAL OFF ALIGNMENT
 CONSTRUCT NORTHBOUND DIAMOND RAMP
 STAGE I CONSTRUCTION

BRIDGE 28



BRIDGE 27



LAYOUT SHEET

SCALE 1" = 100'-0"
 100 0 100

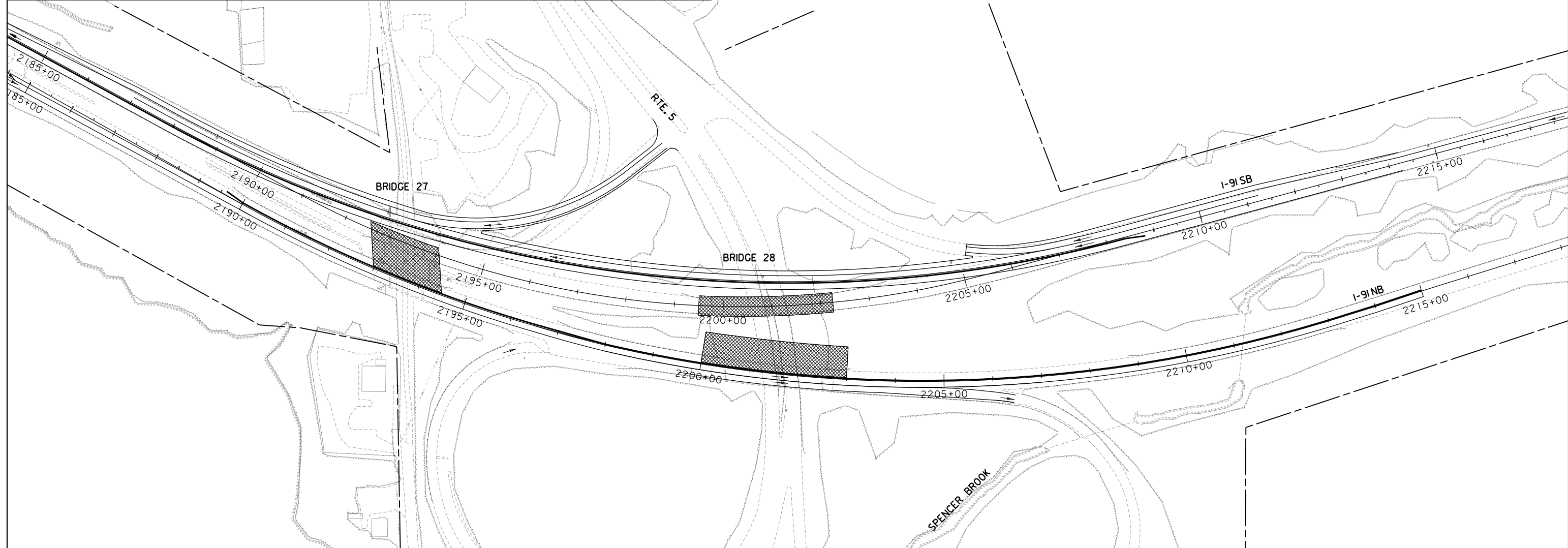
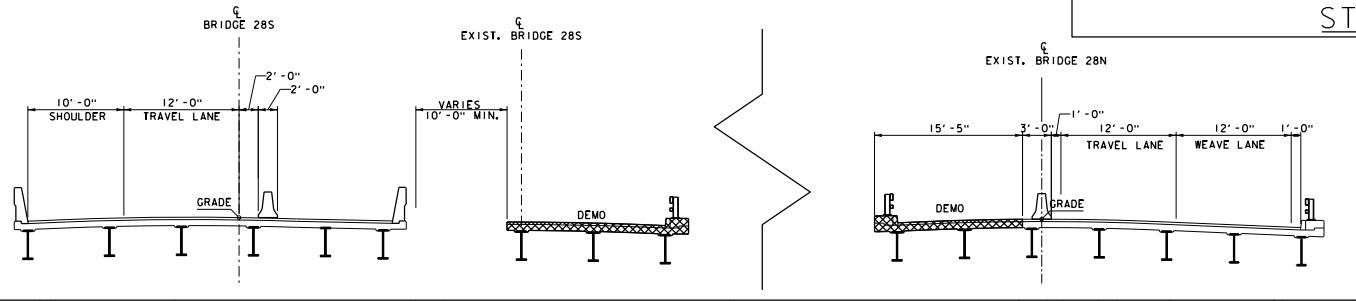
NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.



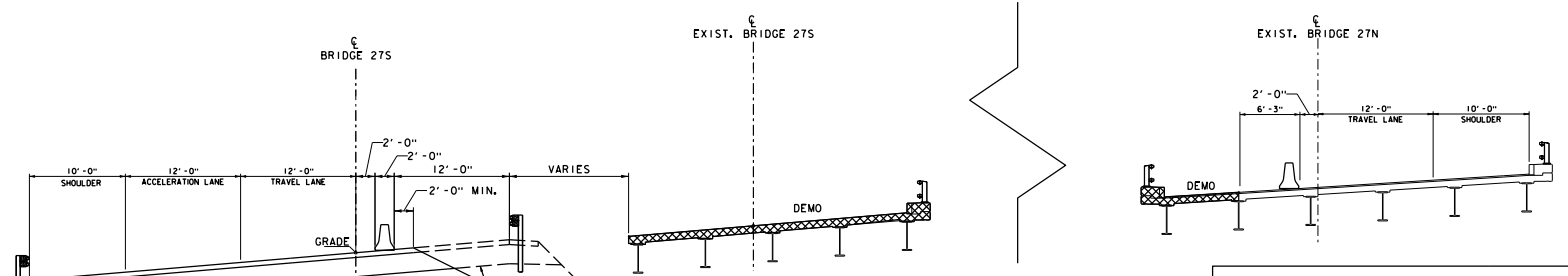
PROJECT NAME:	SPRINGFIELD	PLOT DATE:	2/2/2022
PROJECT NUMBER:	IM 091-1(83)	DRAWN BY:	C. HELMICK
FILE NAME:	z12a574nu_Alt_2b.dgn	CHECKED BY:	L. DRISCOLL
PROJECT LEADER:	J. OLUND	SHEET	33 OF 56
DESIGNED BY:	C. HELMICK		
LAYOUT SHEET I-2B			

ALTERNATIVE 2B:
PARTIAL OFF ALIGNMENT
CONSTRUCT NORTHBOUND DIAMOND RAMP
STAGE 2 CONSTRUCTION

BRIDGE 28



BRIDGE 27



DASHED SECTION MAY BE CONSTRUCTED
IN STAGE 2A INSTEAD OF STAGE 1 IF
ADDITIONAL ROOM FOR BRIDGE DEMO IS DESIRED

LAYOUT SHEET

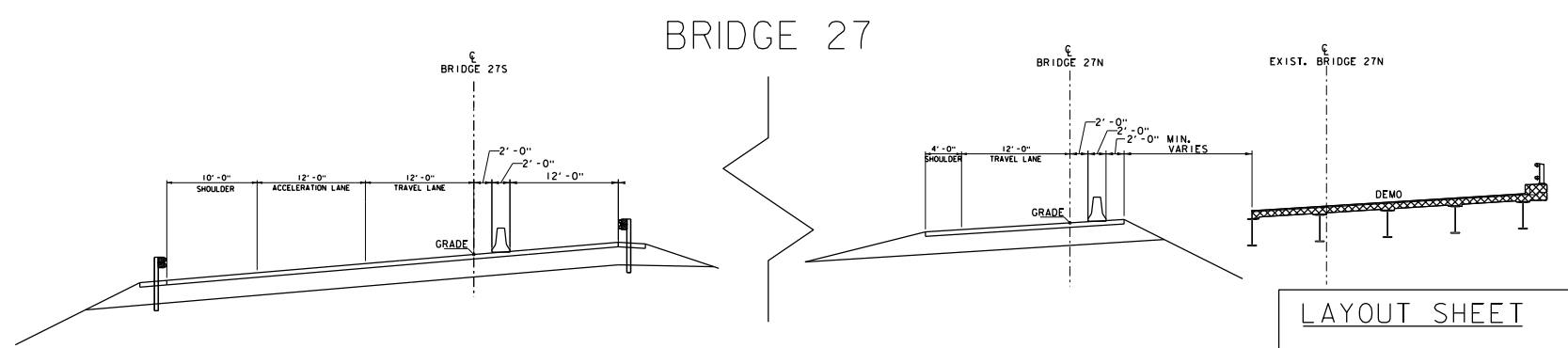
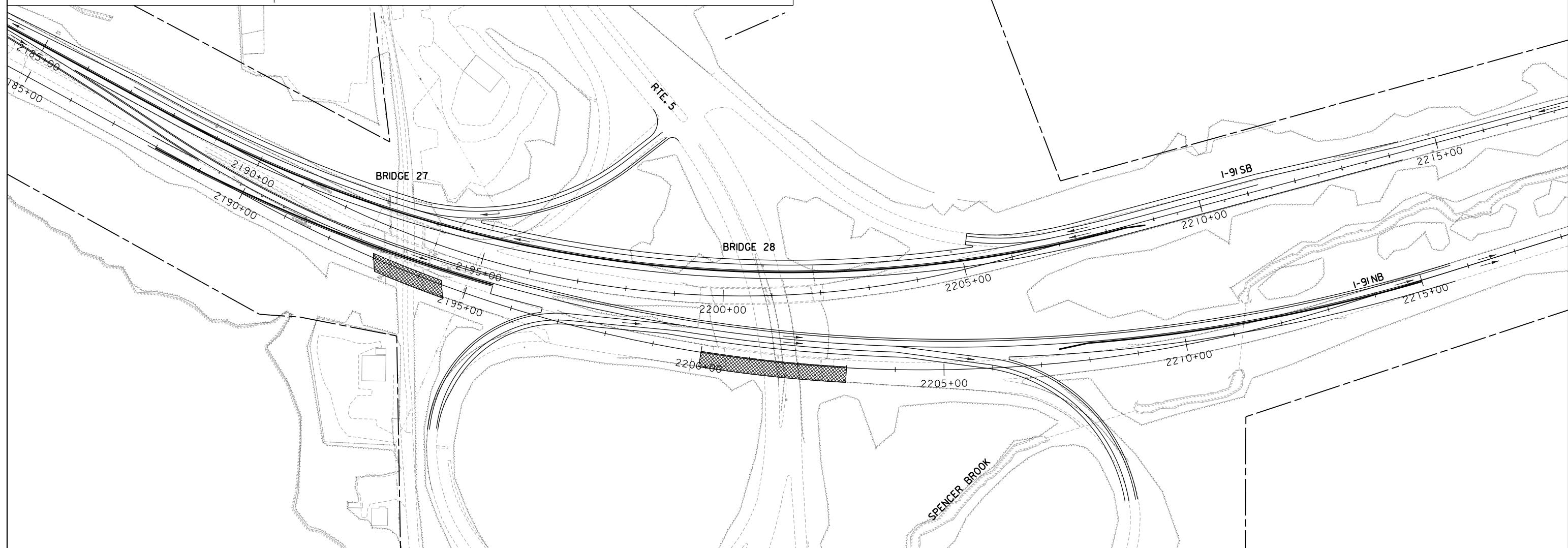
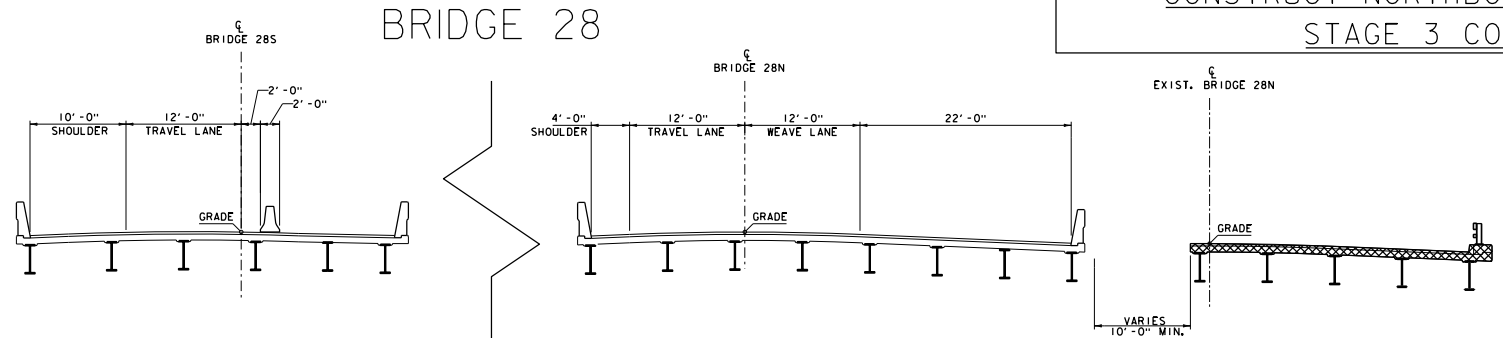
SCALE 1" = 100' - 0"
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NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-I(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_2b.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 34 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 2-2B	



ALTERNATIVE 2B:
PARTIAL OFF ALIGNMENT
CONSTRUCT NORTHBOUND DIAMOND RAMP
STAGE 3 CONSTRUCTION



LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

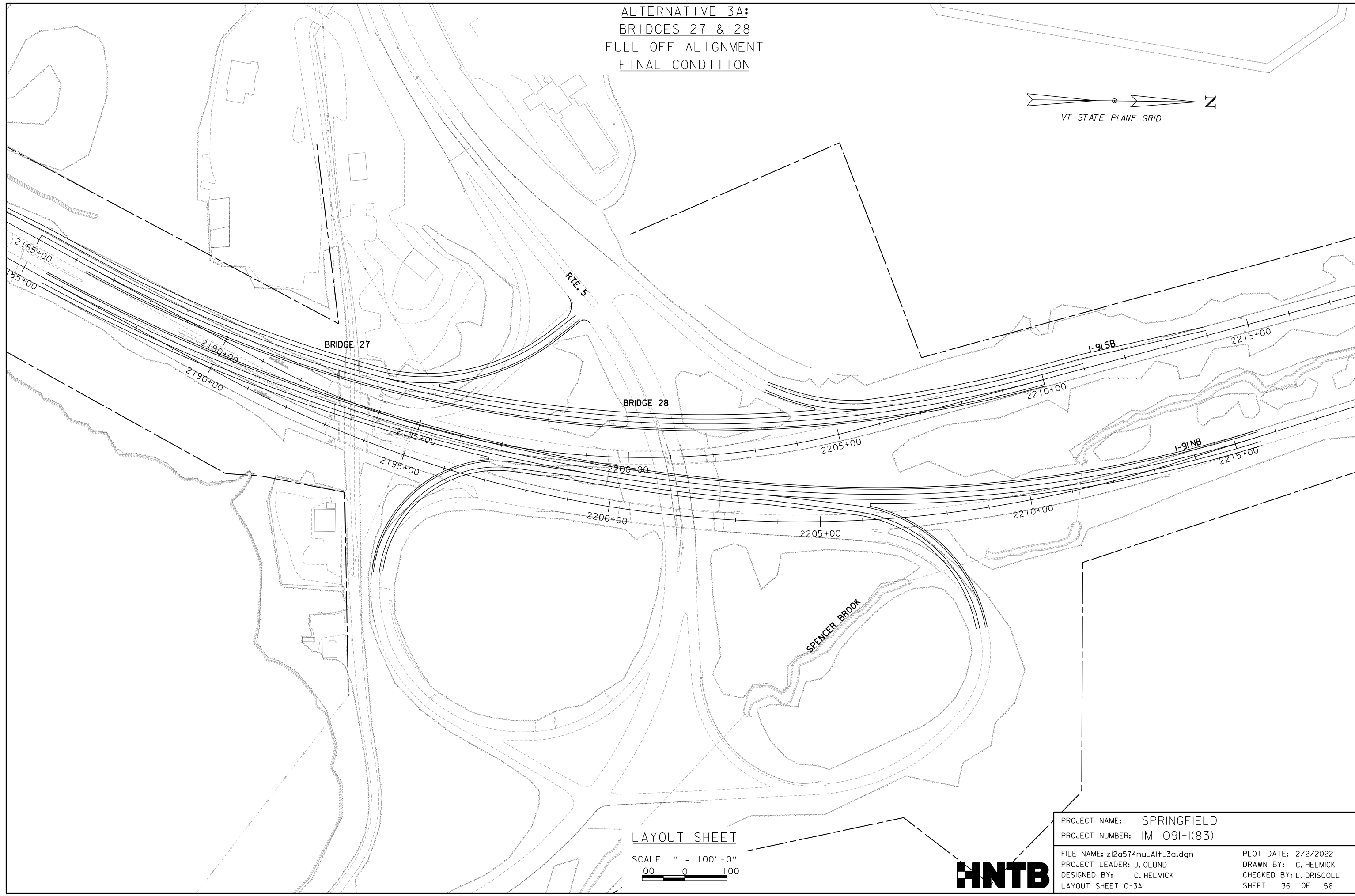
PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Alt_2b.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 3-2B

