

RR-38-2021



Hello Ms. Wallace,

The pages that follow are responsive to your request RR-38-2021

This information was provided by the Public Works Department to clarify the documents that follow:

There were two main submittals to the Union Pacific Railroad between March 2020 and January 2021. The first was the attached Method of Construction Report on June 16, 2020. This report was reviewed by the Railroad and instead of accepting the Town's preferred option, they opted to push for another alternative. The Town met with the Railroad on August 27, 2020 after their response and requested they re-evaluate their response. The Railroad requested that the Town submit a Staged Construction Request to show the Railroad why the Town wants the preferred option. This request was sent on September 9, 2020. The Railroad then spent the next few months reviewing the request along with the preferred option. The Town again met with the Railroad on December 17, 2020 to review the Method of Construction Report from June and discuss the preferred option. The Railroad then sent an official approval of the preferred underpass option on January 6, 2021.

Please feel free to reach out with any questions,

Theresa Denham

Deputy Clerk

and

Angelia Huonker

Clerk

### APPEAL RIGHT

Pursuant to law, you are entitled to appeal the decision denying your request for certain information. You may appeal by requesting a review by the Attorney General's Public Access Counselor within 60 calendar days from the date of this denial. Here is the contact information of the Public Access Counselor:

Office of the Attorney General

Public Access Bureau  
500 S. 2<sup>nd</sup> Street  
Springfield, Illinois 62706  
217-558-0486  
[publicaccess@atg.state.il.us](mailto:publicaccess@atg.state.il.us)

You also have the right to judicial review. Suit may be filed in the Circuit Court for McLean County:

Law and Justice Center  
Circuit Clerk  
104 W. Front St.  
Bloomington, IL 61701  
309-888-5301  
[www.co.mclean.il.us/circuitclerk](http://www.co.mclean.il.us/circuitclerk)



November 29, 2017

**AGREEMENT FOR PRELIMINARY ENGINEERING SERVICES**

Crossing: Public: Yes  
State: IL City: Normal  
MP 123.66 Joliet Subdivision  
McLean County

Jordon Albers  
Manager, Industry & Public Projects  
Union Pacific Railroad Company  
100 North Broadway Ste. 1500  
St. Louis, MO 63102

Dear Mr. Albers:

The Town of Normal, Illinois (Agency) is preparing plans to construct a pedestrian underpass under the Union Pacific Railroad Company (Railroad) tracks at the location referenced above. The proposed work includes the construction of the underpass structure and approaches at the Uptown Normal Multimodal Passenger Rail Station (Uptown Station). The underpass will provide a safer and more efficient grade separated route for pedestrians and bicyclists moving between Uptown Normal and the larger Bloomington-Normal urban area integrating the existing Constitution Trail, a 43.5-mile mixed pedestrian and bicycle path that connects the towns of Normal and Bloomington, IL. The project will also provide grade separated access to the east passenger boarding platform at the Uptown Station. Please see attached Project Location Map and Conceptual Rendering.

The Agency considers it necessary for the successful advancement of the project for the Railroad to collaborate in the development of the project by performing the following:

- preliminary engineering and other related services
- development of cost estimates
- review of the project's preliminary layouts

The Agency authorizes and agrees to reimburse the Railroad for its expenses and actual costs that are incurred for collaborating in the development of the project's preliminary engineering and other preliminary activities. The Railroad has estimated that these preliminary engineering and other preliminary costs will be \$15,000. A copy of the approved purchase order is attached. Payment will be made within thirty (30) days from the Agency's receipt and approval of the Railroad's request for reimbursement. Railroad will refer to Agency's Project Number (325-9820-466.55-22) and forward Invoices to:

Wayne Aldrich, P.E.  
11 Uptown Circle  
Normal, IL 61761

*"Committed to Service Excellence"*

11 Uptown Circle • Post Office Box 589 • Normal, Illinois 61761-0589  
Telephone (309) 454-2444 • Fax (309) 454-9609 • TDD (309) 454-9630  
[www.normal.org](http://www.normal.org)

Pending the Railroad's execution of this agreement, the Agency will submit one (1) set of half-scale prints of the concept plans showing the basic features of the proposed project at the location referenced above. Enclosed is a project location map and conceptual rendering.

The project may require the Railroad to incur costs for force account activities. It is understood that the Railroad will prepare a force account cost estimate for work activities to be provided by Railroad and that this estimate may be attached to the Railroad generated Construction & Maintenance (C&M) agreement.

This agreement is intended to address Preliminary Engineering. It is understood by both parties that the Railroad may withhold its approval for any reason directly or indirectly related to safety or its operations, property issues or effect to its facilities. If the Project is approved, Union Pacific will continue to work with the Agency to develop Final Plans, Specifications and prepare Material and Cost Estimates for Railroad Construction Work associated with the project. It is also understood that if the project is constructed, if at all, at no cost to the Railroad.

The Agency and the Railroad will enter into separate License, Right of Entry, Construction and Maintenance Agreements associated with the actual construction of the project if the project is accepted and approved by the railroad. The Agreements will be drafted by Union Pacific and forwarded to the Agency after cost estimates have been approved.

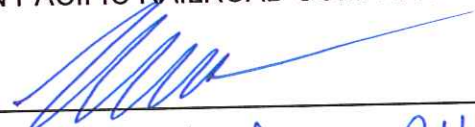
Please contact Wayne Aldrich, Public Works Director, at telephone number (309) 454-9576 or via email at [waldrich@normal.org](mailto:waldrich@normal.org) if you have any questions. Your assistance in this matter is appreciated.

Sincerely,

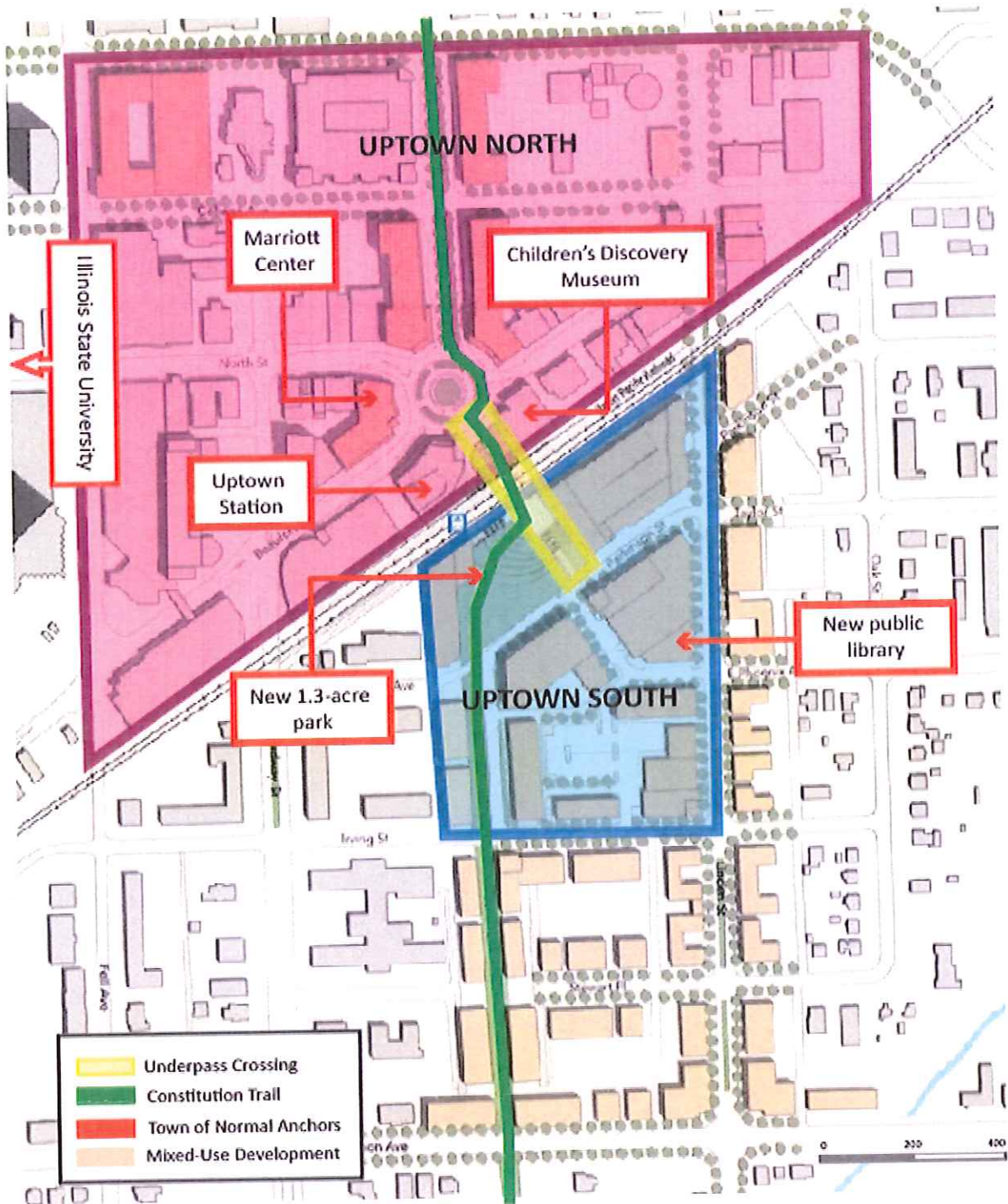


Wayne Aldrich, P.E.  
Public Works Director  
Town of Normal, Illinois

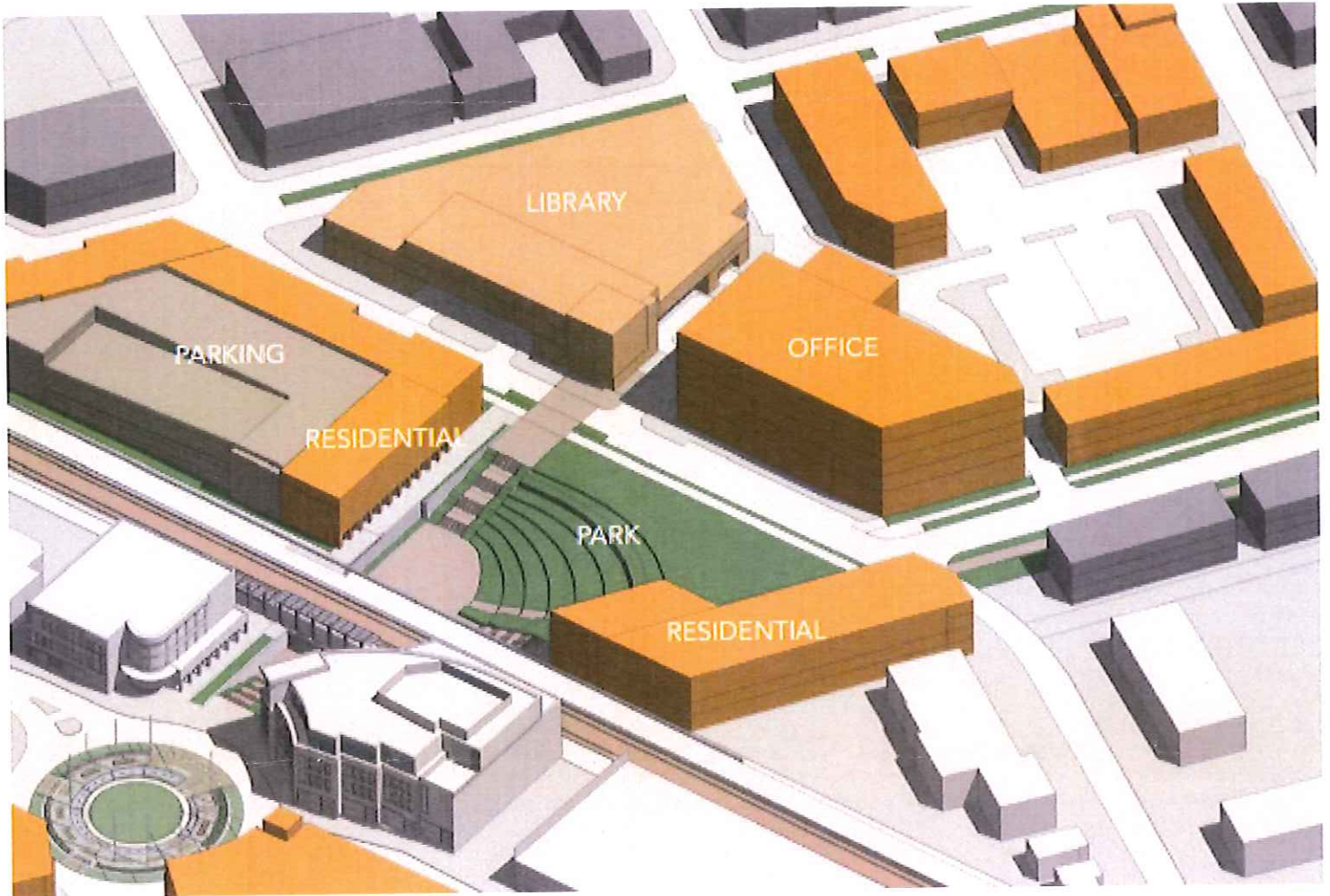
UNION PACIFIC RAILROAD COMPANY

By  Date 12/8/17  
Name and Title Jordan Albers Sr. Specialist

Attachment(s)  
Cc: Angela Huonker, City Clerk



Normal, Illinois  
 Proposed Pedestrian Underpass  
**PROJECT LOCATION MAP**



Normal, Illinois  
Proposed Pedestrian Underpass  
**CONCEPTUAL RENDERING**

PURCHASE ORDER

PAGE: 1

P.O. #: 092457

DATE: 11/22/17

TO: UNION PACIFIC RAILROAD COMPANY  
 1400 DOUGLAS STREET  
 OMAHA, NE 68179

INVOICE TO:  
 TOWN OF NORMAL  
 11 UPTOWN CIRCLE  
 NORMAL, IL 61761

SHIP TO:  
 TOWN OF NORMAL  
 305 S. LINDEN STREET  
 NORMAL, IL 61761

VENDOR # 2725 DELIVER BY: 11/16/17 SHIP VIA: F.O.B.

TERMS NET REQUISITIONED BY JRAGLAND ACCOUNT NO. 325-9820-466.55-22 PROJECT

LINE#	QUANTITY	UOM	ITEM NO. AND DESCRIPTION	UNIT COST	EXTENDED COST
1	15000.00	EA	AGREEMENT FOR PRELIMINARY ENGINEERING SERVICES	1.0000	15000.00
				SUB-TOTAL	15000.00
				TOTAL	15000.00



## MEMORANDUM

---

To: Jordon Albers, Union Pacific Railroad

From: Courtney McCormick, WSP

Cc: Wayne Aldrich, Town of Normal  
Jason Comfort, Town of Normal  
Rick Powell, WSP

Subject: Proposed Grade Separated Pedestrian Crossing, Conceptual Design Alternatives, Normal, IL  
MP 124.10 Joliet Subdivision, near closed Crossing No. 290811W, 40.50869800/-88.98398600

Date: June 12, 2018

---

The Normal Pedestrian Crossing project team appreciates Union Pacific Railroad's review and comments regarding the 10% conceptual design, dated February 12, 2018, for the proposed grade separated pedestrian crossing at MP 124.10 (Joliet Subdivision) in Normal, Illinois. In response to your comments, we have reviewed additional alternatives to achieve a design that will meet the needs of the Town of Normal while also minimizing impacts to railroad operations during construction of the proposed pedestrian underpass at the Uptown Station in Normal.

Included within this memorandum, please find included additional information on the project history, design guidelines, and design alternatives.

### PROJECT HISTORY

Through the Illinois High-Speed Rail program, the project team and stakeholders reviewed conditions and safety of existing at-grade crossings within the corridor. This included the existing at-grade pedestrian crossing (DOT No. 290811W, MP 124.08) at the Amtrak station in Normal, Illinois. In accordance with guidelines from Amtrak and Union Pacific Railroad for pedestrian and at-grade crossings near a station, as well as guidance from the project team, the decision was made to voluntarily close the existing crossing. The existing at-grade pedestrian crossing was closed on May 21, 2013.

Additionally, with the Illinois High-Speed Rail program, existing station conditions were evaluated in accordance with Amtrak and Union Pacific Railroad requirements for two-track station locations. IDOT and the High-Speed Rail project team determined that a second platform on the mainline was needed for High-Speed Rail operations as well as a pathway for passengers to safely travel between the platforms. The Town of Normal proceeded with designs for an overpass, with focus on accommodating the Amtrak passengers. On April 16, 2014, the Illinois Commerce Commission entered an Order (ICC Order No. T14-0014) authorizing replacement of the closed crossing with a pedestrian overpass to be completed by December 31, 2015.

Construction of the overpass was later postponed by the Town of Normal for several reasons, including the limited functionality for Amtrak passengers. Specifically, the overpass design, with two elevators and one stair tower, would not conveniently convey the estimated 150 passengers needing to cross the tracks at one time. Additionally, the overpass design was not suitable for trail users and cyclists because of the limited capacity and limited operating hours, which would have been restricted to Uptown Station hours of operation.

In 2015, the Normal Town Council approved an update to their master plan for the redevelopment of the 8-acre area south of the tracks, including a new 70,000 square foot public library and up to 500,000 square feet of residential, retail, and office space. The updated master plan outlines a vision for pedestrian and bicycle

# MEMORANDUM

Proposed Grade Separated Pedestrian Crossing, Conceptual Design Alternatives, Normal, IL  
MP 124.10 Joliet Subdivision, near closed Crossing No. 290811W, 40.50869800/-88.98398600

June 12, 2018

connectivity in Uptown and states that a non-deterred, safe, functional, and aesthetically compatible crossing is critical for the success of this redevelopment plan.

In September 2016, following filing of a Supplemental Petition by Normal and Status Hearing, the Illinois Commerce Commission entered a Supplemental Order extending the deadline for completion of an alternative design and construction of the project. The completion date was extended to December 31, 2021.

With the crossing closure and postponement of a grade separated crossing at Uptown Station, users of the Constitution Trail are re-routed to the Linden Street at-grade crossing. Amtrak passengers primarily use the Broadway Street at-grade crossing.