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 35 OF 56



ALTERNATIVE 3A:
BRIDGES 27 & 28
FULL OFF ALIGNMENT
FINAL CONDITION



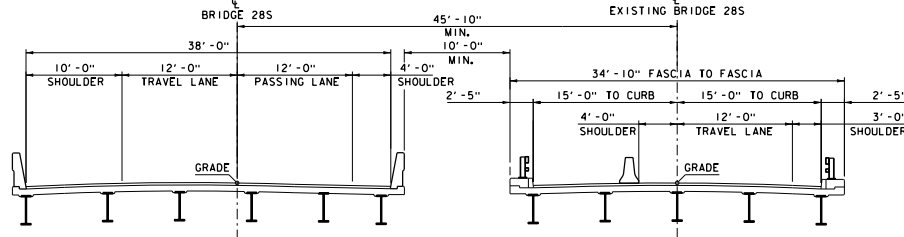
LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

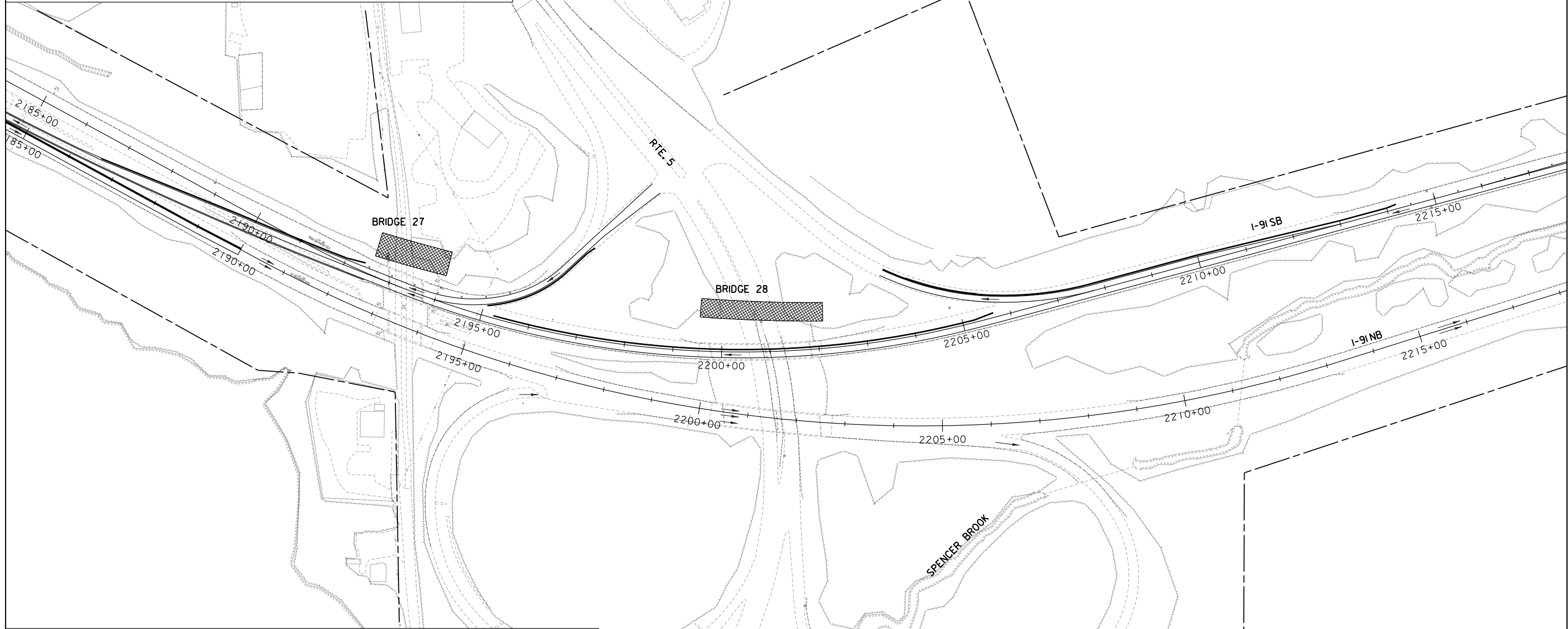
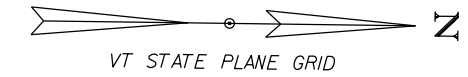


PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_3a.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 36 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 0-3A	

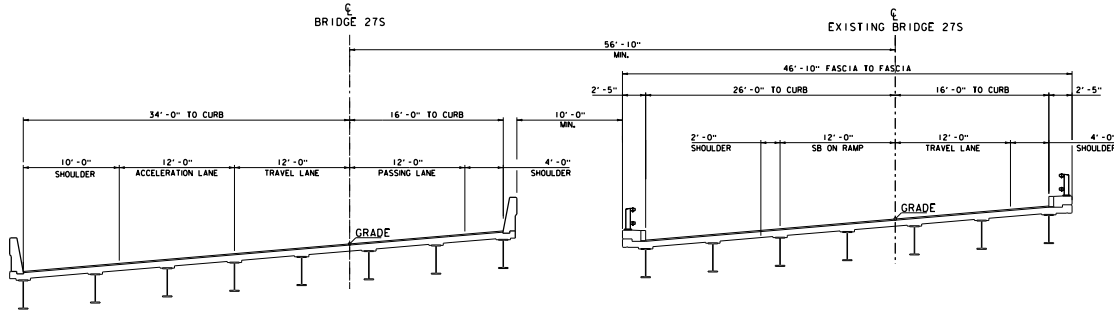
BRIDGE 28



ALTERNATIVE 3A:
BRIDGES 27 & 28
FULL OFF ALIGNMENT
STAGE I CONSTRUCTION



BRIDGE 27



LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

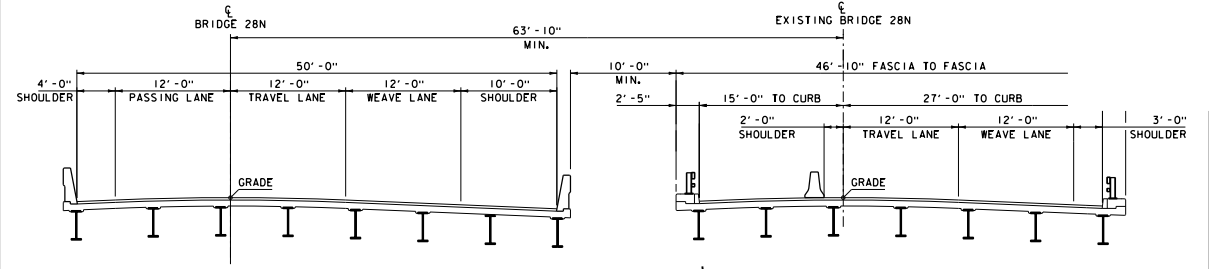


PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

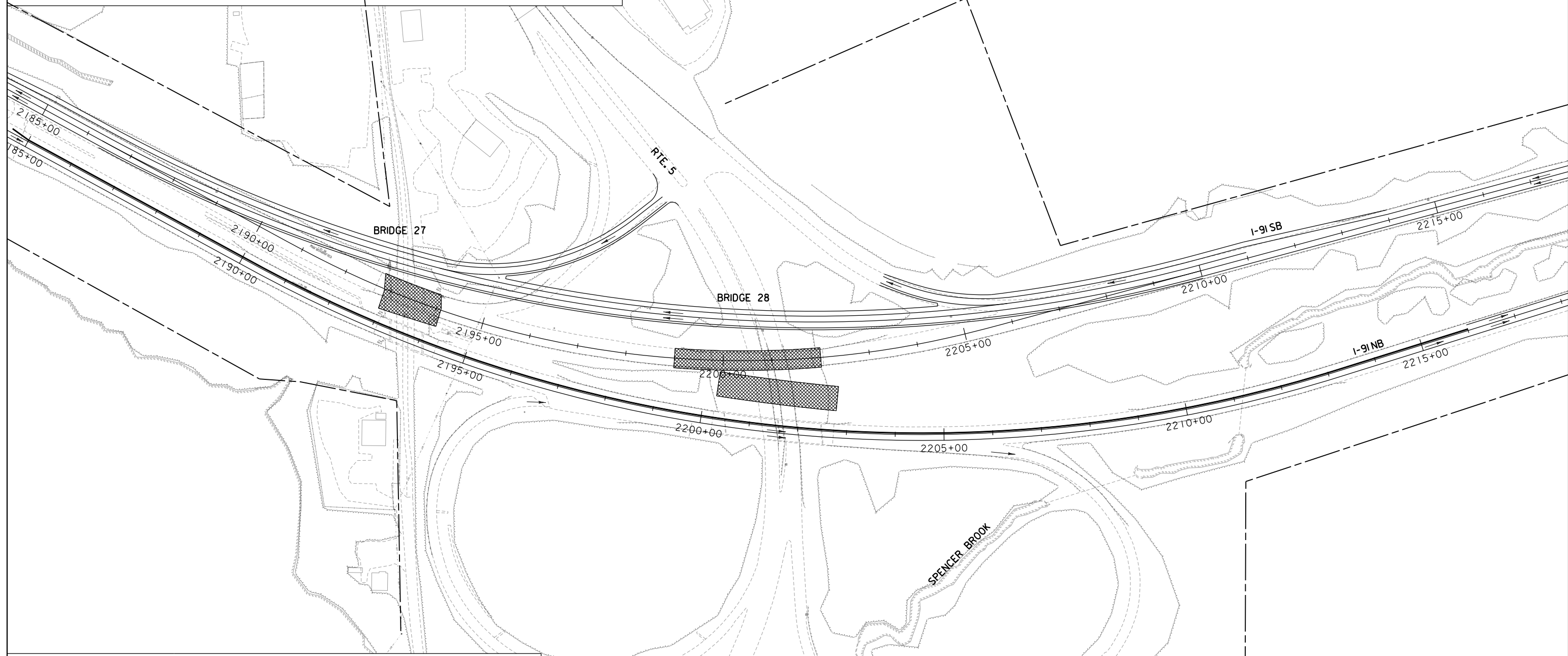
FILE NAME: z12a574nu_Alt_3a.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET I-3A

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 37 OF 56

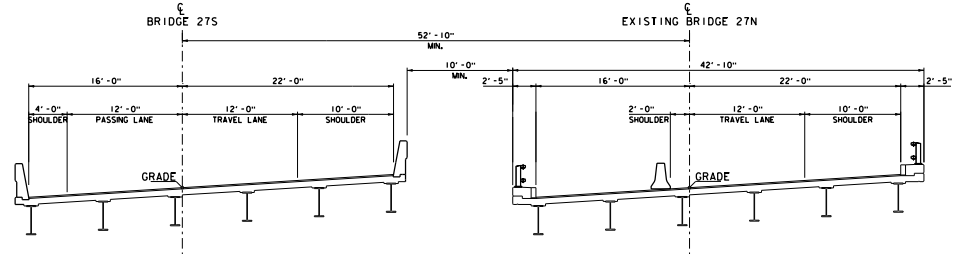
BRIDGE 28



ALTERNATIVE 3A:
BRIDGE 27 & 28
FULL OFF ALIGNMENT
STAGE 2 CONSTRUCTION



BRIDGE 27



LAYOUT SHEET

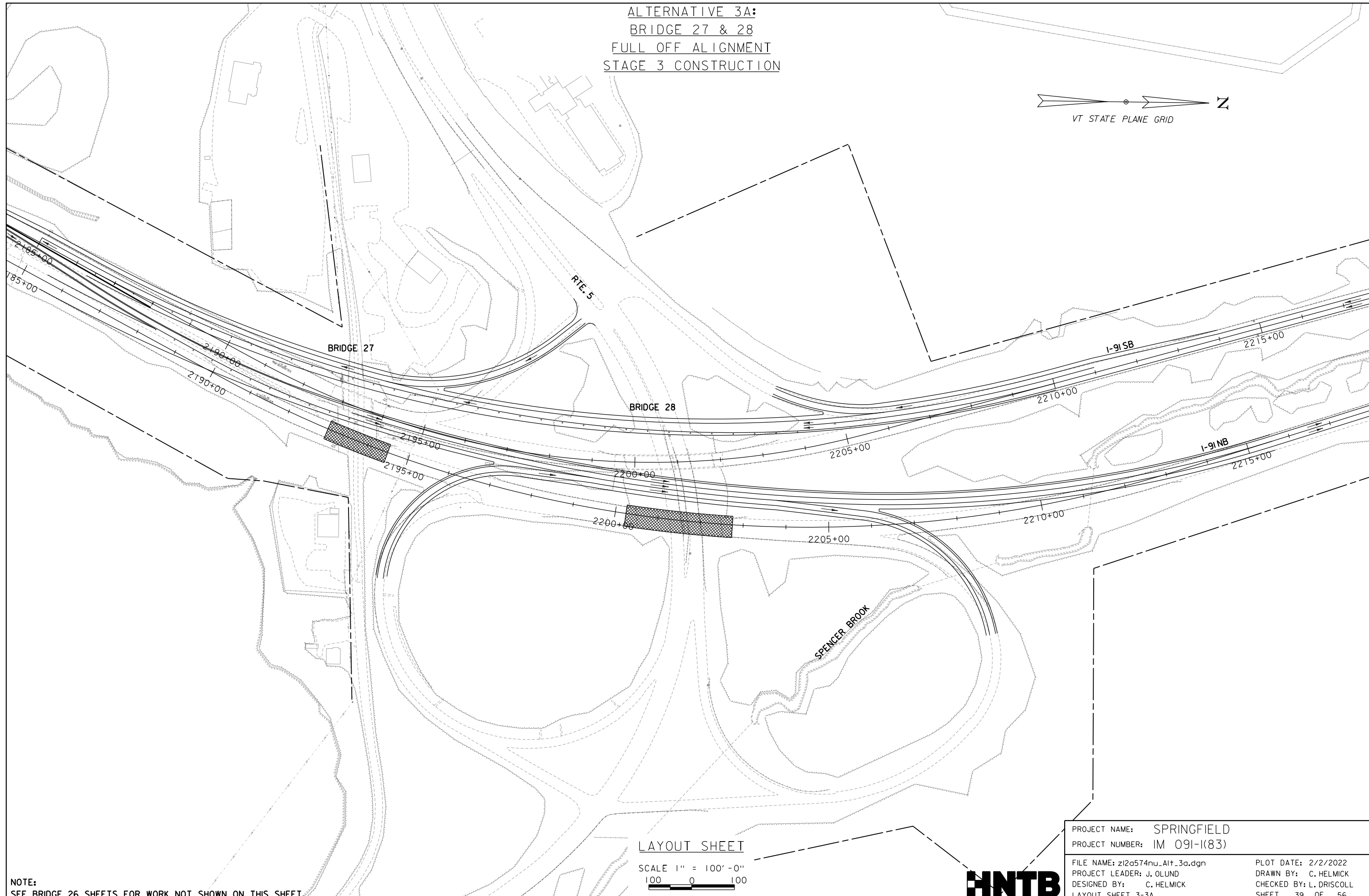
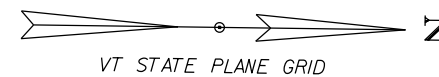
SCALE 1" = 100' - 0"
100 0 100

NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.



PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-I(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_3a.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 38 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 2-3A	

ALTERNATIVE 3A:
 BRIDGE 27 & 28
 FULL OFF ALIGNMENT
 STAGE 3 CONSTRUCTION



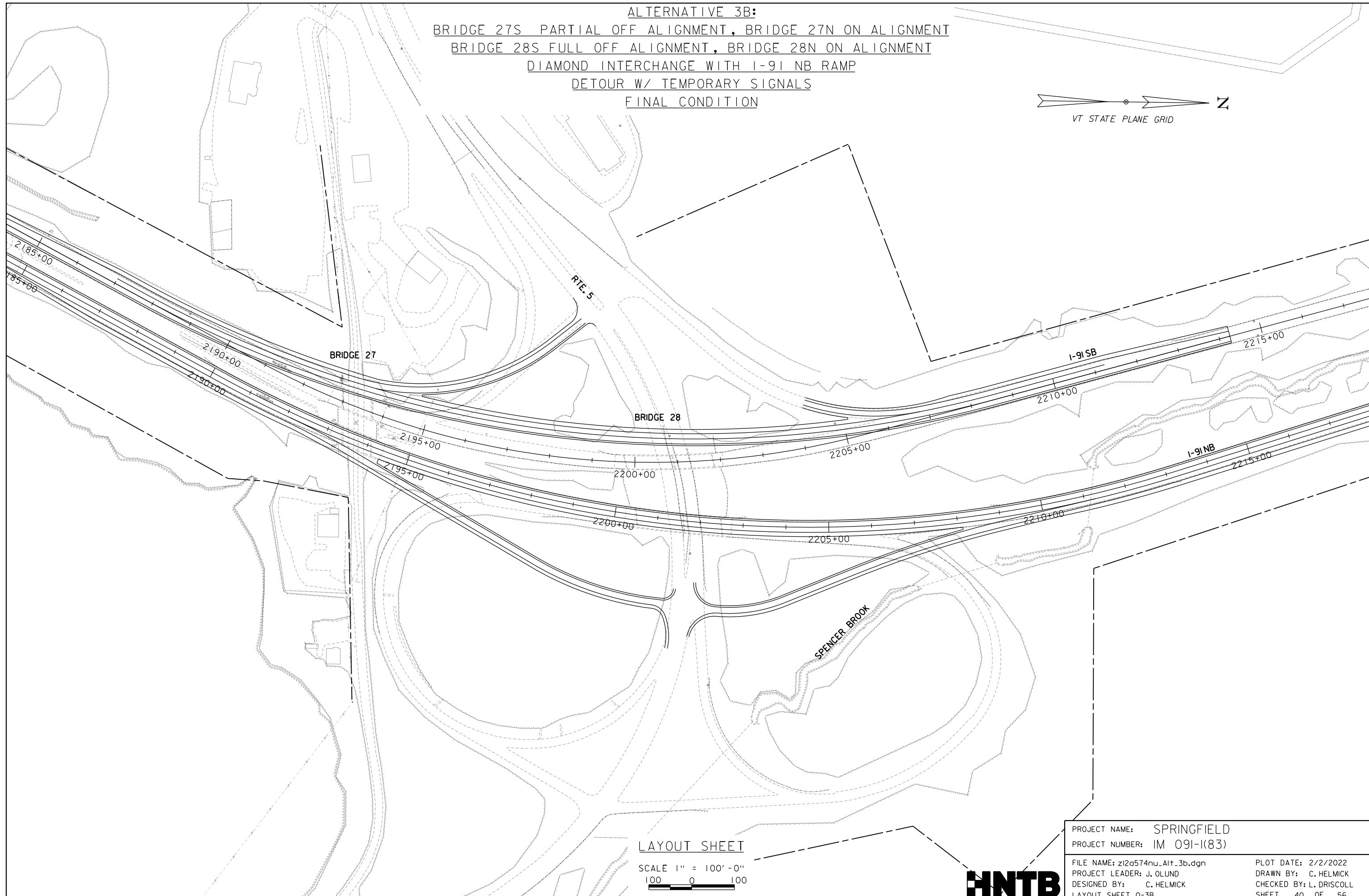
NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET
 SCALE 1" = 100' - 0"
 100 0 100

PROJECT NAME:	SPRINGFIELD	PLOT DATE:	2/2/2022
PROJECT NUMBER:	IM 091-I(83)	DRAWN BY:	C. HELMICK
FILE NAME:	z12a574nu_Alt_3a.dgn	CHECKED BY:	L. DRISCOLL
PROJECT LEADER:	J. OLUND	LAYOUT SHEET	3-3A
DESIGNED BY:	C. HELMICK		SHEET 39 OF 56



ALTERNATIVE 3B:
 BRIDGE 27S PARTIAL OFF ALIGNMENT, BRIDGE 27N ON ALIGNMENT
 BRIDGE 28S FULL OFF ALIGNMENT, BRIDGE 28N ON ALIGNMENT
 DIAMOND INTERCHANGE WITH I-91 NB RAMP
 DETOUR W/ TEMPORARY SIGNALS
 FINAL CONDITION



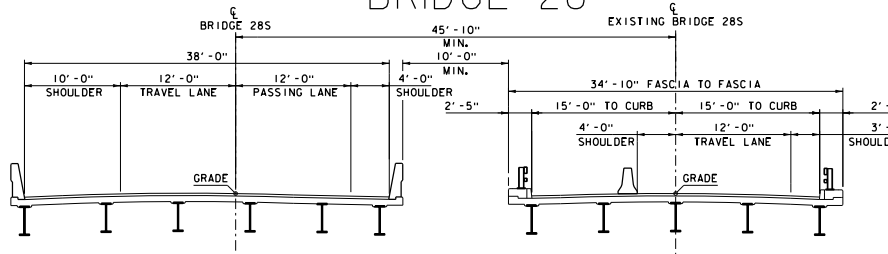
LAYOUT SHEET

SCALE 1" = 100' -0"
 100 0 100

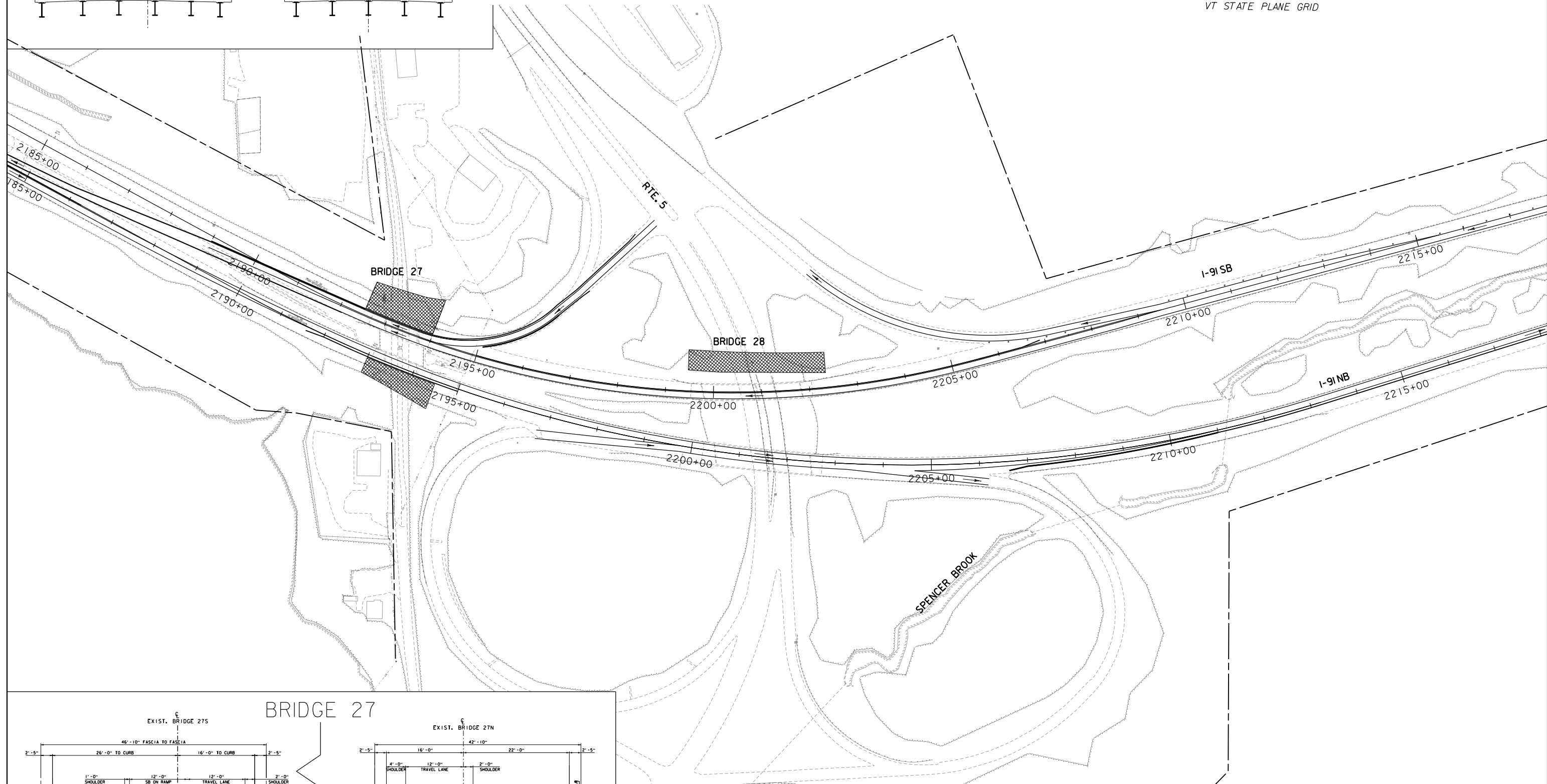
PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_3b.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 40 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 0-3B	



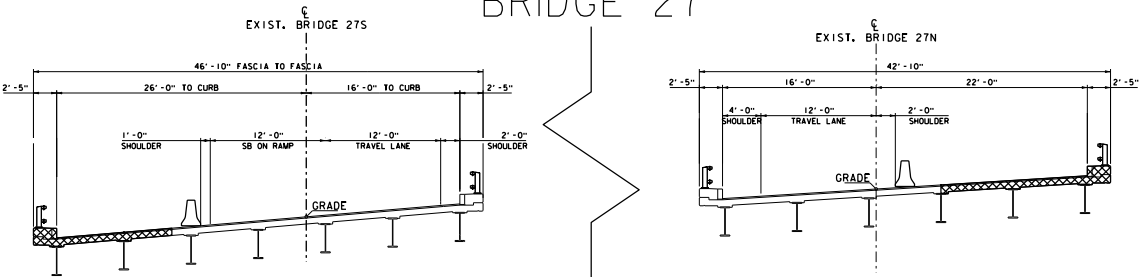
BRIDGE 28



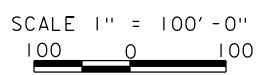
ALTERNATIVE 3B:
 BRIDGE 27S PARTIAL OFF ALIGNMENT, BRIDGE 27N ON ALIGNMENT
 BRIDGE 28S FULL OFF ALIGNMENT, BRIDGE 28N ON ALIGNMENT
 DIAMOND INTERCHANGE WITH I-91 NB RAMP
 DETOUR W/ TEMPORARY SIGNALS
 STAGE I CONSTRUCTION



BRIDGE 27



LAYOUT SHEET

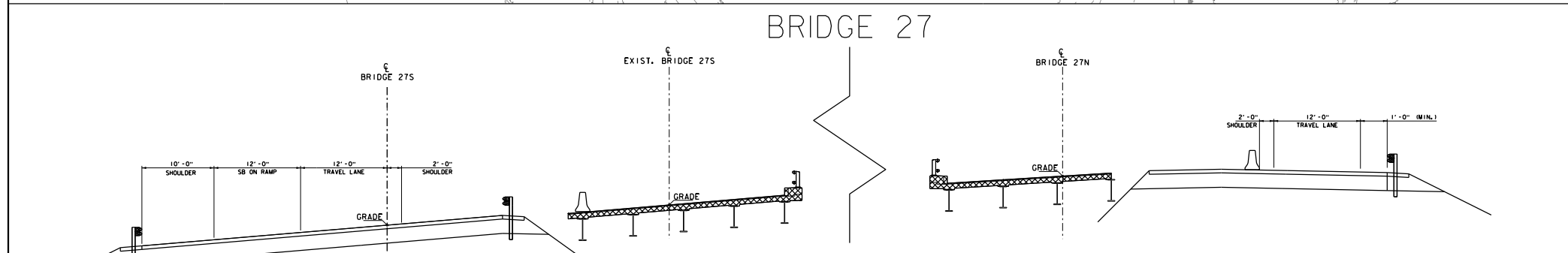
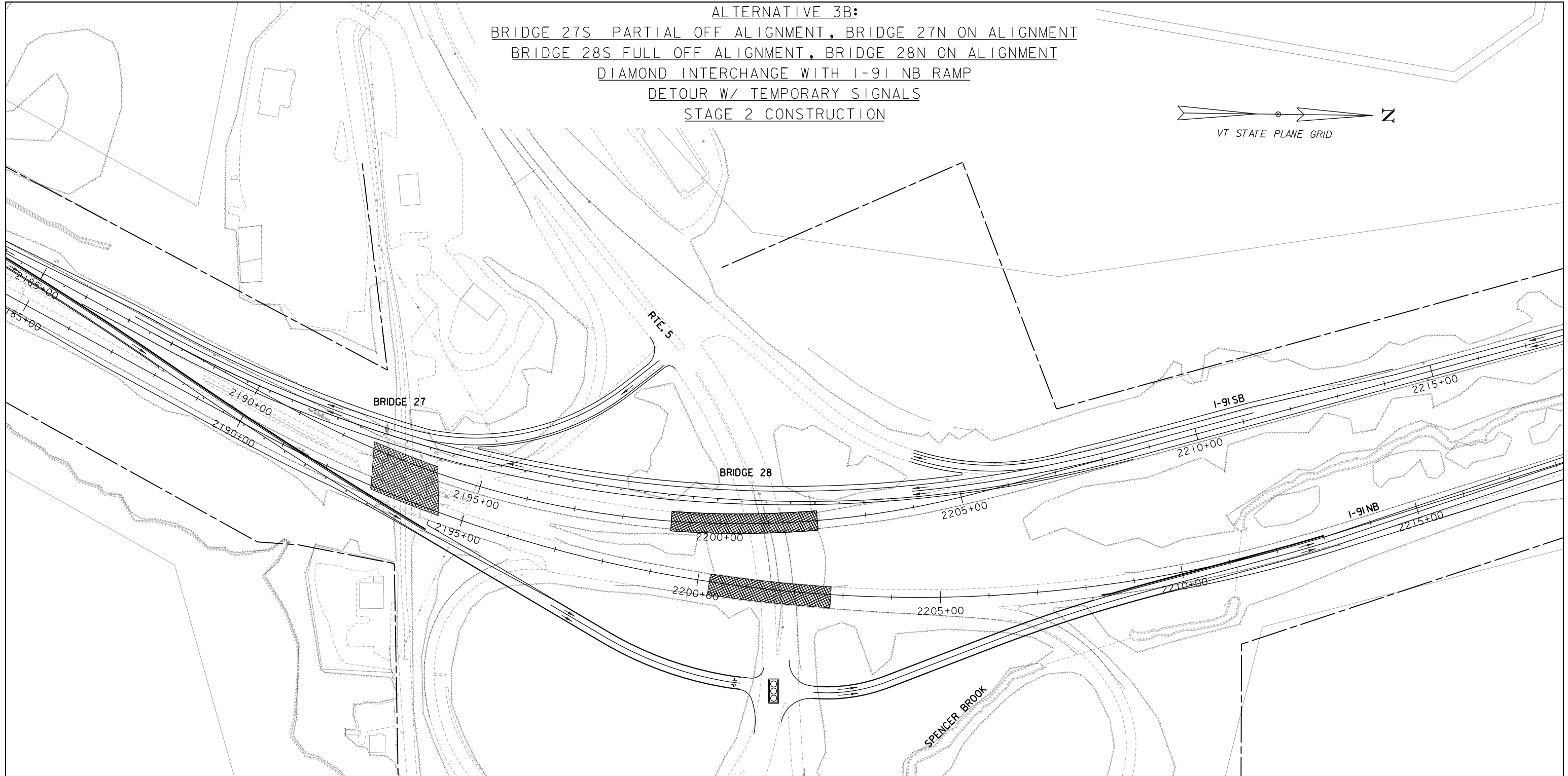
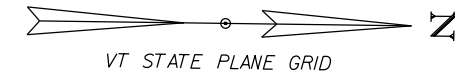


NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME:	SPRINGFIELD	PLOT DATE:	2/2/2022
PROJECT NUMBER:	IM 091-1(83)	DRAWN BY:	C. HELMICK
FILE NAME:	z12a574nu_Alt_3b.dgn	CHECKED BY:	L. DRISCOLL
PROJECT LEADER:	J. OLUND	SHEET	41 OF 56
DESIGNED BY:	C. HELMICK		
LAYOUT SHEET	I-3B		



ALTERNATIVE 3B:
 BRIDGE 27S PARTIAL OFF ALIGNMENT, BRIDGE 27N ON ALIGNMENT
 BRIDGE 28S FULL OFF ALIGNMENT, BRIDGE 28N ON ALIGNMENT
 DIAMOND INTERCHANGE WITH I-91 NB RAMP
 DETOUR W/ TEMPORARY SIGNALS
 STAGE 2 CONSTRUCTION



LAYOUT SHEET

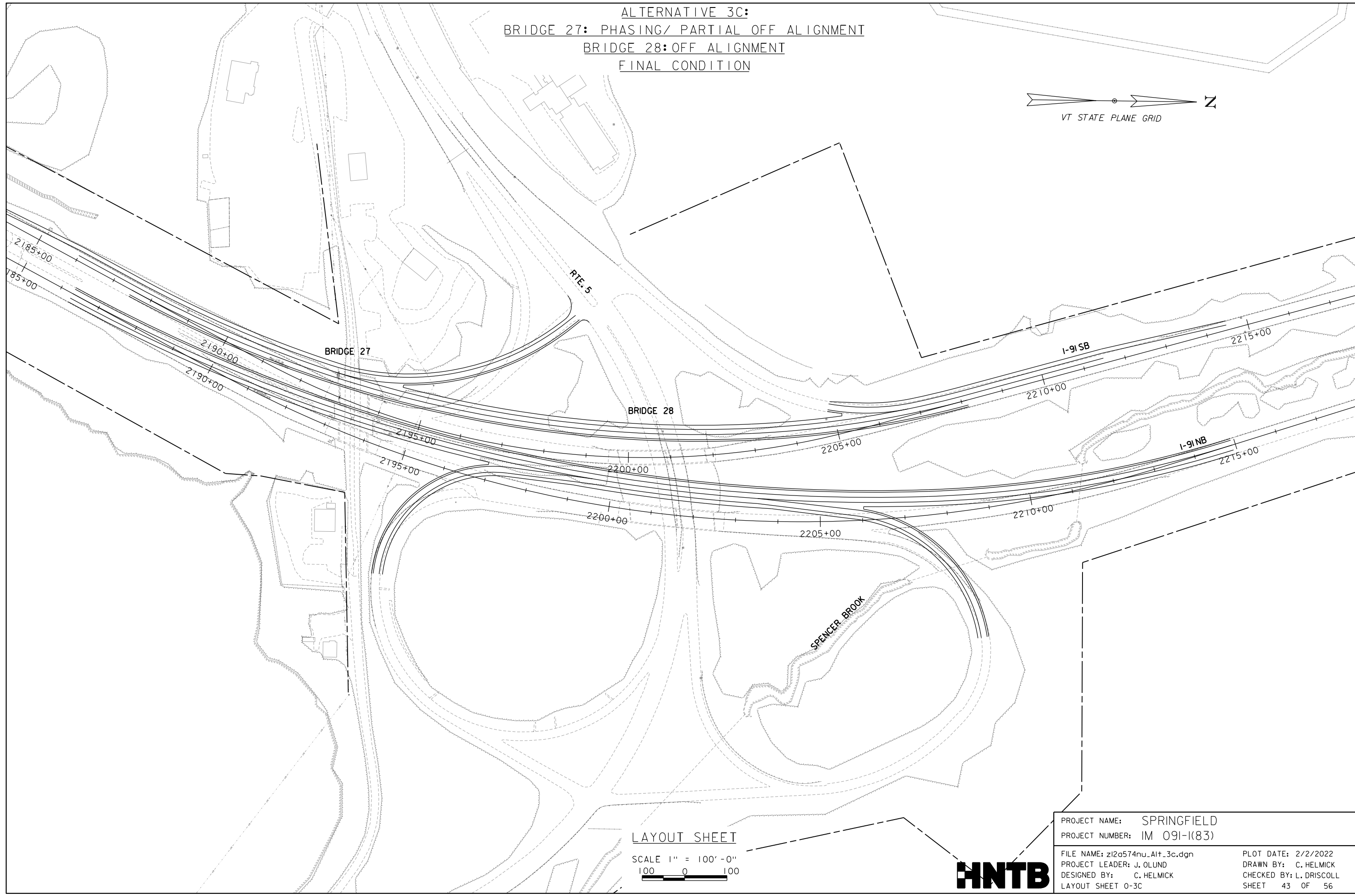
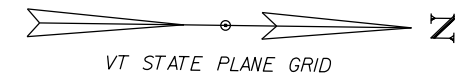
SCALE 1" = 100' - 0"
 100 0 100

NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME:	SPRINGFIELD	PLOT DATE:	2/2/2022
PROJECT NUMBER:	IM 091-1(83)	DRAWN BY:	C. HELMICK
FILE NAME:	z12a574nu_Alt_3b.dgn	CHECKED BY:	L. DRISCOLL
PROJECT LEADER:	J. OLUND	SHEET	42 OF 56
DESIGNED BY:	C. HELMICK		
LAYOUT SHEET	2-3B		



ALTERNATIVE 3C:
BRIDGE 27: PHASING/ PARTIAL OFF ALIGNMENT
BRIDGE 28: OFF ALIGNMENT
FINAL CONDITION



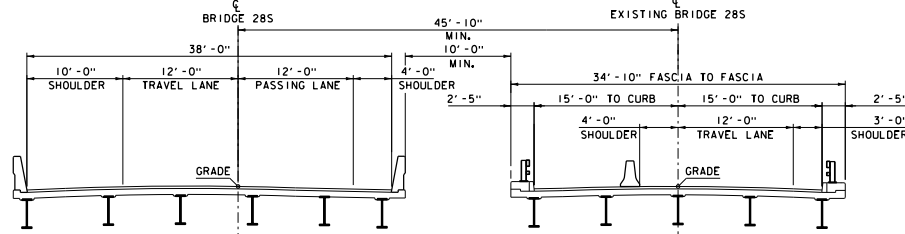
LAYOUT SHEET

SCALE 1" = 100' -0"
100 0 100

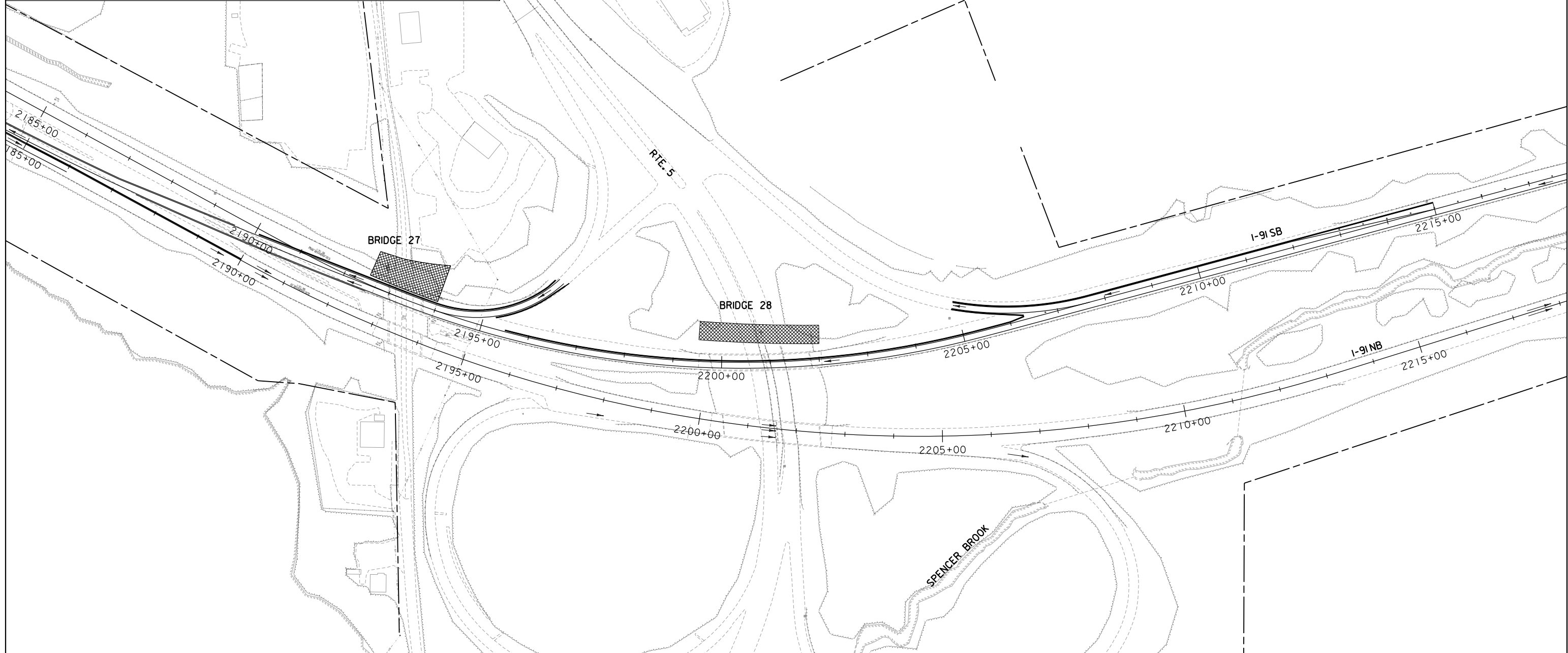


PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-I(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_3c.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 43 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 0-3C	

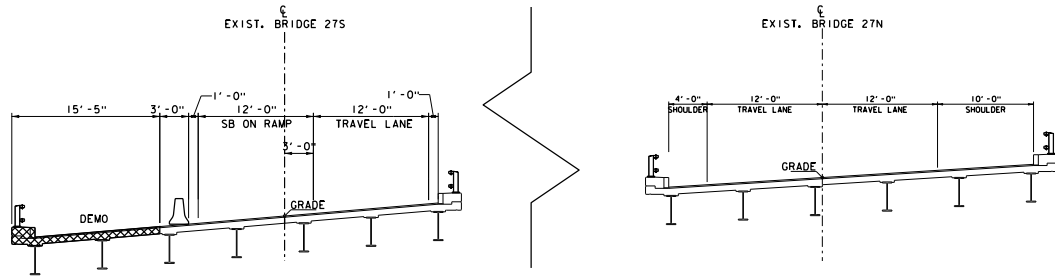
BRIDGE 28



ALTERNATIVE 3C:
BRIDGE 27: PHASING/ PARTIAL OFF ALIGNMENT
BRIDGE 28: OFF ALIGNMENT
STAGE I CONSTRUCTION



BRIDGE 27



LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

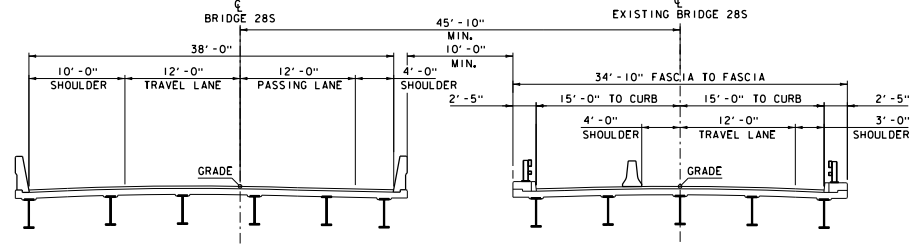
PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-I(83)

FILE NAME: z12a574nu_Alt_3c.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET I-3C

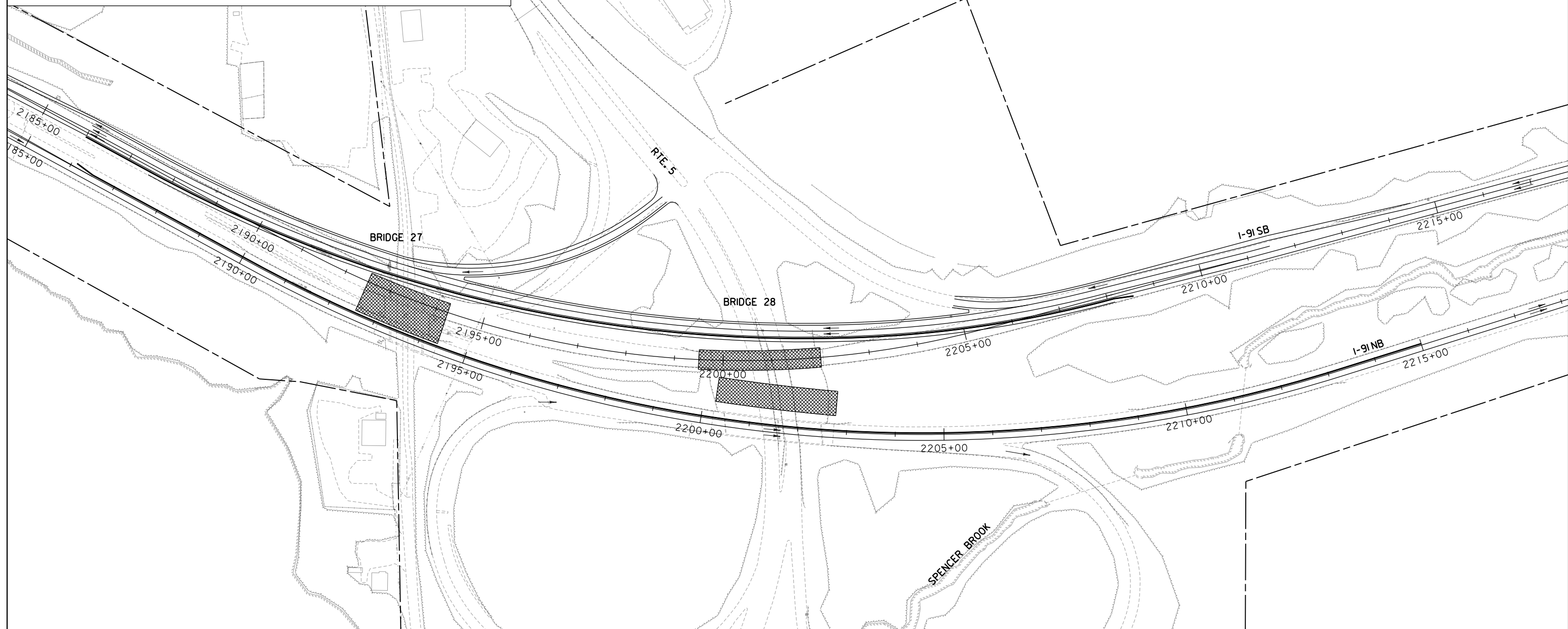
PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 44 OF 56