## DESIGN GUIDELINES

The proposed underpass will accommodate two-way traffic for train passengers, pedestrians, and cyclists between the Uptown North and Uptown South areas, including the Constitution Trail. The goals of the project are to:

- Improve safety by providing a crossing that separates pedestrian and cyclist traffic from vehicle and rail traffic.
- Provide convenient, safe, and accessible passage for users.
- Provide a facility that is convenient and intuitive to use.
- Minimize delays and adverse travel for pedestrians and cyclists.
- Improve mobility and connectivity for pedestrians and cyclists in the Uptown neighborhood and Bloomington-Normal communities.
- Provide a direct link between developments on the north and south side of Uptown, including the Children's Museum, Uptown Station, City Hall, and the proposed Normal Public Library.
- Maximize access to public transportation.
- Promote transportation opportunities for disadvantaged groups.

Conceptual designs for the underpass have been advanced utilizing guidelines from Union Pacific Railroad, the Town of Normal, American Association of State Highway and Transportation Officials (AASHTO), and Crime Prevention Through Environmental Design (CPTED).

The project will incorporate UPRR's Guidelines for Railroad Grade Separation Projects, dated May 2016, particularly sections:

- 4 – General Requirements for Grade Separation Projects
- 6 – Underpass Structures
- 7 – Trails

Additional guidelines being incorporated into the project design include:

From Town of Normal Bicycle Master Plan for Shared Use Path (Sidepath),

- Width
  - § Minimum 10 feet width for a two-way sidepath and is only recommended for segments with low traffic.
  - § Recommended width is 12 feet for most situations.
  - § 12 to 14 feet or wider is recommended for heavy-use situations where there is a strong presence of multiple users, such as joggers and bicyclists.
- Lateral Clearance
  - § 2 feet or wider shoulders on both sides.
- Overhead Clearance
  - § Minimum 8 feet, but recommended 10 feet, for clearance of overhead obstructions.



# MEMORANDUM

Proposed Grade Separated Pedestrian Crossing, Conceptual Design Alternatives, Normal, IL  
MP 124.10 Joliet Subdivision, near closed Crossing No. 290811W, 40.50869800/-88.98398600

June 12, 2018

From AASHTO Guide for Development of Bicycle Paths,

- Shared use paths should not be developed adjacent to roadways, unless it is generally separated from the roadway.
- As the shared use paths ends, cyclists who are traveling against traffic tend to continue to travel in the wrong direction, including those who are making their way to the shared use path. Wrong-way bicycle travel is a major cause of crashes.
- Shared use paths should have white-colored bicycle lane marking and be placed after an intersection and other appropriate locations.
- At intersections, shared use paths' crossings should be located where bicyclists would not be in blind spots.
- Whenever possible, separate bicycle and pedestrian paths to minimize bicycle/pedestrian conflicts.
- Provide directional signage to direct users to and from the shared use path.

From CPTED,

- Natural Surveillance – A person is less likely to commit a crime if he/she perceives someone would see him/her do it.
- Natural Access Control – Using and designing pathways, fences, lighting, signage, and landscaping to clearly direct traffic to and from the appropriate entrances. Having a proper flow of people can decrease opportunities for crime.
- Territorial Reinforcement – Physical designs, such as signage, pavement treatment, and landscaping enable users to develop a sense of ownership of the space. Clearly distinguishing public and private areas would discourage potential trespassers.
- Maintenance / “Broken Window Theory” – Neglected or poorly maintained properties are breeding ground for criminal activities.
- Activity Support – Design the space so it enhances or creates a new form of activities in the space. Diverse land uses around the space brings activity throughout the day.
- Image – Appearance that an area is not conducive to crime.
- Motivation Reinforcement – Utilizing physical design to improve the community's social cohesion and sense of territory.

Based on the above sizing criteria, it is proposed that the design of the underpass accommodate an opening that is 20 feet wide and 10 feet high.

Additional design considerations include ramp lengths, subsurface conditions, constructability, and impact to freight and passenger operations.

As a public facility, the ramp grades to and from the underpass must be American with Disabilities Act (ADA) compliant. The underpass depth combined with the ADA grade requirements will influence the lengths of the access ramps. A greater underpass depth, for example, will require greater ramp lengths. Accommodating greater ramp lengths to meet ADA compliance may become an issue because of constraints on site with existing structures and facilities.

Greater ramp lengths will also adversely impact connectivity and mobility for pedestrians and cyclists, one of the project goals referenced above. Current conceptual designs include minimal turns to navigate the change in elevation on the north side.

Subsurface conditions on-site consist of soft to medium stiff clay, which is favorable for tunneling and other excavation methods. Past borings and excavations in the area have also noted presence of a water bearing sand layer, which would present a construction risk. An ongoing subsurface investigation is underway to confirm expected conditions at the location of the proposed underpass.

# MEMORANDUM

Proposed Grade Separated Pedestrian Crossing, Conceptual Design Alternatives, Normal, IL  
MP 124.10 Joliet Subdivision, near closed Crossing No. 290811W, 40.50869800/-88.98398600

June 12, 2018

Regarding impacts to railroad operations, the project team is proposing three alternative designs to minimize freight disruptions and to limit track outages to one track per work window. In addition to review of the alternatives, the project team would appreciate guidance from Union Pacific on whether existing train schedules and limiting impacts to one track at a time would permit for work windows to be completed without further disruption to operations.

## DESIGN ALTERNATIVES

Three design alternatives are provided with this memorandum for Union Pacific's review. The alternatives are:

- Option 1 – Open Cut Bridge Construction
- Option 2 – Pipe Roof Construction
- Option 3 – Jacked Box Construction

With the 10% design comments, we understand that Union Pacific Railroad had recommended further review of jack and bore construction options for the underpass. The project team has reviewed conventional jacked pipe concepts, but the size constraints of that construction method restricted the viability for the underpass to meet the space requirements for an underpass serving both pedestrian and cyclist traffic safely. A traditional jack and bore circular pipe would not meet the sizing criteria described above, or would need to be substantially oversized, given Union Pacific Railroad guidelines for new underpass trail crossings. It also would require a deeper elevation having a greater adverse effect on overall accessibility, including meeting ADA requirements. The three options presented have been identified as alternatives that potentially reduce impact to railroad operations while providing an underpass opening to safely accommodate all intended users.

For your review, the following plan sheets are attached.

- Option 1 - Open Cut Bridge Construction, dated May 24, 2018, Sheets 001-005 of 005
- Option 2 - Pipe Roof Construction, dated May 24, 2018, Sheet 001 of 001
- Option 3 - Jacked Box Construction, dated May 24, 2018, Sheet 001 of 001

Option 1 is similar in concept to the design provided in the 10% submittal. The open cut concept has been modified to reduce initial work windows from 8 hours to 4 hours, when possible, affecting one track per outage. This would be achieved by installing a driven pile foundation and earth retention system instead of drilled caissons. This alternative is proposing 8-hour work windows for installation of each span of the precast concrete bridge system.

Option 2 proposes use of an interlocking steel pipe system to construct an interlocking pipe roof for initial support of the tunnel structure, which will then be followed by excavation of the underpass. A jacking and retrieval pit would be constructed on both sides of the UP right-of-way and large diameter pipes would be either jacked, pulled or micro-tunneled beneath the tracks. Excavation would then proceed in drifts with internal support and a base slab being installed within each drift. After excavation is completed, a final lining for the tunnel would be constructed.

Option 3 is a jacked box construction method. With this alternative, cast-in-place concrete box segments are thrust through the ground via hydraulic jacks. Like Option 2, the jacked box method would require jacking and retrieval pits to cast the box and to facilitate the jacking process. Given the unsupported, open face of the box, ground improvement or structural support of the tracks above the box would be required to minimize settlement and disturbance at the ground surface. The ground improvement or structural support would require several work windows from 4 to 8 hours based on the means and methods of the contractor, albeit fewer windows that anticipated in Option 1.

# MEMORANDUM

Proposed Grade Separated Pedestrian Crossing, Conceptual Design Alternatives, Normal, IL  
MP 124.10 Joliet Subdivision, near closed Crossing No. 290811W, 40.50869800/-88.98398600

June 12, 2018

While Options 2 and 3 could potentially reduce impacts to railroad operations, each option does present additional construction risks. Of concern with each is need for a specialty contractor to complete construction, which could impact the bid process, construction cost, and construction schedule. Also of concern, both options increase the risk of settlement and disturbance occurring at the ground surface. Infiltration of groundwater into the excavations could potentially induce settlements on the soft to medium stiff clays encountered beneath the ground surface. Whereas Option 1 could satisfactorily cut-off groundwater from entering the excavation, Options 2 and 3 may require extensive mitigation to control settlements to prevent impacts to railroad operations.

Also, Options 2 and 3 are approximately 4 feet deeper than Option 1, which will significantly impact the length of the access ramps to the underpass. Designing within the limited area available on either side of the tracks and to meet ADA compliance for the ramp slopes, switchbacks may be required for the access ramps. Excess lengths and non-direct routes may cause the path to be unfavorable for passengers and trail users, which heightens the risk of unauthorized crossing at-grade creating unsafe conditions on the tracks and railroad property. Elevators, in combination with stairs, could be considered to provide ADA-compliant alternative access for a deeper underpass elevation, but would be subject to additional maintenance and malfunction concerns; also, elevators would be unlikely to be used by bicyclists who would likely detour to one of the existing at-grade crossings, as compared to a passive ADA-compliant ramp design.

The below table summarizes the benefits and risks for each option in terms of the project needs and goals.

For comparison purposes, high level cost estimates were completed for each alternative. Because of the nature of the estimates, the costs are summarized in terms of comparison to each other using Option 1 as the baseline. The project team will continue to refine the estimates as designs are advanced.

# MEMORANDUM

Proposed Grade Separated Pedestrian Crossing, Conceptual Design Alternatives, Normal, IL  
 MP 124.10 Joliet Subdivision, near closed Crossing No. 290811W, 40.50869800/-88.98398600

June 12, 2018

OPTION	CONSTRUCTABILITY	CONSTRUCTION RISK	DEPTH	IMPACT TO RAMP LENGTHS	IMPACT TO RR OPERATIONS	CONSTRUCTION COST
1) OPEN CUT BRIDGE CONSTRUCTION	Common construction methods	Low	Shallowest elevation at 14'-8"	Moderate	Moderate <i>Note: impact less than original 10% concept design</i>	Moderate
2) PIPE ROOF CONSTRUCTION	Requires specialty contractor	Moderate	Deeper profile at 18'-7"	Significant	Minimal	Moderate
3) JACKED BOX CONSTRUCTION	Requires specialty contractor	High	Deeper profile at 18'-6"	Significant	Moderate	High

# MEMORANDUM

Proposed Grade Separated Pedestrian Crossing, Conceptual Design Alternatives, Normal, IL  
MP 124.10 Joliet Subdivision, near closed Crossing No. 290811W, 40.50869800/-88.98398600

June 12, 2018

## NEXT STEPS

After evaluation of the three alternatives, the Normal Pedestrian Crossing project team is recommending Option 1. While Options 2 and 3 may potentially have less of a direct impact to railroad operations, there are greater risks related to the construction methods. Additionally, the depths for Options 2 and 3 would adversely affect access ramp lengths to and from the underpass and introduce ADA compliance challenges.

We appreciate Union Pacific Railroad's participation in reviewing alternatives for the underpass and look forward to receiving your feedback on the Town's path forward. Please let us know if additional information is required to assist with your review.

Following your review, we would like to propose a meeting the week of July 9, 2018 for further discussion of the alternatives.

After the preferred option has been selected, the project team will advance 25% design. The estimated schedule for the preliminary engineering submittals are:

25% submittal – September 2018

30% submittal – November 2018

**BRIDGE CONSTRUCTION SEQUENCE**

**Step 1. Track Preparation**

- a. Set up two removable track panels and jump spans as needed on each track. Center each panel over each proposed abutment.
- b. The setup of track panels and jump span shall occur in four-hour work window or as approved by UPRR.

**Step 2. Abutment Installation**

Utilize the removable track panels as needed for the following steps.

- a. Excavate to bottom of cap beam.
- b. Install H piles, sheeting and T.S.R.S..
- c. Install precast cap beam.
- d. Repeat above steps for next track.
- e. The installation of abutment shall occur in four-hour work windows or as approved by UPRR.

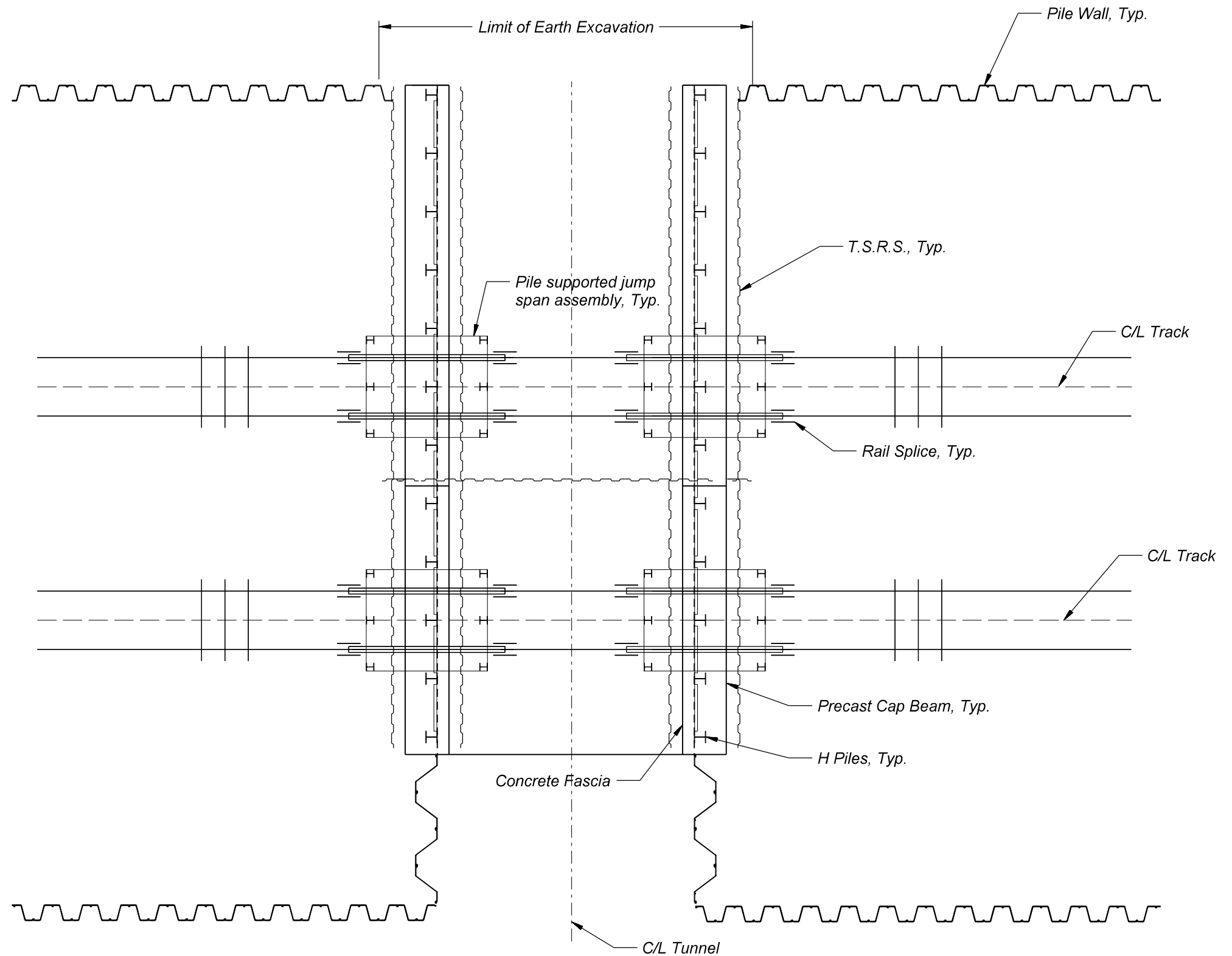
**Step 3. Bridge Installation**

- a. Remove one track (one track out of service).
- b. Remove jump span assemblies and inside T.S.R.S..
- c. Excavate to bridge seat elevation.
- d. Install precast abutment backwall, PPC deck beam, and waterproofing membrane.
- e. Remove outside T.S.R.S and backfill behind abutment.
- f. Place ballast, and track panels (track operation resumes).
- g. Repeat above steps for next track.
- h. Installation of each span will be completed in an eight-hour work window or as approved by UPRR.

**Step 4. Tunnel Construction**

- a. Excavate to the bottom of concrete slab.
- b. Place waterproofing membrane and drain pipe.
- c. Construct concrete slab.
- d. Construct concrete fascia
- e. Track operation is not affected during the tunnel construction.

**Step 5. Construct pedestrian bridges adjacent to mainline (track operation not affected).**



**ESTIMATED INTERRUPTION OF SERVICE**

Step	Duration
1	Max. 4 hr. per track
2a - 2c	Max. 4 hr. per abutment per track
3a - 3e	Max. 8 hr. per track