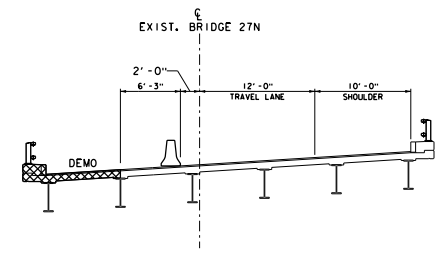
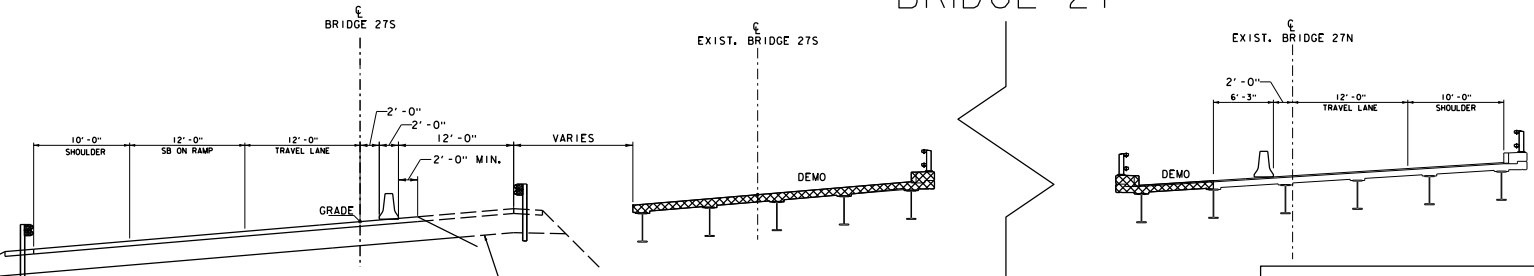
BRIDGE 28



ALTERNATIVE 3C:
BRIDGE 27: PHASING/ PARTIAL OFF ALIGNMENT
BRIDGE 28: OFF ALIGNMENT
STAGE 2 CONSTRUCTION



BRIDGE 27



LAYOUT SHEET

SCALE 1" = 100' - 0"
100 0 100

NOTE:
SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

DASHED SECTION MAY BE CONSTRUCTED
IN STAGE 2A INSTEAD OF STAGE 1 IF
ADDITIONAL ROOM FOR BRIDGE DEMO IS DESIRED

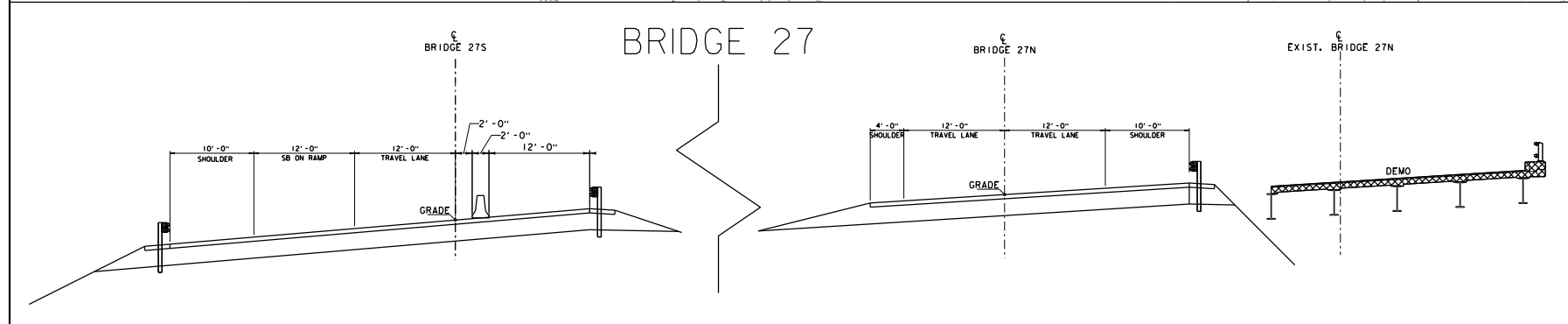
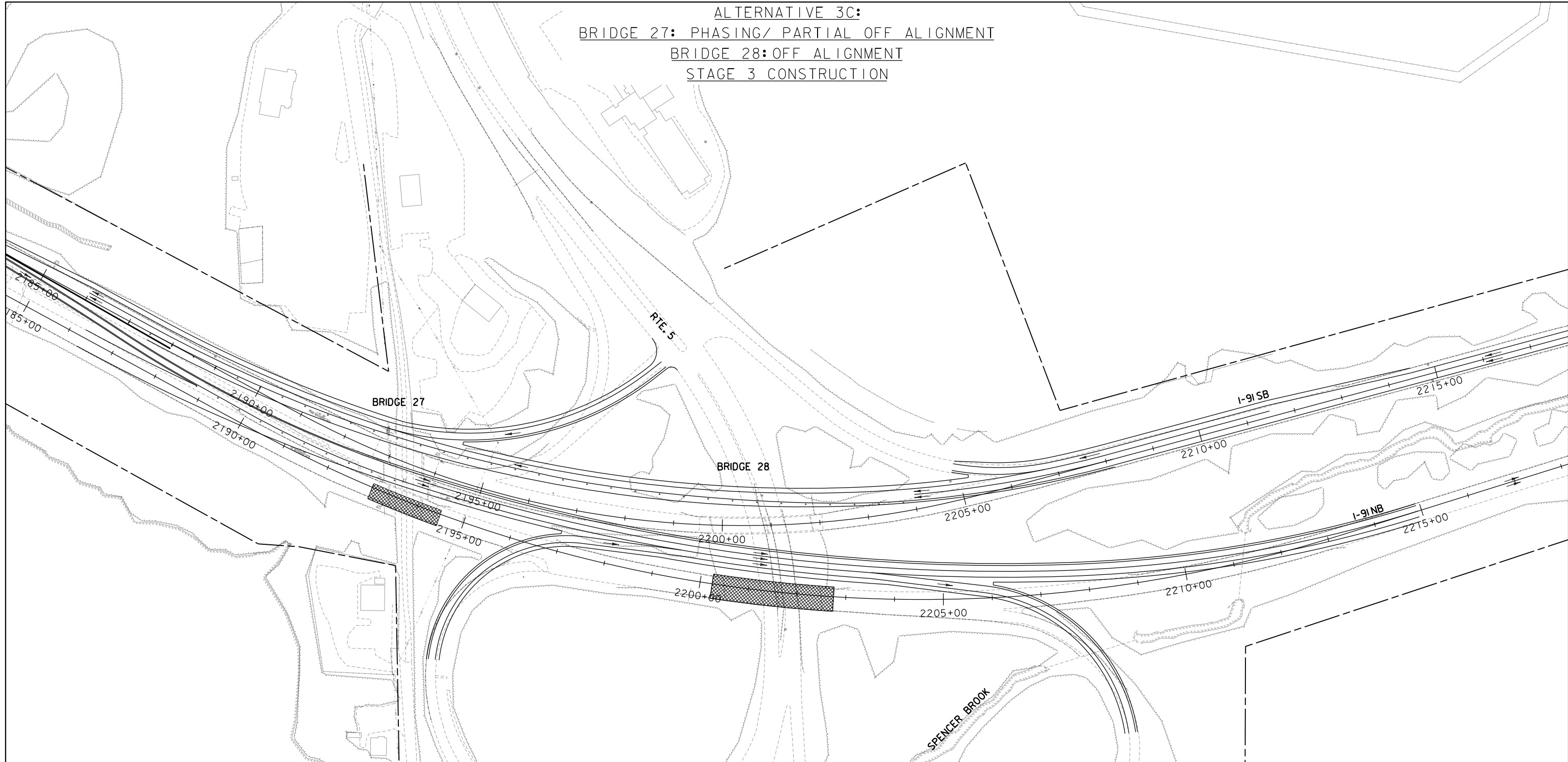
PROJECT NAME: SPRINGFIELD
PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Alt_3c.dgn
PROJECT LEADER: J. OLUND
DESIGNED BY: C. HELMICK
LAYOUT SHEET 2-3C

PLOT DATE: 2/2/2022
DRAWN BY: C. HELMICK
CHECKED BY: L. DRISCOLL
SHEET 45 OF 56



ALTERNATIVE 3C:
 BRIDGE 27: PHASING/ PARTIAL OFF ALIGNMENT
 BRIDGE 28: OFF ALIGNMENT
 STAGE 3 CONSTRUCTION



LAYOUT SHEET

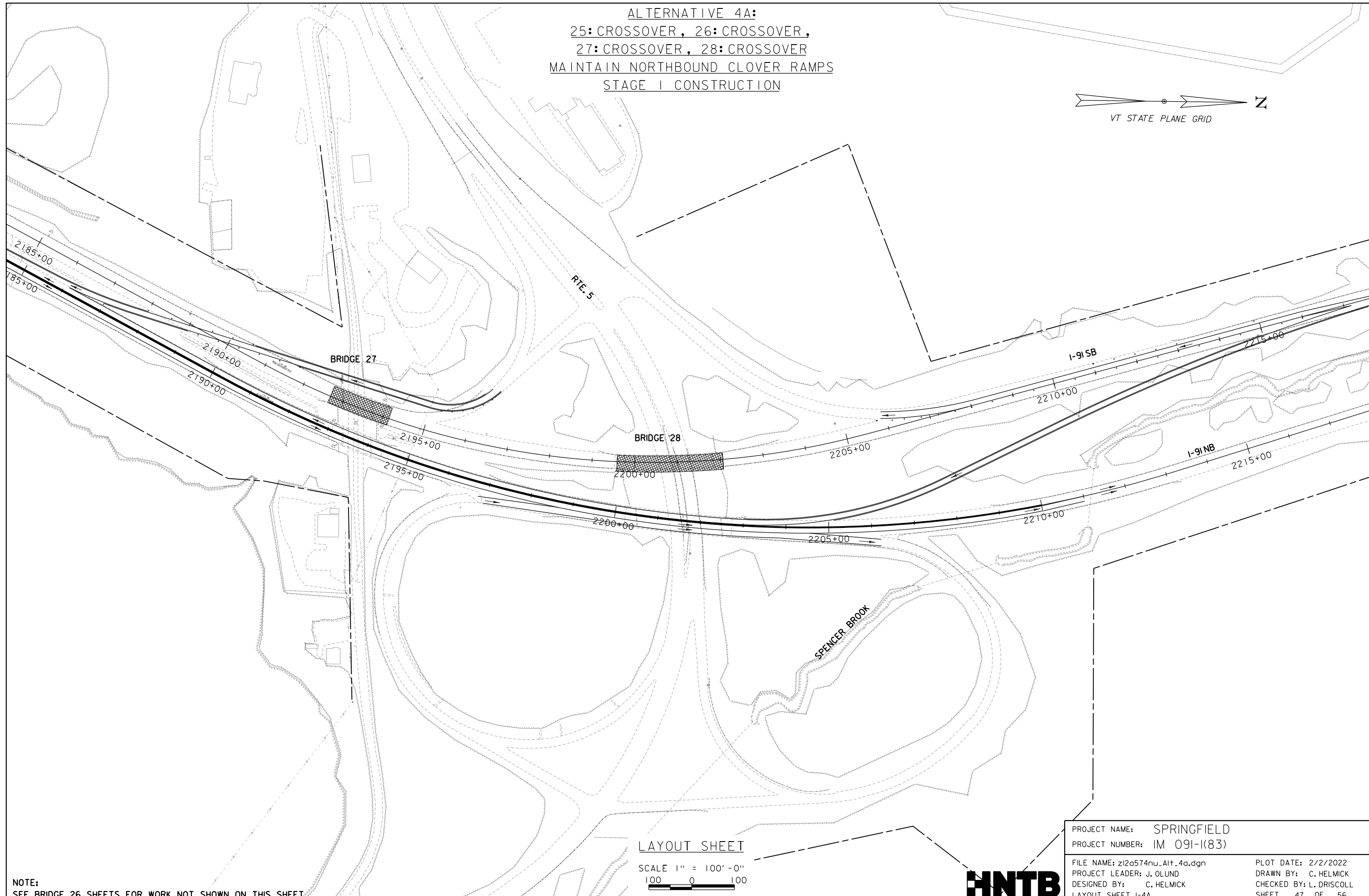
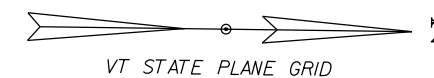
SCALE 1" = 100' - 0"
 100 0 100

NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME:	SPRINGFIELD	PLOT DATE:	2/2/2022
PROJECT NUMBER:	IM 091-I(83)	DRAWN BY:	C. HELMICK
FILE NAME:	z12a574nu_Alt_3c.dgn	CHECKED BY:	L. DRISCOLL
PROJECT LEADER:	J. OLUND	LAYOUT SHEET	3-3C
DESIGNED BY:	C. HELMICK	SHEET	46 OF 56



ALTERNATIVE 4A:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 MAINTAIN NORTHBOUND CLOVER RAMPS
 STAGE I CONSTRUCTION



NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET

SCALE 1" = 100' - 0"
 100 0 100

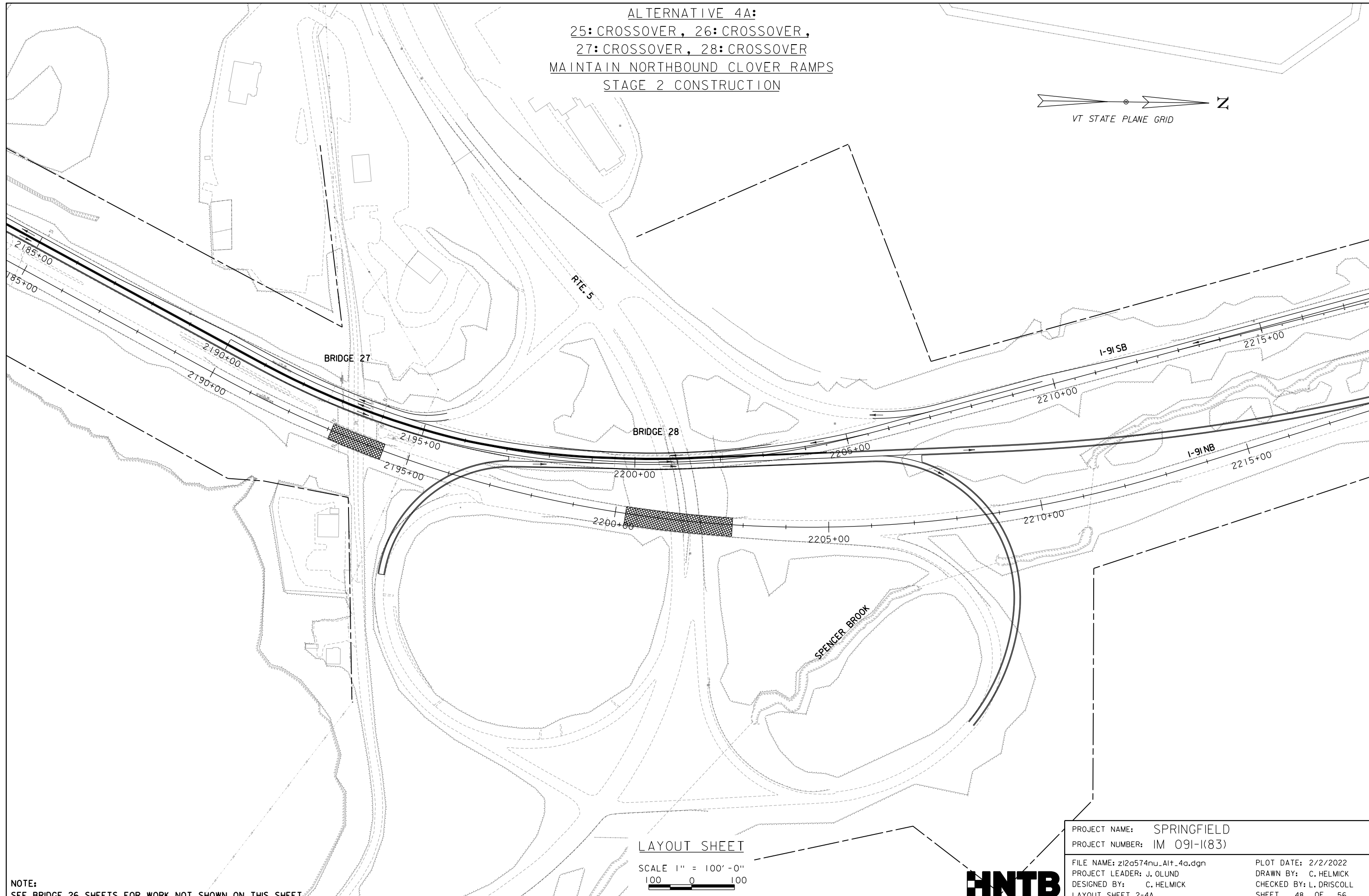
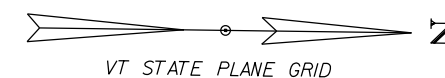
PROJECT NAME: SPRINGFIELD
 PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Alt_4a.dgn
 PROJECT LEADER: J. OLUND
 DESIGNED BY: C. HELMICK
 LAYOUT SHEET I-4A

PLOT DATE: 2/2/2022
 DRAWN BY: C. HELMICK
 CHECKED BY: L. DRISCOLL
 SHEET 47 OF 56



ALTERNATIVE 4A:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 MAINTAIN NORTHBOUND CLOVER RAMPS
 STAGE 2 CONSTRUCTION



LAYOUT SHEET

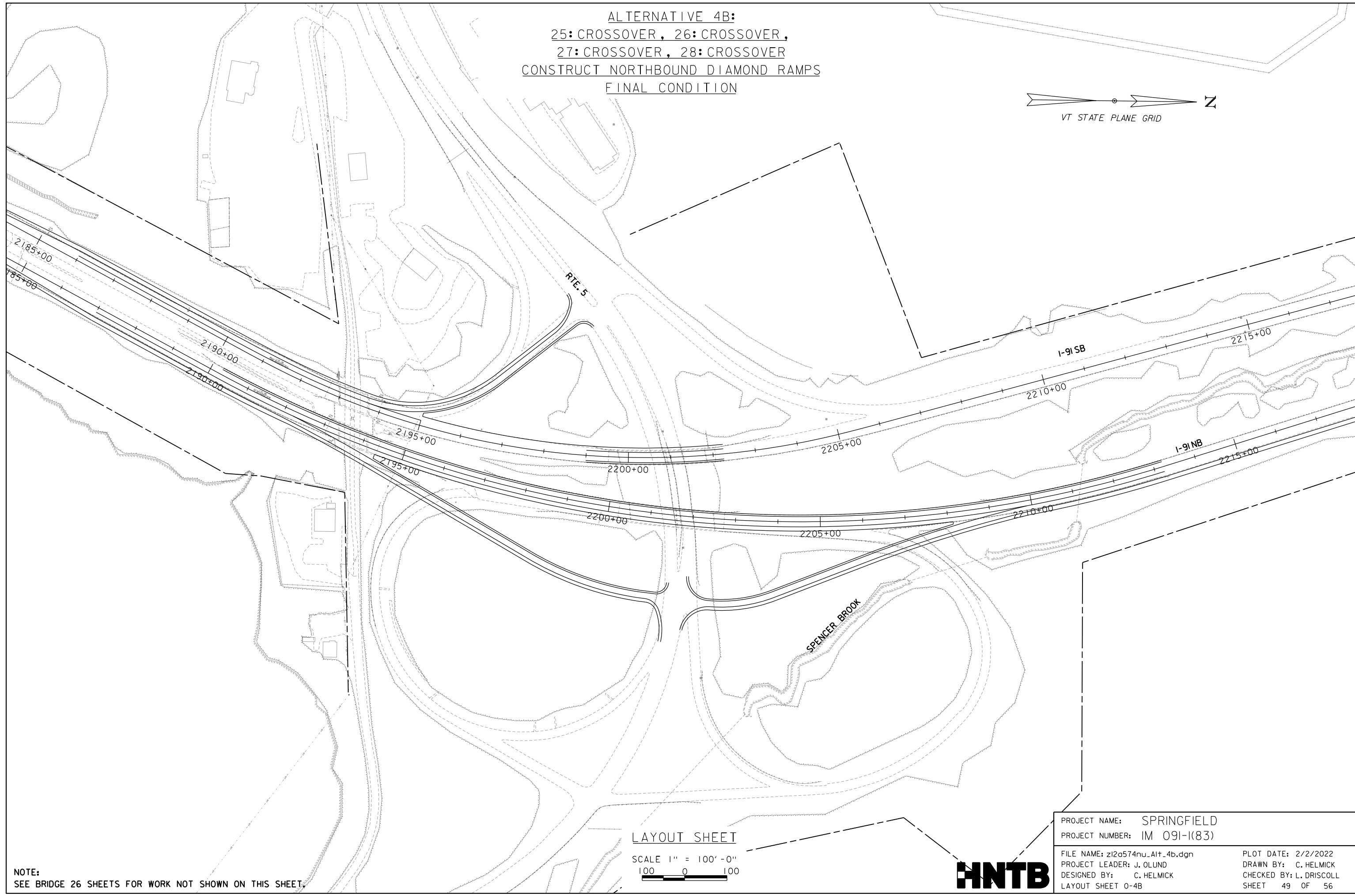
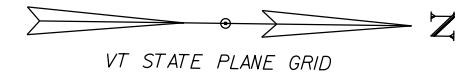
SCALE 1" = 100' -0"
 100 0 100

NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME: SPRINGFIELD	
PROJECT NUMBER: IM 091-I(83)	
FILE NAME: z12a574nu_Alt_4a.dgn	PLOT DATE: 2/2/2022
PROJECT LEADER: J. OLUND	DRAWN BY: C. HELMICK
DESIGNED BY: C. HELMICK	CHECKED BY: L. DRISCOLL
LAYOUT SHEET 2-4A	SHEET 48 OF 56



ALTERNATIVE 4B:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 CONSTRUCT NORTHBOUND DIAMOND RAMP
 FINAL CONDITION



NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET

SCALE 1" = 100' - 0"
 100 0 100

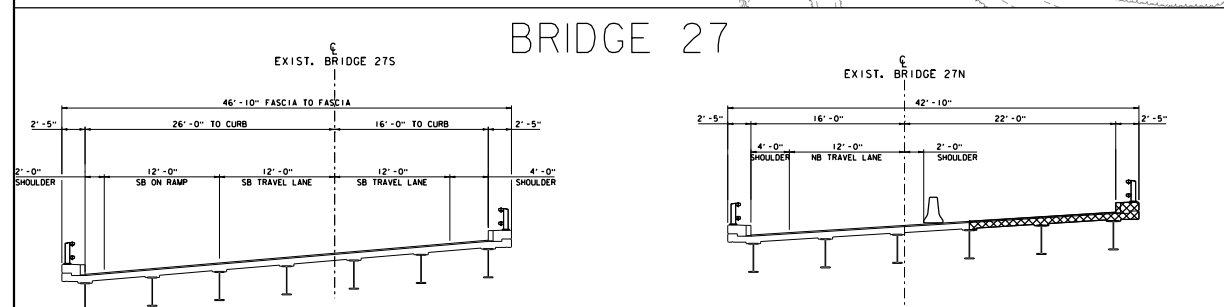
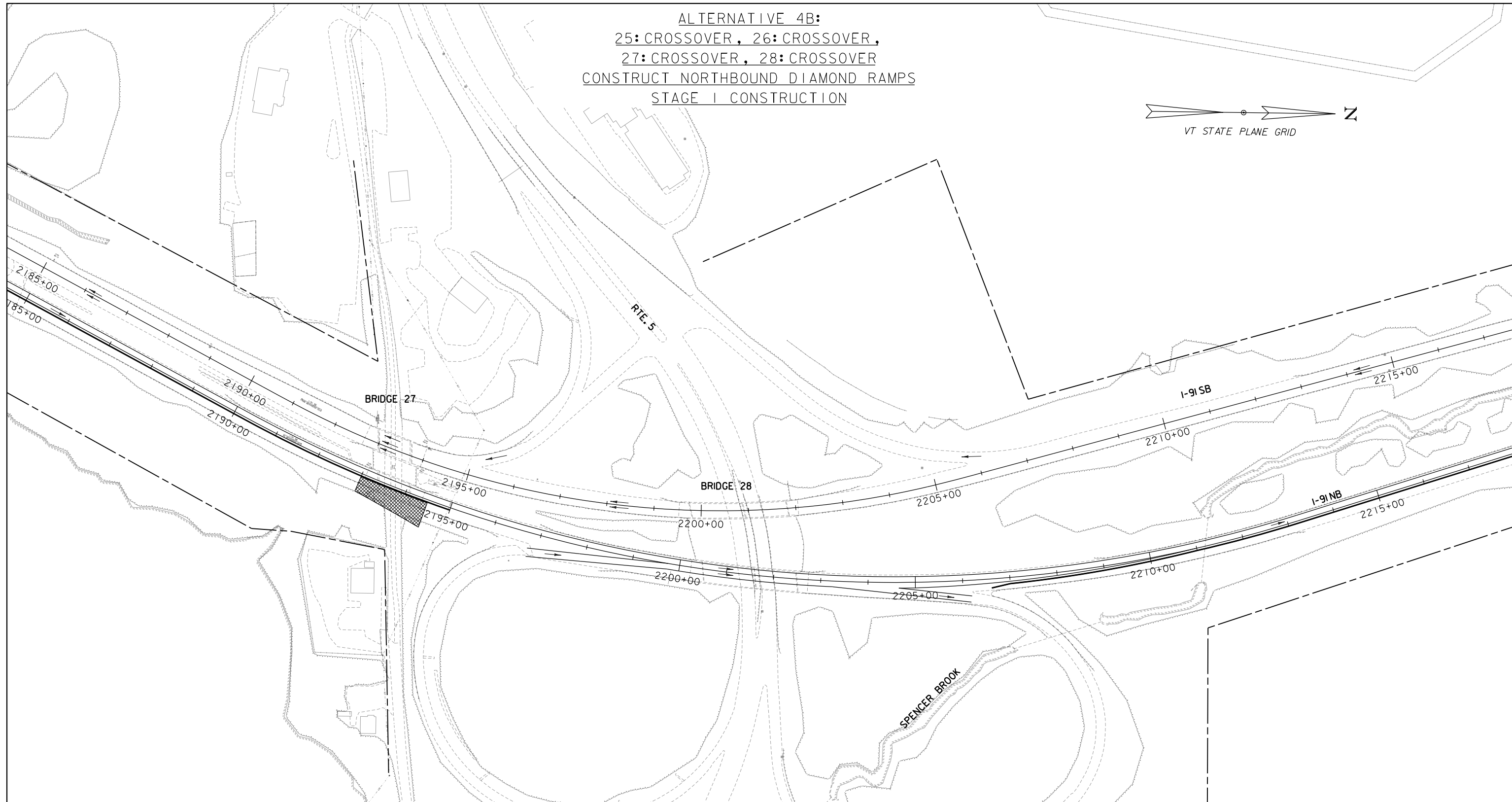
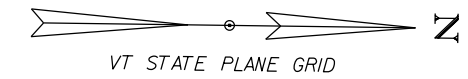
PROJECT NAME: SPRINGFIELD
 PROJECT NUMBER: IM 091-1(83)

FILE NAME: z12a574nu_Alt_4b.dgn
 PROJECT LEADER: J. OLUND
 DESIGNED BY: C. HELMICK
 LAYOUT SHEET 0-4B

PLOT DATE: 2/2/2022
 DRAWN BY: C. HELMICK
 CHECKED BY: L. DRISCOLL
 SHEET 49 OF 56



ALTERNATIVE 4B:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 CONSTRUCT NORTHBOUND DIAMOND RAMPS
 STAGE I CONSTRUCTION



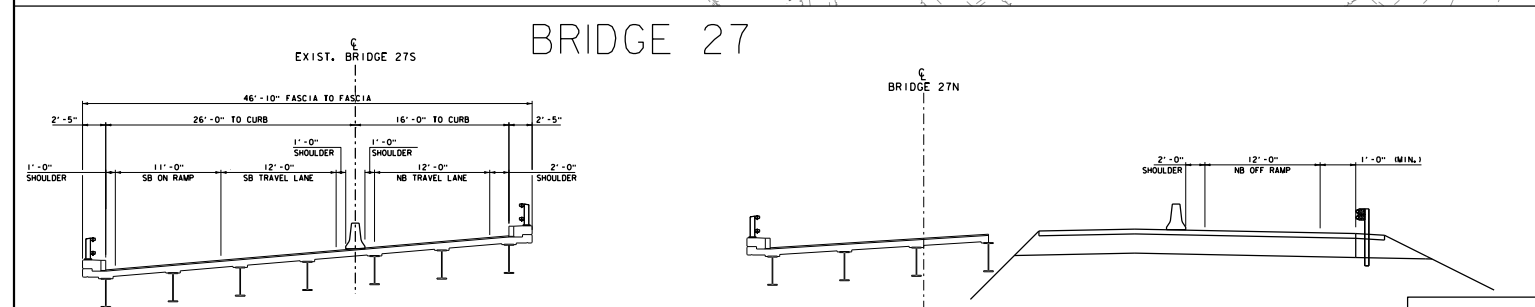
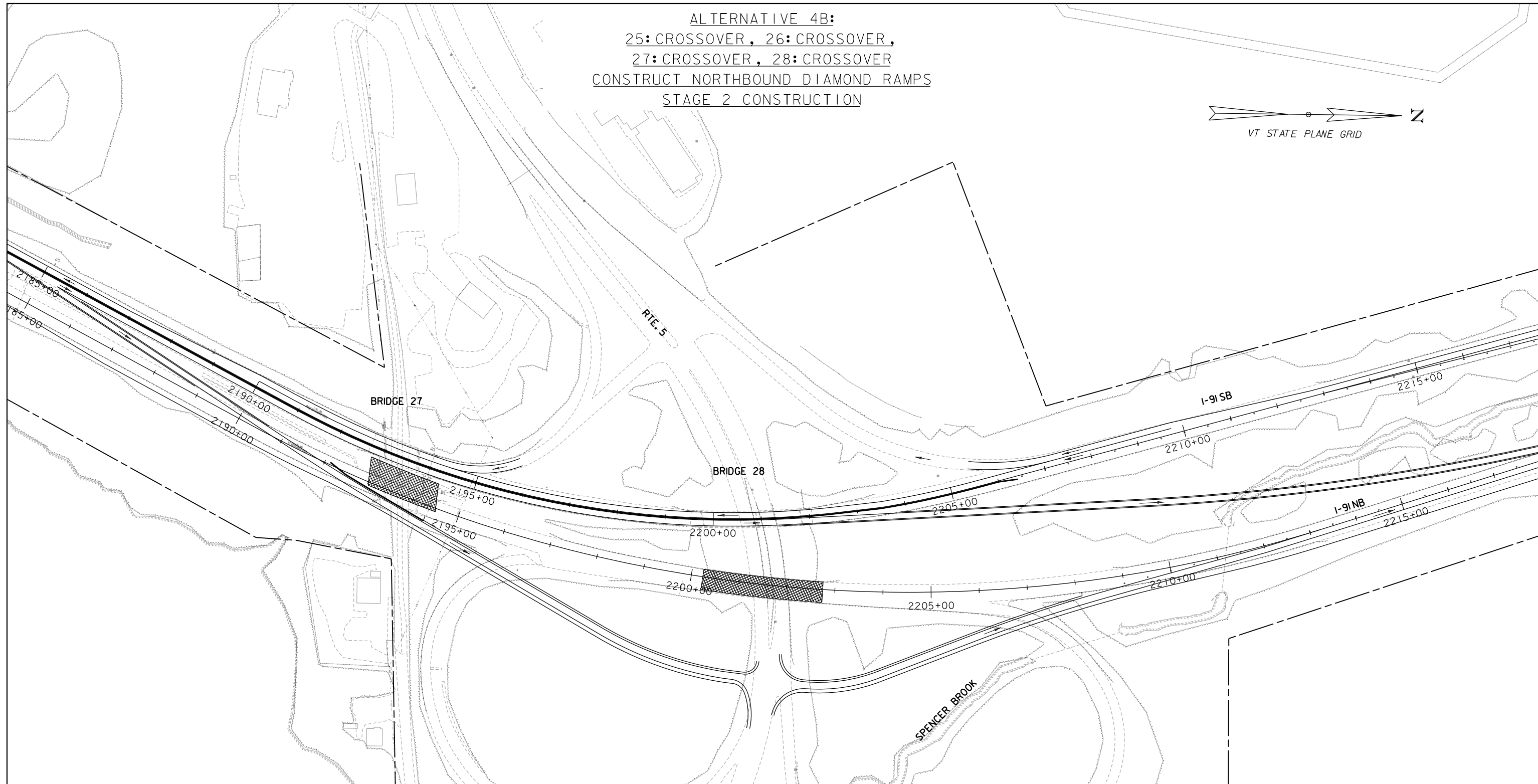
NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET
 SCALE 1" = 100' - 0"
 100 0 100

PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_4b.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 50 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET I-4B	



ALTERNATIVE 4B:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 CONSTRUCT NORTHBOUND DIAMOND RAMP
 STAGE 2 CONSTRUCTION



LAYOUT SHEET

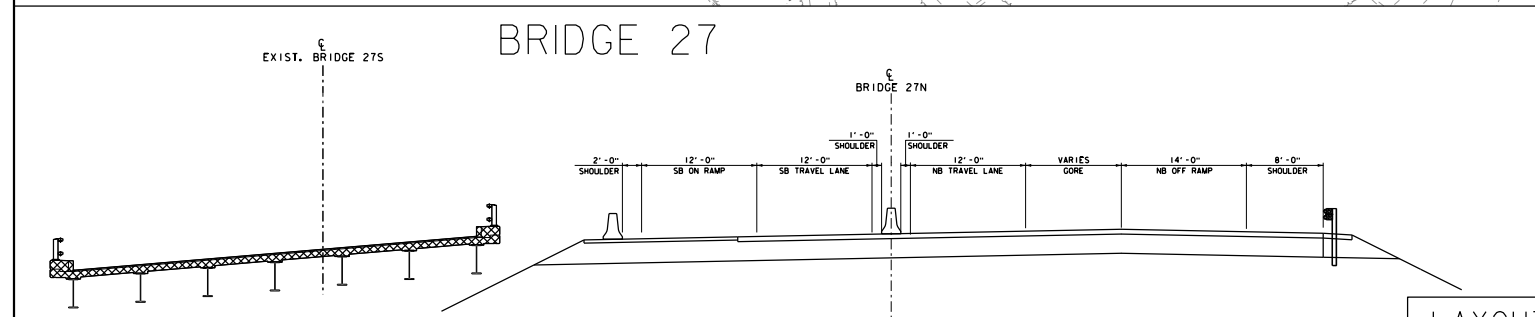
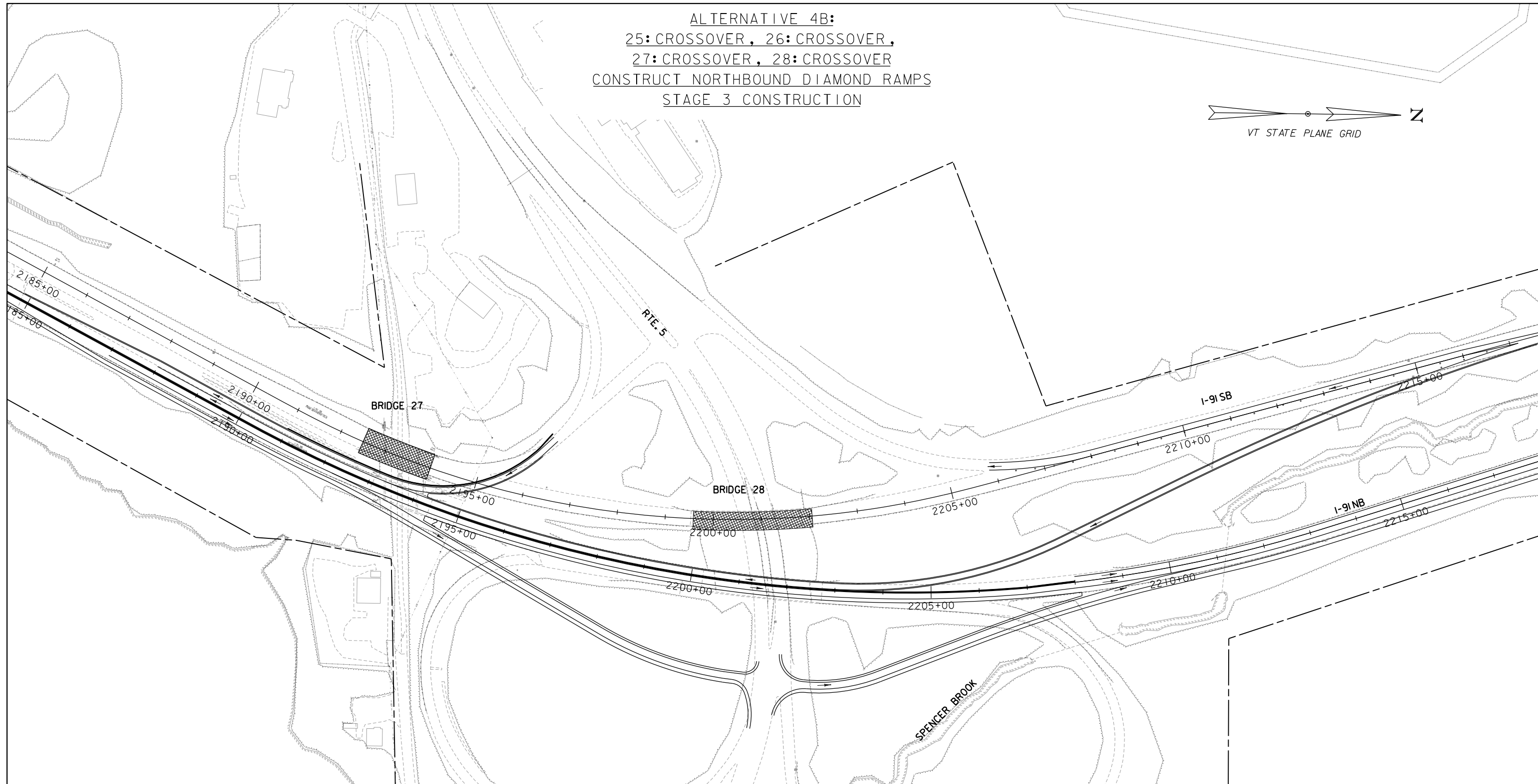
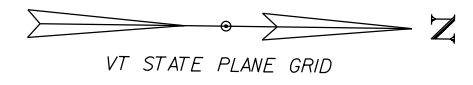
SCALE 1" = 100' - 0"
 100 0 100

NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_4b.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 51 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 2-4B	



ALTERNATIVE 4B:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 CONSTRUCT NORTHBOUND DIAMOND RAMP
 STAGE 3 CONSTRUCTION



LAYOUT SHEET

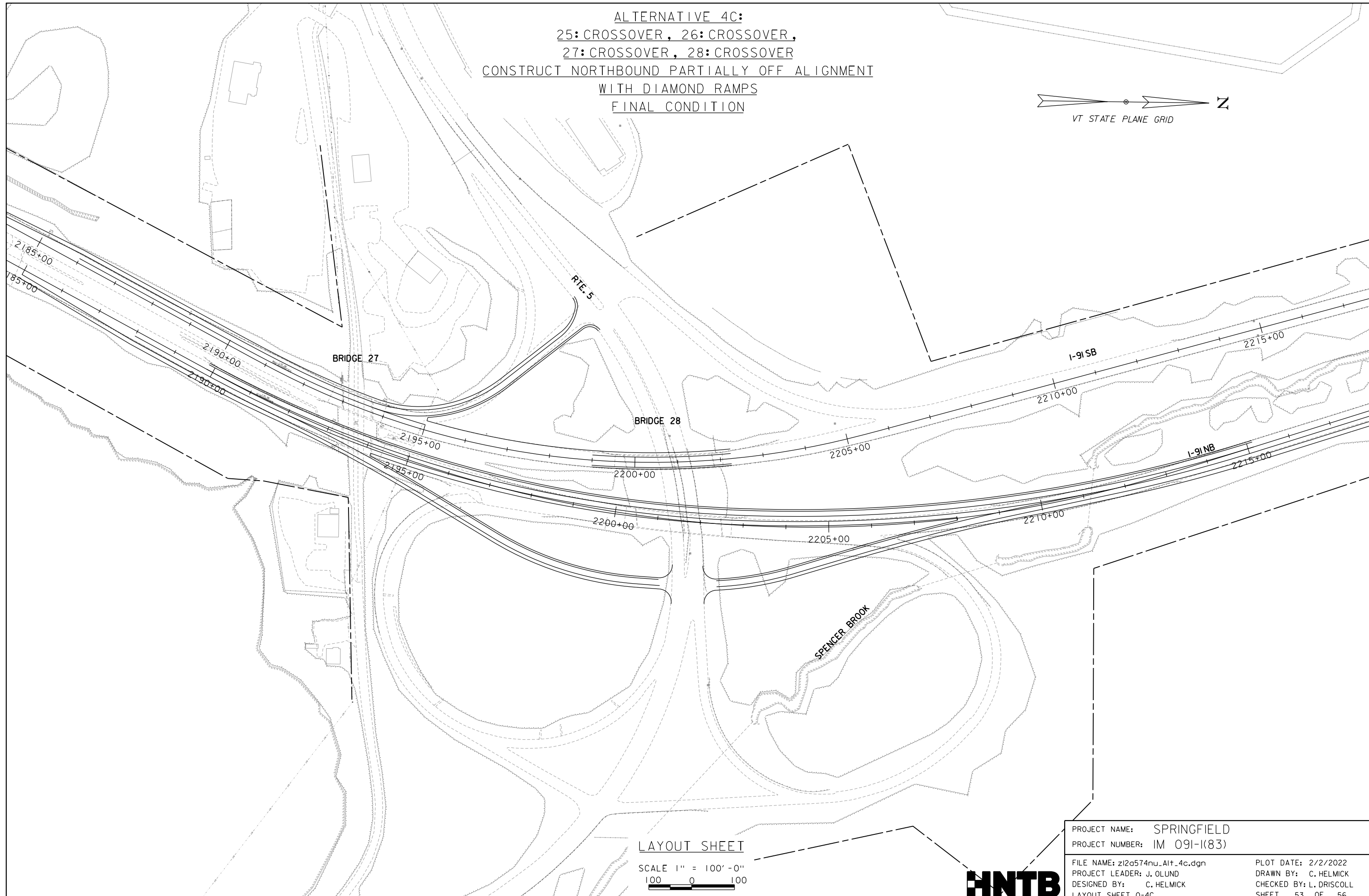
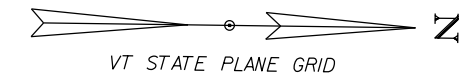
SCALE 1" = 100' - 0"
 100 0 100

NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_4b.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 52 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 3-4B	



ALTERNATIVE 4C:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 CONSTRUCT NORTHBOUND PARTIALLY OFF ALIGNMENT
 WITH DIAMOND RAMPS
 FINAL CONDITION



LAYOUT SHEET

SCALE 1" = 100' - 0"
 100 0 100

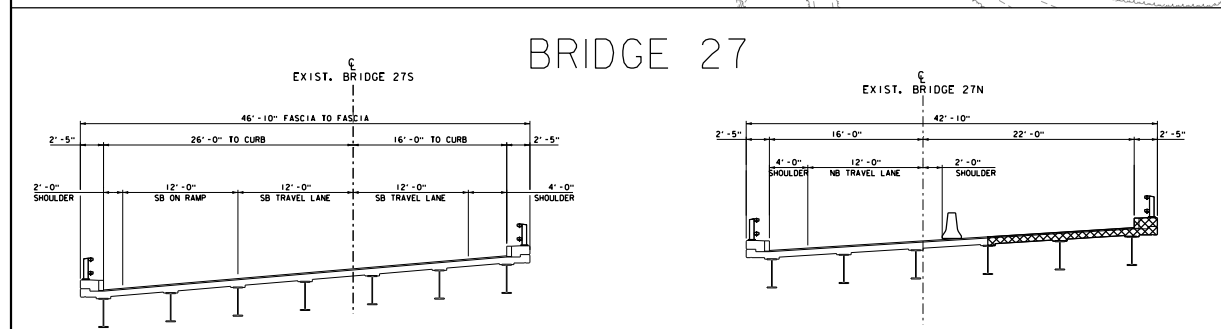
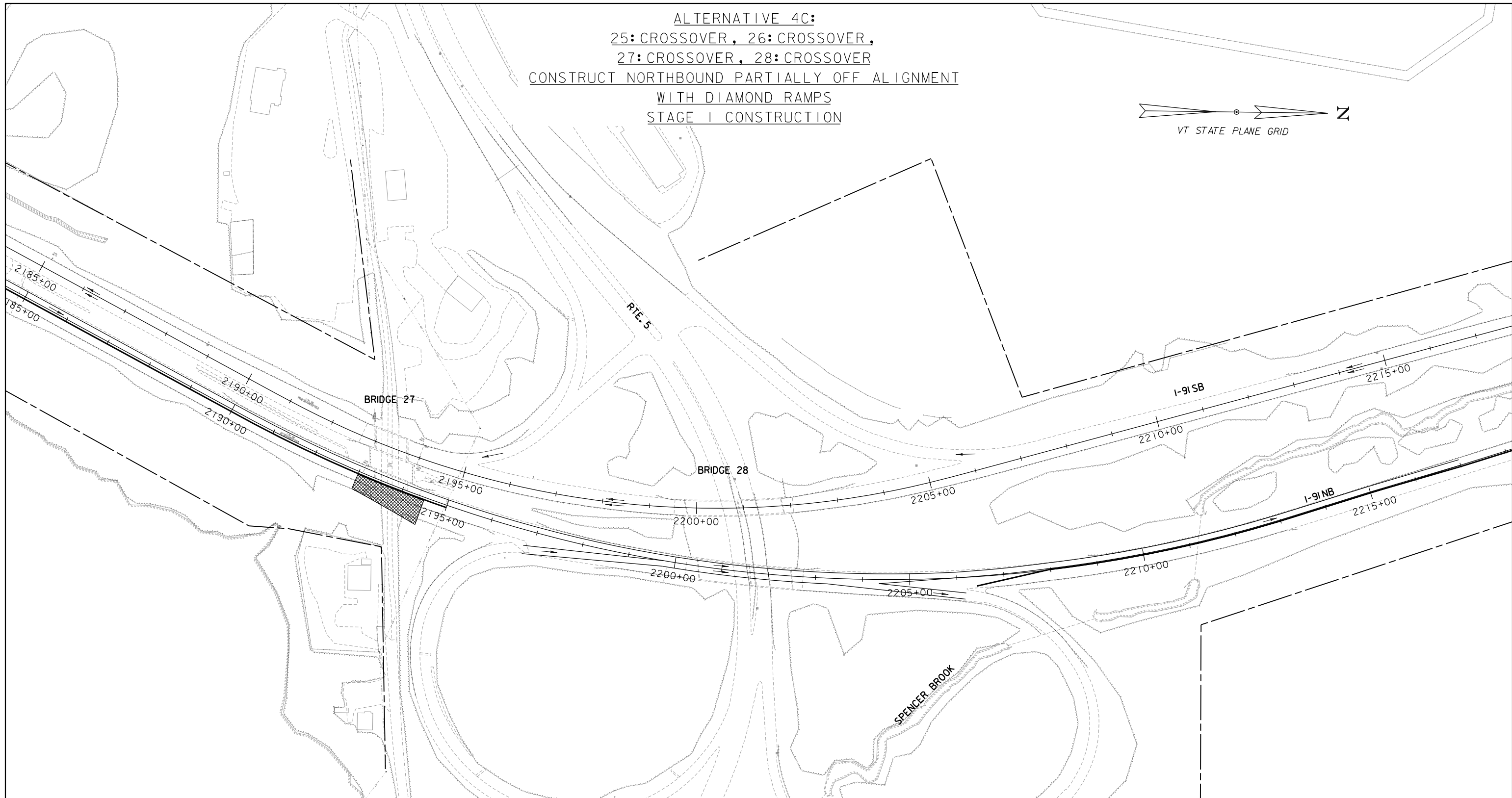
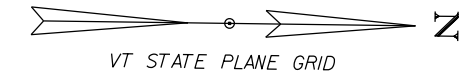
PROJECT NAME: SPRINGFIELD
 PROJECT NUMBER: IM 091-I(83)