**PLAN**  
(N.T.S.)

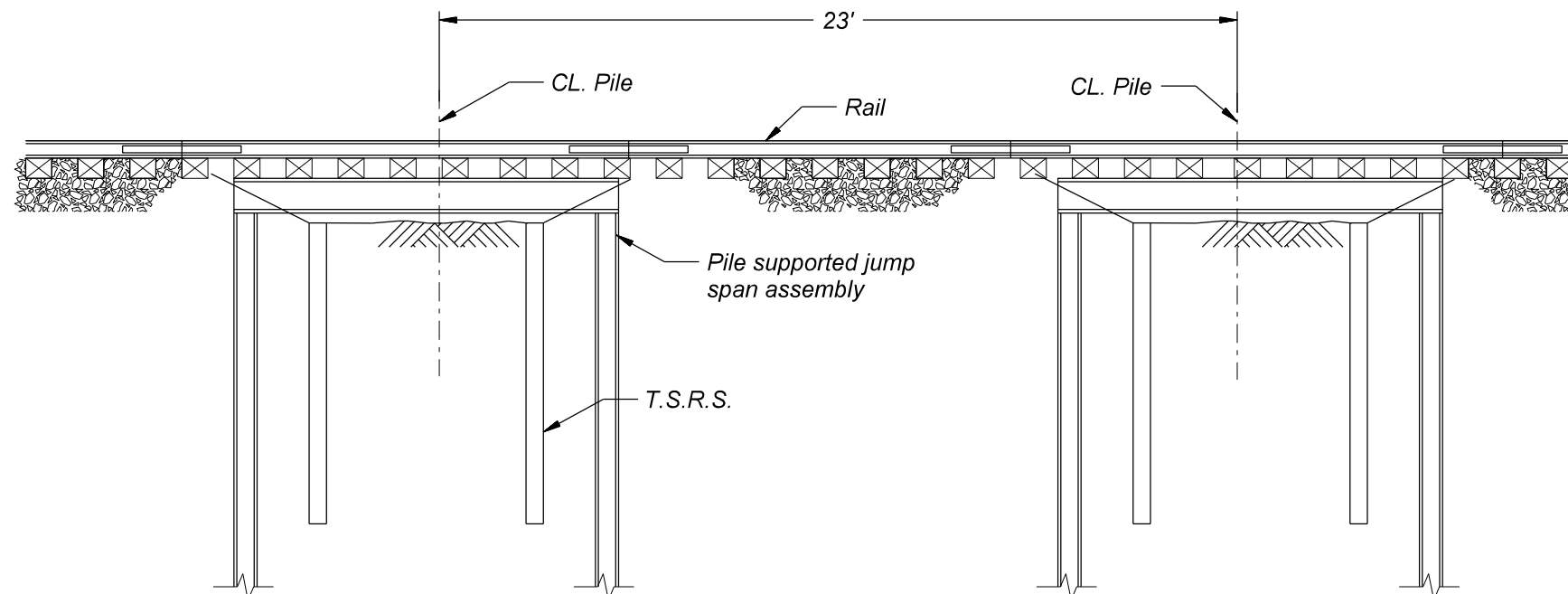
Color.tbl  
 T:\16950A\Normal\Phase 1 Study\CAD\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V8\_Pen.tbl  
 T:\16950A\Normal\Phase 1 Study\Struct\CADD\01-General\Note - Concrete Bridge.dgn  
 Defaulc  
 6/6/2018

		DRAWN BY: JZ	LOCATION & DESCRIPTION:  Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10  SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - GNERAL PLAN
		CHECKED BY: P.JL	
DATE: 05/24/2018			
SHEET NUMBER: 001 of 005			

C:\or\_tables\T:\16950A\Normal\Phase 1\Study\CAD\_Reference\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\02a-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018

**Step 1. Track Preparation**

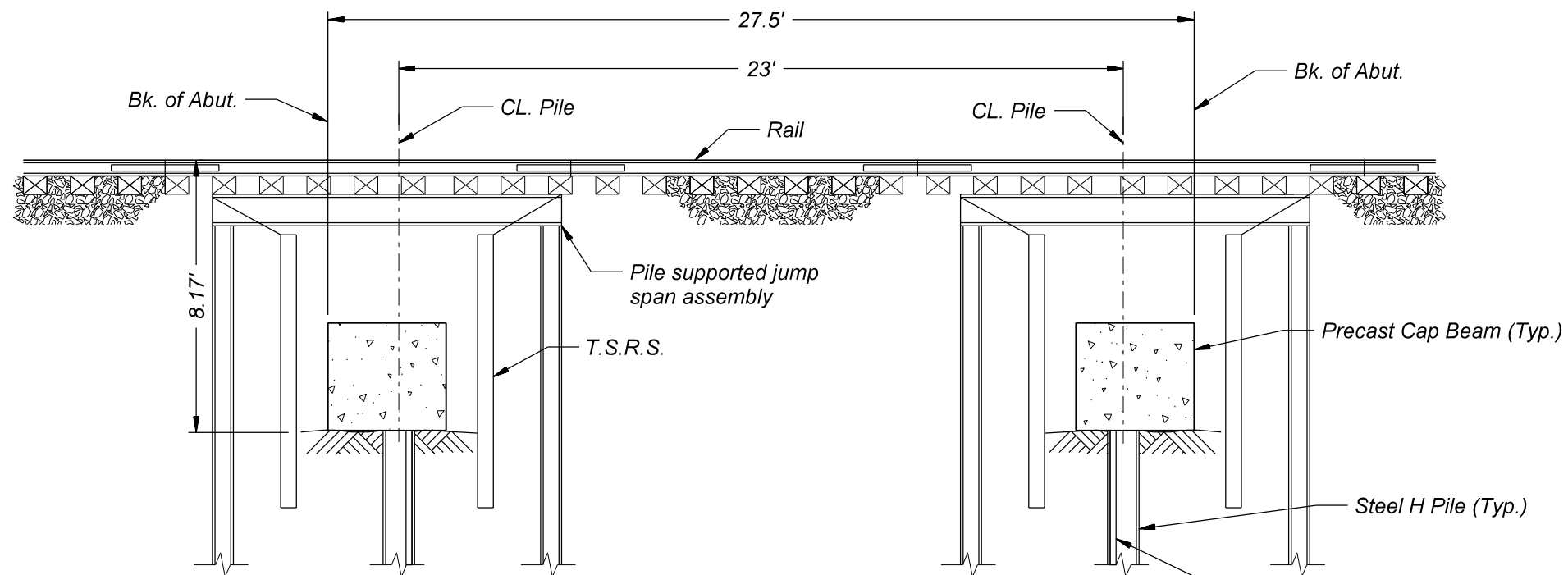
- a. Set up two removable panels and jump span as needed on each track. Center each panel over each proposed abutment.
- b. Install T.S.R.S..
- c. The setup of track panels and jump span shall occur in four-hour work window or as approved by UPRR.



**STEP 1**

**Step 2. Abutment Installation**

- Utilize the removable track panels as needed for the following steps.
- a. Excavate to bottom of cap beam.
  - b. Install H piles, and sheeting.
  - c. Install precast cap beam.
  - d. Repeat above steps for next track.
  - e. The installation of abutment shall occur in four-hour work windows or as approved by UPRR.



**STEP 2**

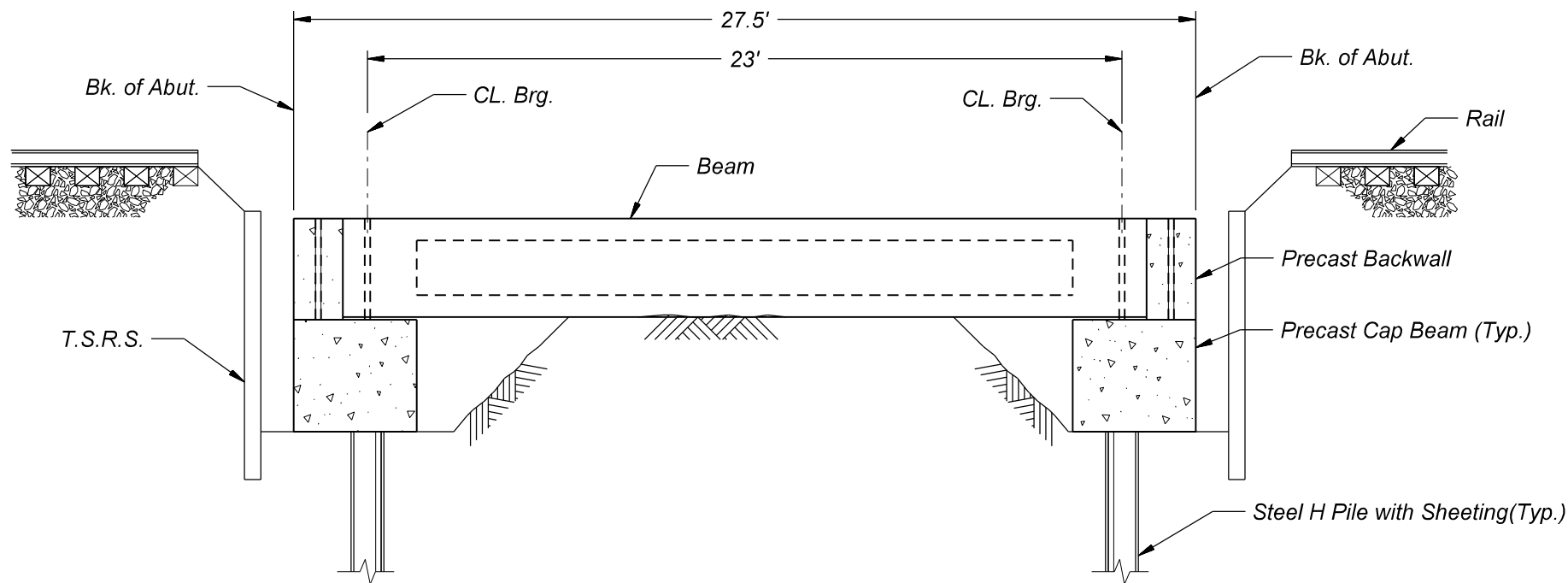
**Note:**  
Method of abutment pile cap attachment to be determined.

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 1
		CHECKED BY: PJL	
		DATE: 05/24/2018	
		SHEET NUMBER: 002 of 005	

C:\or- tables  
 T:\16950A\Normal\Phase 1\Study\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen table.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\02b-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018

**Step 3. Bridge Installation**

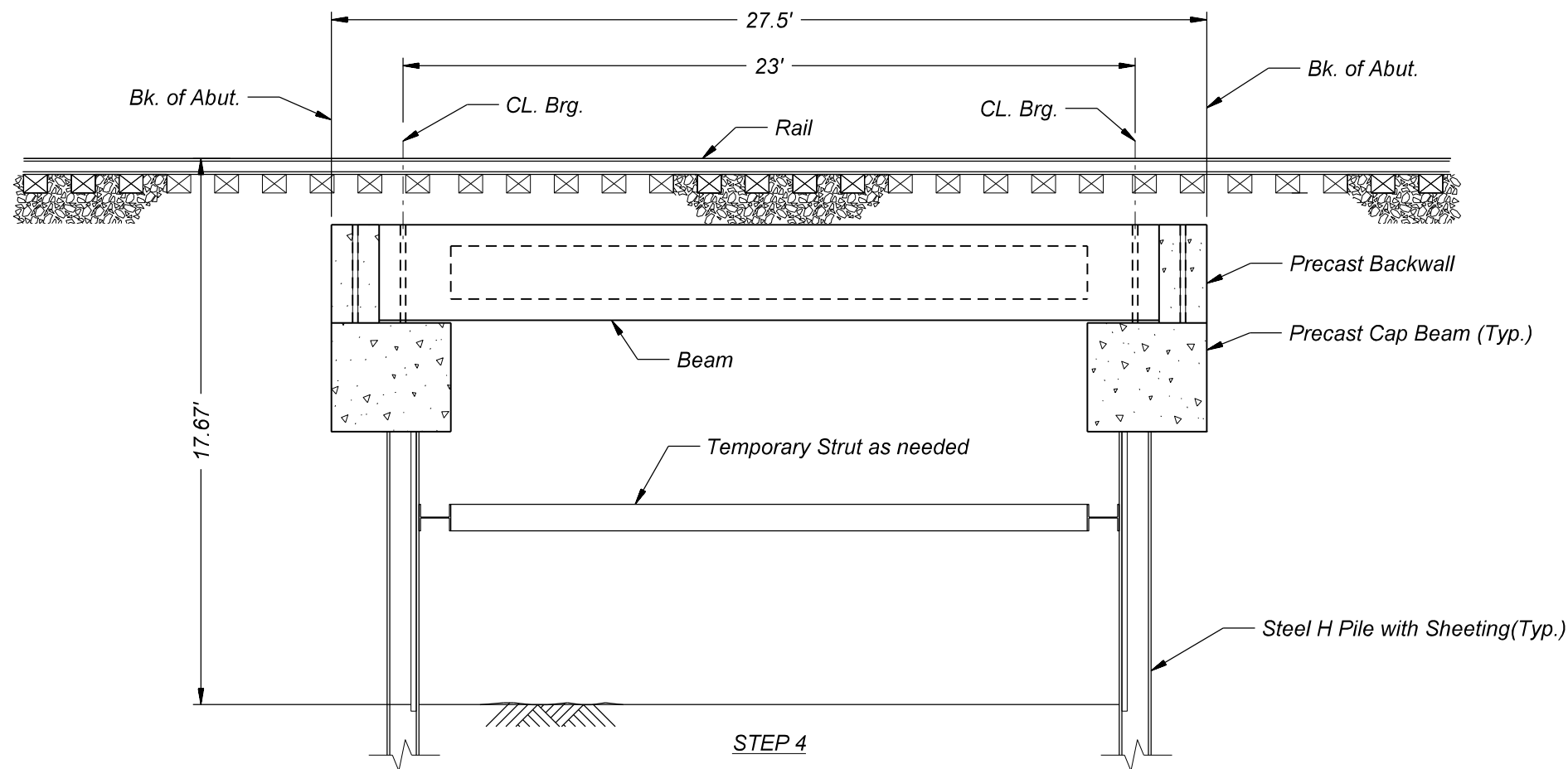
- a. Remove one track (one track out of service).
- b. Remove jump span assemblies and inside T.S.R.S..
- c. Excavate to bridge seat elevation.
- d. Install precast abutment backwall, PPC deck beam, and waterproofing membrane.
- e. Remove outside T.S.R.S and backfill behind abutment.
- f. Place ballast, and track panels (track operation resumes).
- g. Repeat above steps for next track.
- h. Installation of each span will be completed in an eight-hour work window or as approved by UPRR.





**STEP 3**

**Step 4. Tunnel Construction**

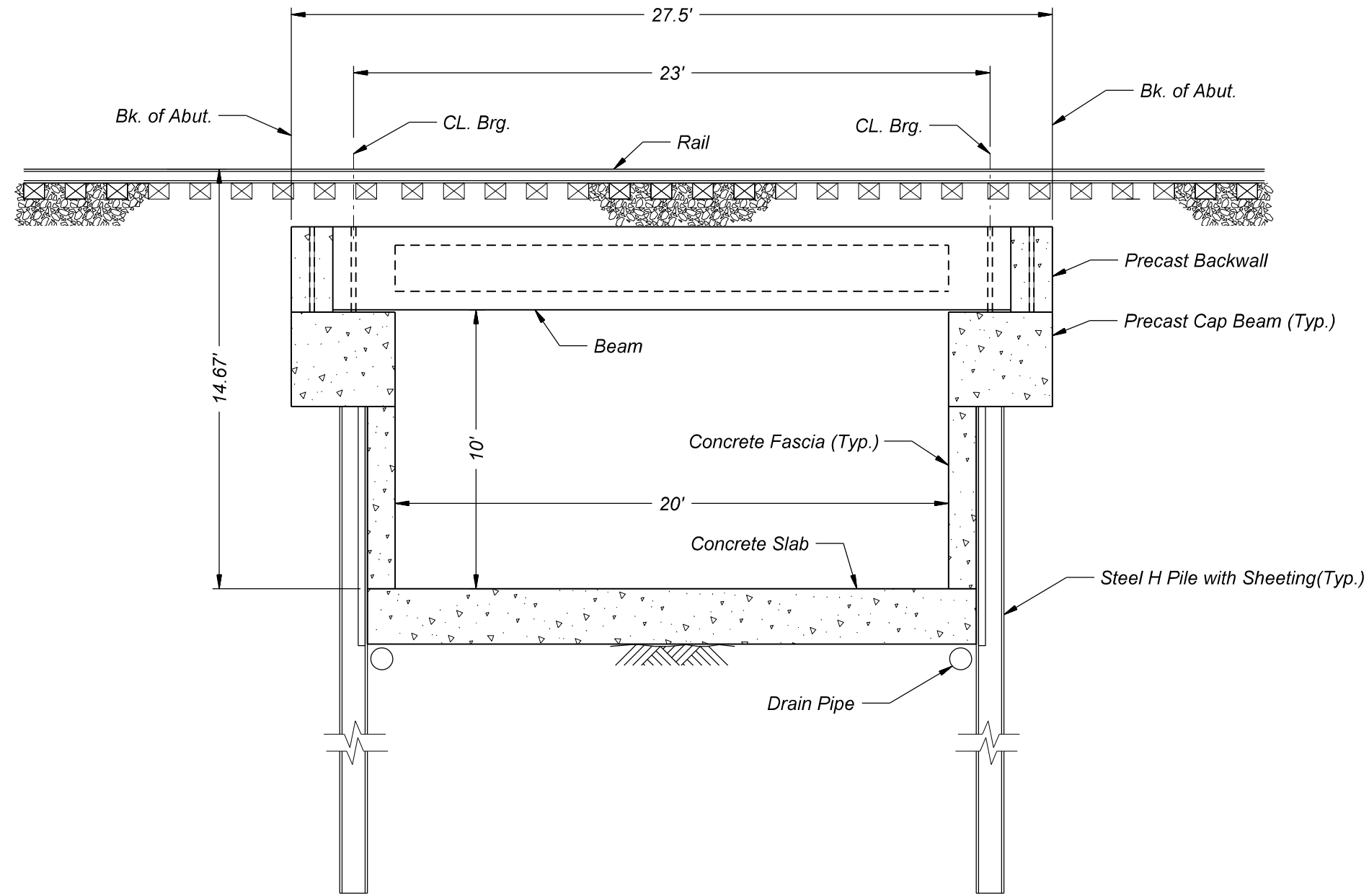
- a. Excavate to the bottom of concrete slab.
- b. Place waterproofing membrane and drain pipe.
- c. Construct concrete slab.
- d. Construct concrete fascia
- e. Track operation is not affected during the tunnel construction.