FILE NAME: z12a574nu_Alt_4c.dgn
 PROJECT LEADER: J. OLUND
 DESIGNED BY: C. HELMICK
 LAYOUT SHEET 0-4C

PLOT DATE: 2/2/2022
 DRAWN BY: C. HELMICK
 CHECKED BY: L. DRISCOLL
 SHEET 53 OF 56



ALTERNATIVE 4C:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 CONSTRUCT NORTHBOUND PARTIALLY OFF ALIGNMENT
 WITH DIAMOND RAMPS
 STAGE I CONSTRUCTION



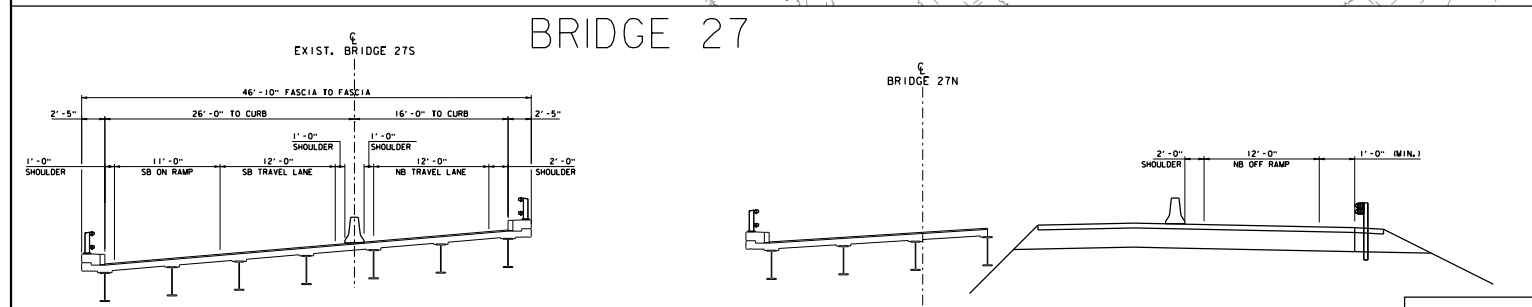
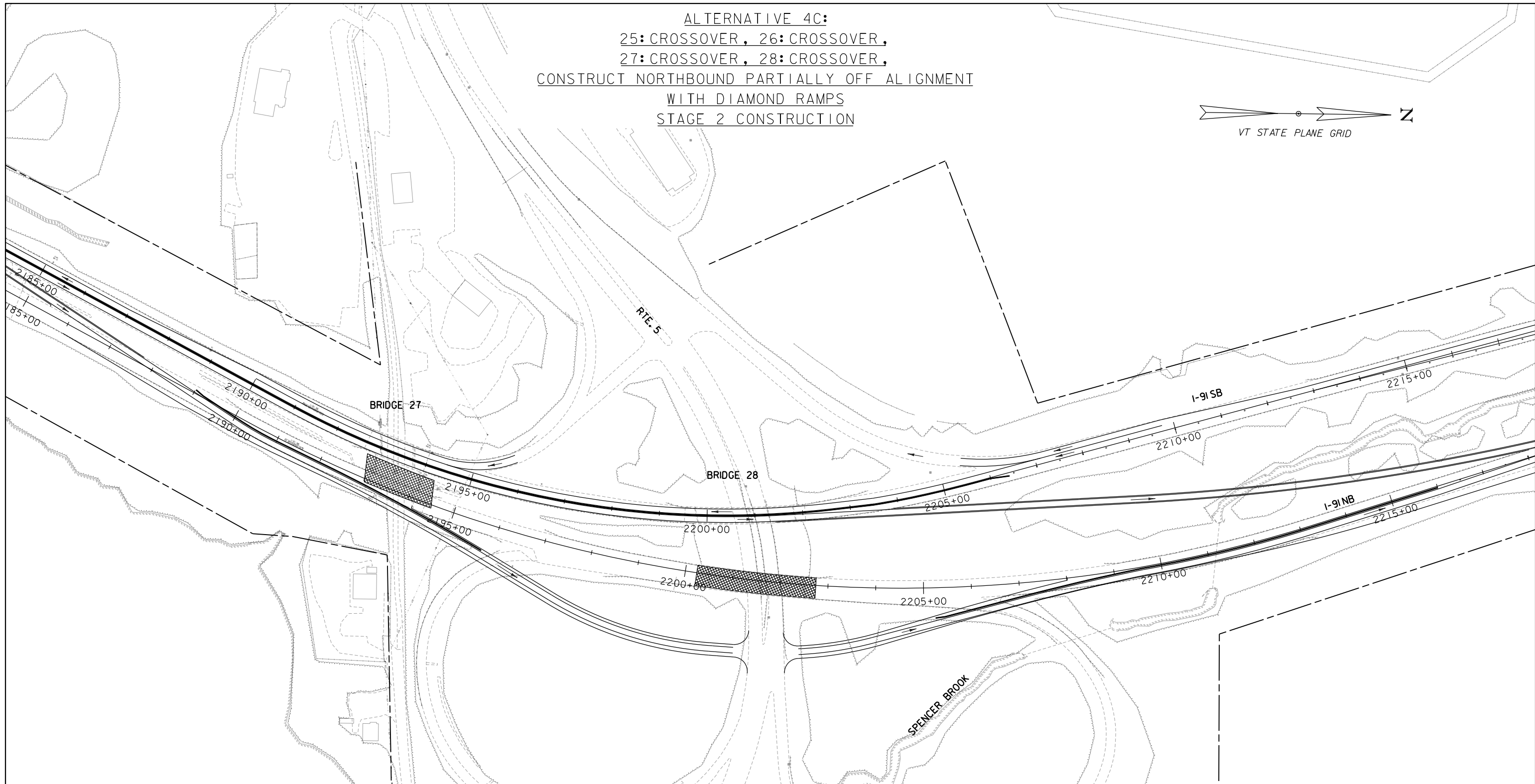
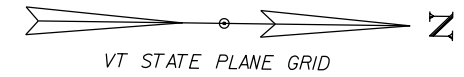
NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

LAYOUT SHEET
 SCALE 1" = 100' - 0"
 100 0 100

PROJECT NAME: SPRINGFIELD		PLOT DATE: 2/2/2022	
PROJECT NUMBER: IM 091-I(83)		DRAWN BY: C. HELMICK	
FILE NAME: z12a574nu_Alt_4c.dgn	DESIGNED BY: C. HELMICK	CHECKED BY: L. DRISCOLL	SHEET 54 OF 56
LAYOUT SHEET I-4C			



ALTERNATIVE 4C:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER,
 CONSTRUCT NORTHBOUND PARTIALLY OFF ALIGNMENT
 WITH DIAMOND RAMPS
 STAGE 2 CONSTRUCTION



LAYOUT SHEET

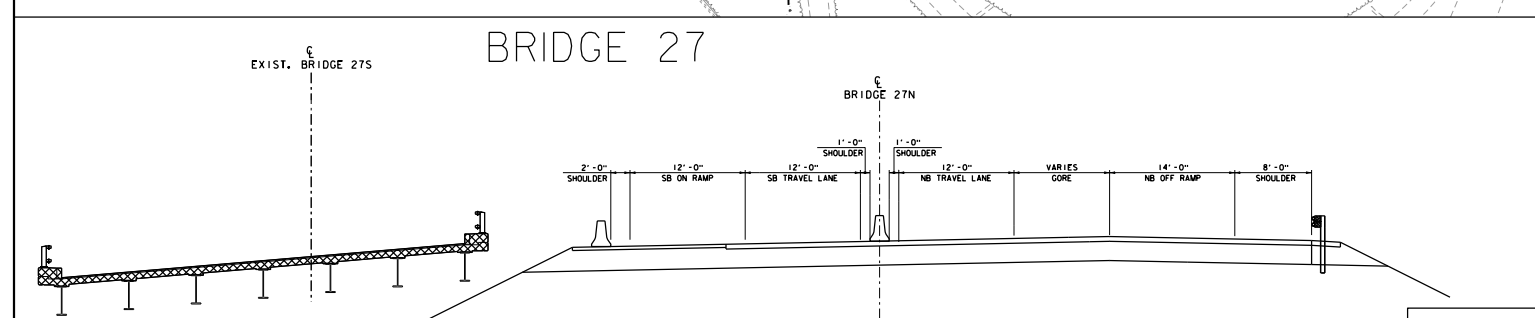
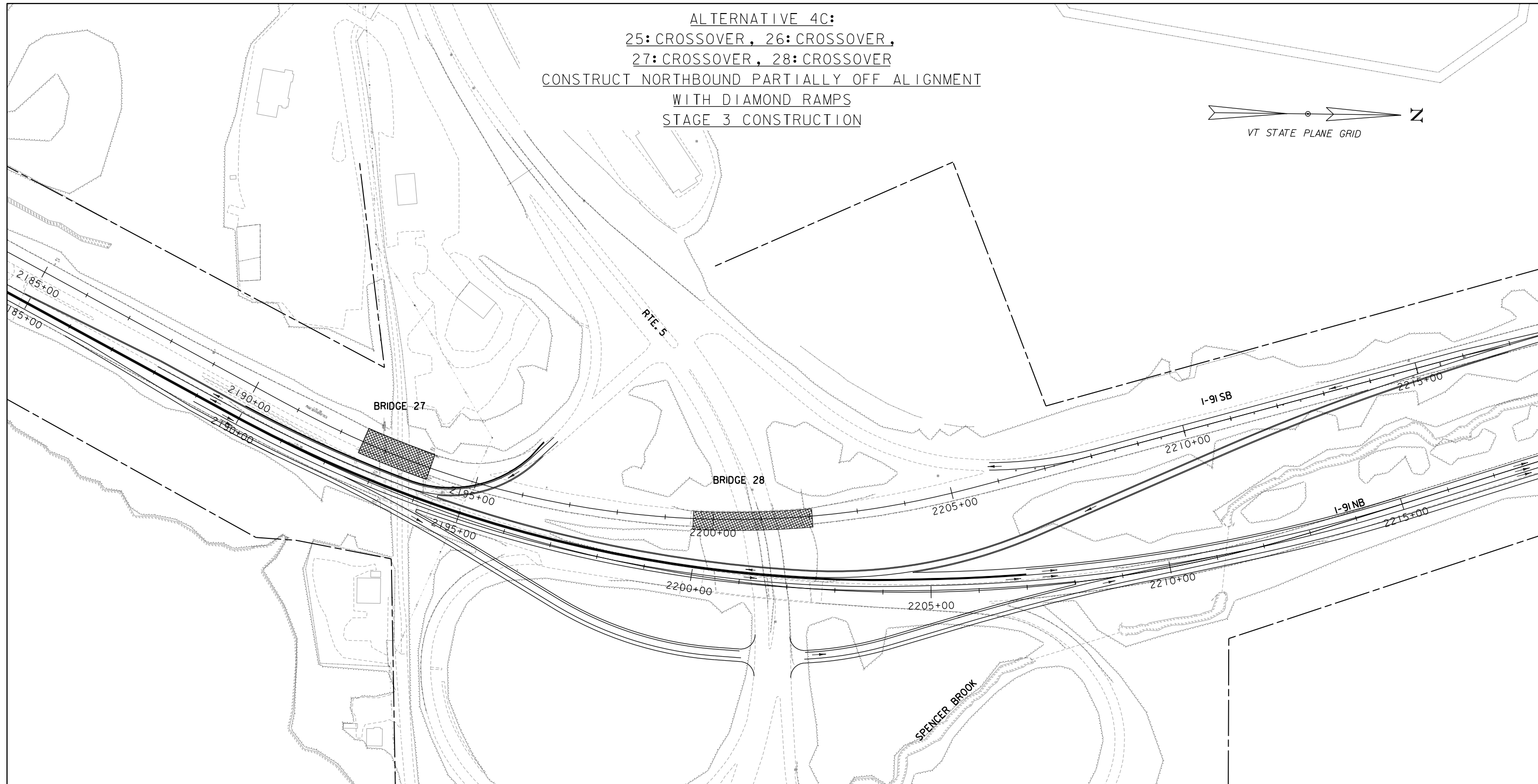
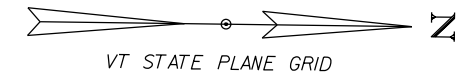
SCALE 1" = 100' - 0"
 100 0 100

NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-1(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_4c.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 55 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 2-4C	



ALTERNATIVE 4C:
 25: CROSSOVER, 26: CROSSOVER,
 27: CROSSOVER, 28: CROSSOVER
 CONSTRUCT NORTHBOUND PARTIALLY OFF ALIGNMENT
 WITH DIAMOND RAMPS
 STAGE 3 CONSTRUCTION



LAYOUT SHEET

SCALE 1" = 100' - 0"

100 0 100

NOTE:
 SEE BRIDGE 26 SHEETS FOR WORK NOT SHOWN ON THIS SHEET.

PROJECT NAME: SPRINGFIELD	PLOT DATE: 2/2/2022
PROJECT NUMBER: IM 091-I(83)	DRAWN BY: C. HELMICK
FILE NAME: z12a574nu_Alt_4c.dgn	CHECKED BY: L. DRISCOLL
PROJECT LEADER: J. OLUND	SHEET 56 OF 56
DESIGNED BY: C. HELMICK	
LAYOUT SHEET 3-4C	