**STEP 4**



		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: P.JL	
		DATE: 05/24/2018	SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 2
		SHEET NUMBER: 003 of 005	



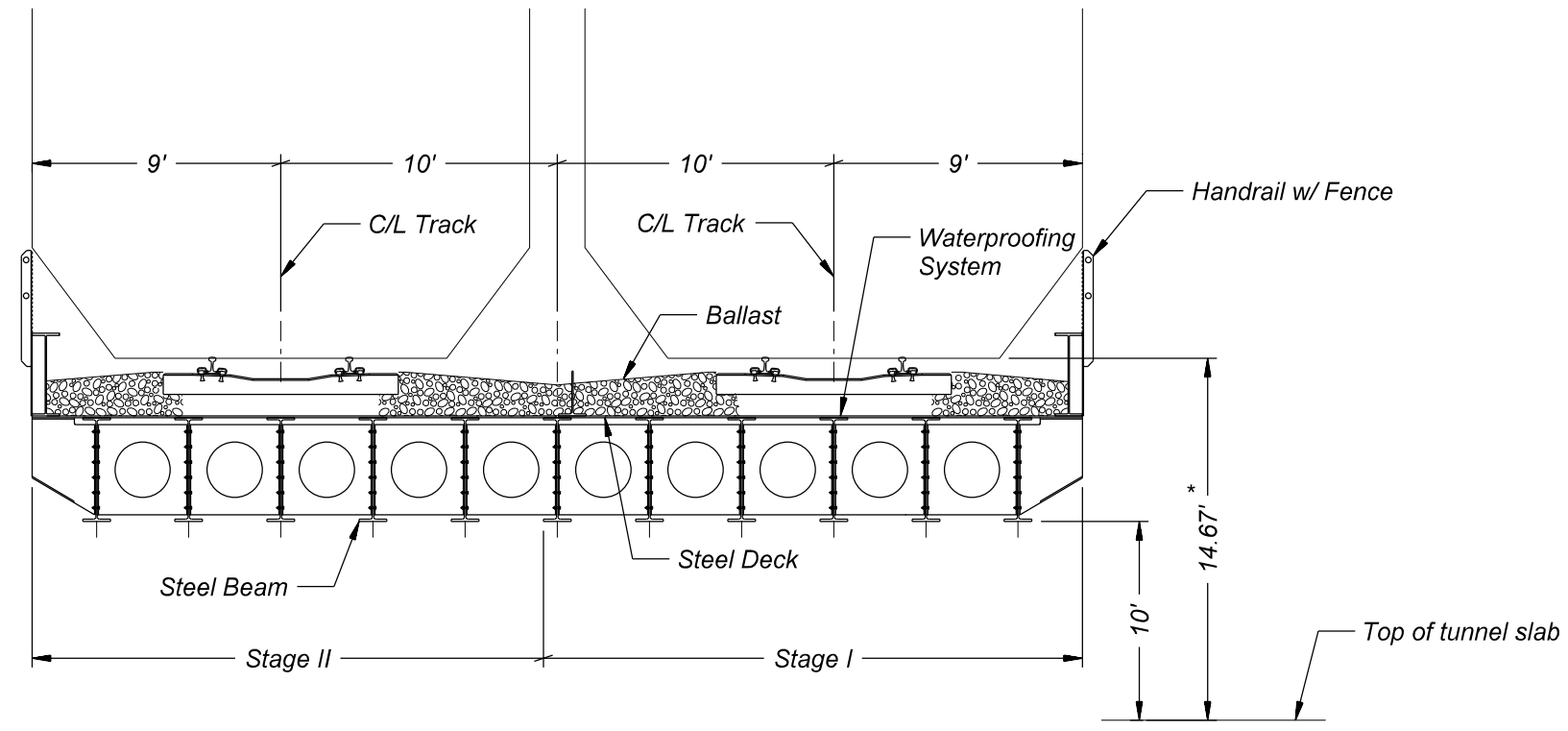


TYPICAL BRIDGE ELEVATION

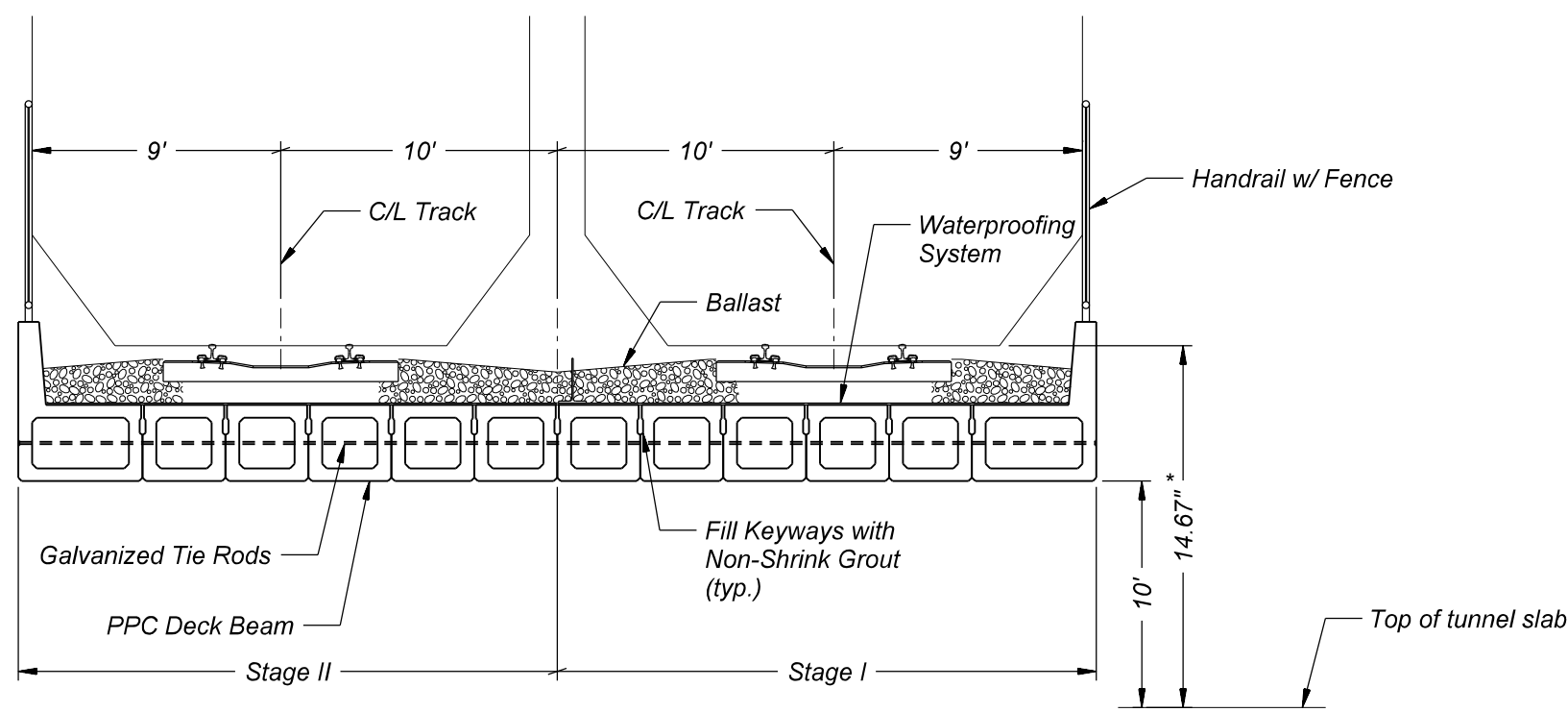
C:\p\tables  
 T:\16950A\Normal\Phase 1\Study\CAD\_Refernce\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pentable.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\02c-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 3
		CHECKED BY: P.JL	
		DATE: 05/24/2018	
		SHEET NUMBER: 004 of 005	

C:\or\_t\bl\et  
 T:\16950A\Normal\Phase 1 Study\CAD\_References\UPRR Standards\tables\Pen\UPRR\_V81\_Pentable.tbl  
 T:\16950A\Normal\Phase 1 Study\Struct\CADD\03-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018





STEEL BEAM OPTION



CONCRETE BEAM OPTION

\* Approximate distance measured from top of rail to top of tunnel floor

Note:  
Pedestrian bridge superstructure to be determined.

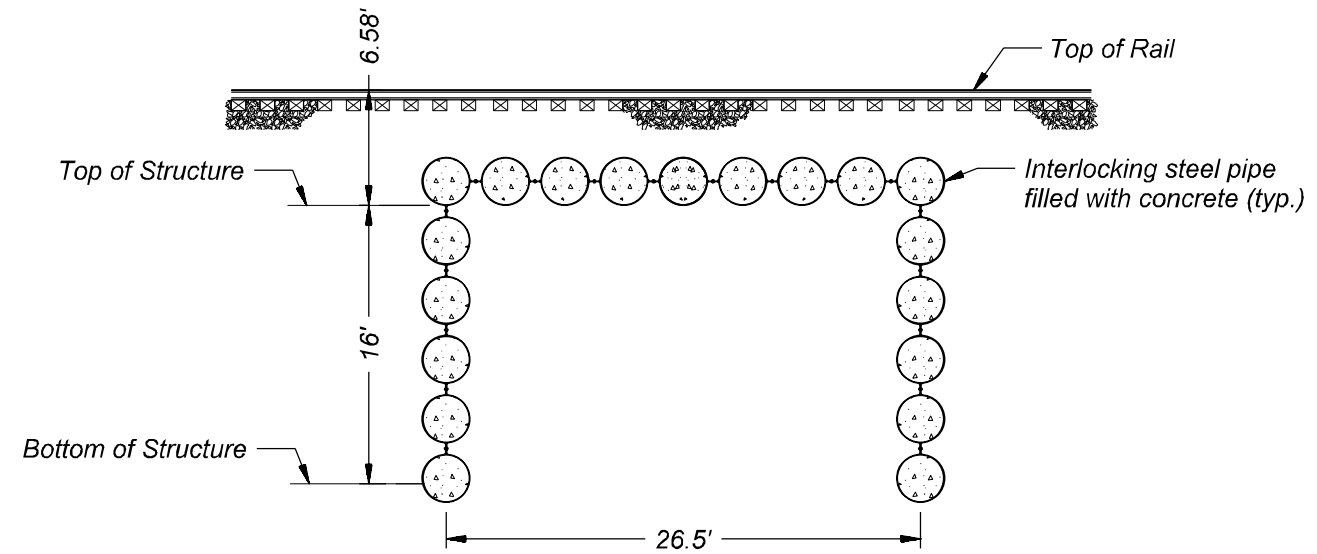
		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: PJL	
		DATE: 05/24/2018	
		SHEET NUMBER: 005 of 005	
SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - CROSS SECTION			

**TUNNEL CONSTRUCTION SEQUENCE**

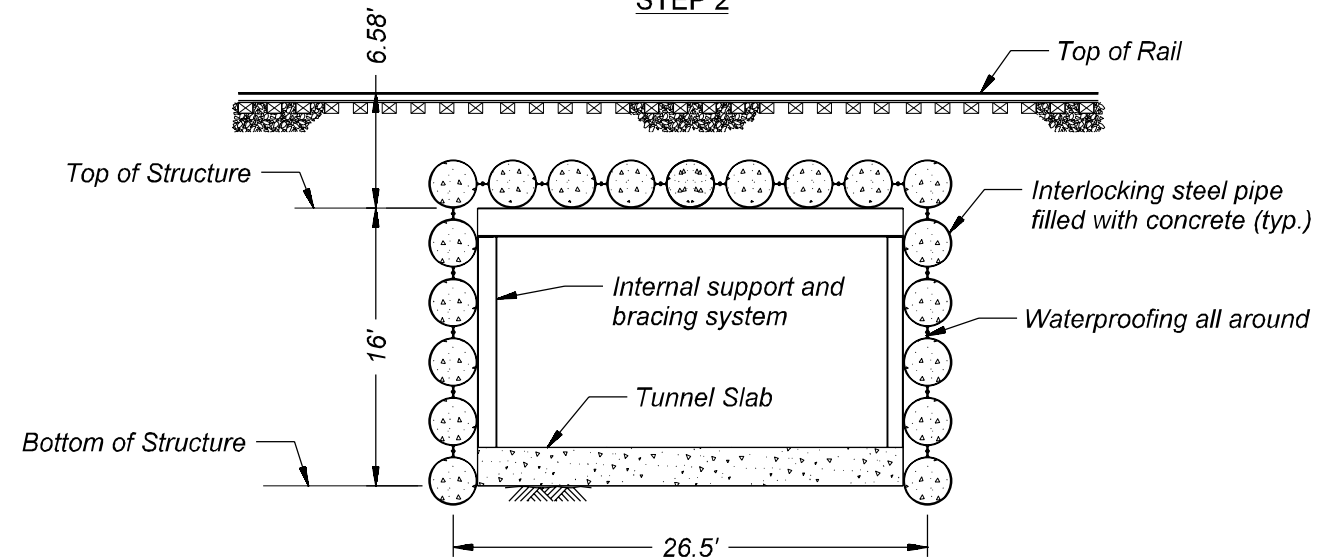
- Step 1: Construct jacking and retrieval pits at tunnel portals.
- Step 2: Install a "gate" type pipe arching around the proposed tunnel structure.
- Step 3: Excavate drifts in approximately 5 foot increments to permit the installation of the bottom tunnel slab, internal support and bracing sequentially along the length of the tunnel.
- Step 4: Install waterproofing, reinforcing steel, miscellaneous utilities and cast-in-place finish concrete.

**ESTIMATED INTERRUPTION OF SERVICE**

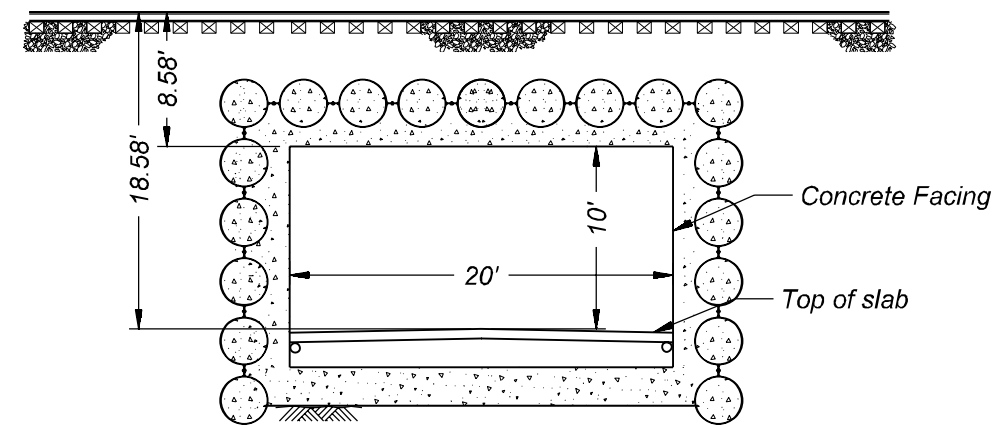
Work windows of 4 hours required for instrumentation and monitoring.  
 Potential for rail traffic to be stopped while work is being performed if ground deformations are observed.



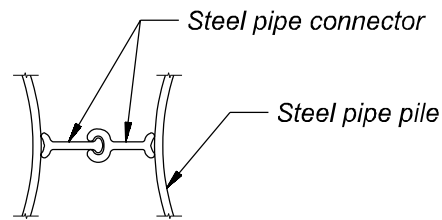
**STEP 2**



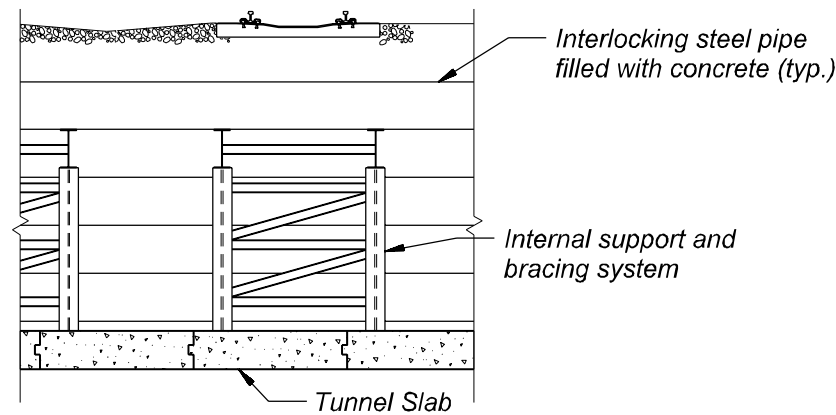
**STEP 3**



**STEP 4**



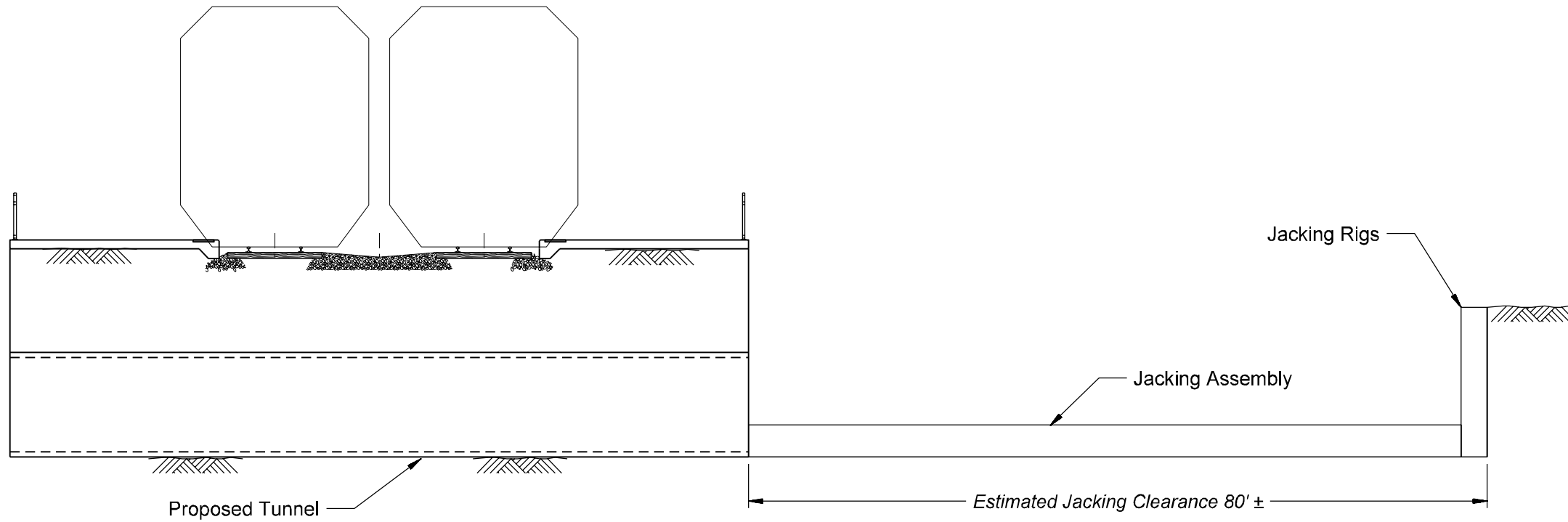
**INTERLOCKING DETAIL**



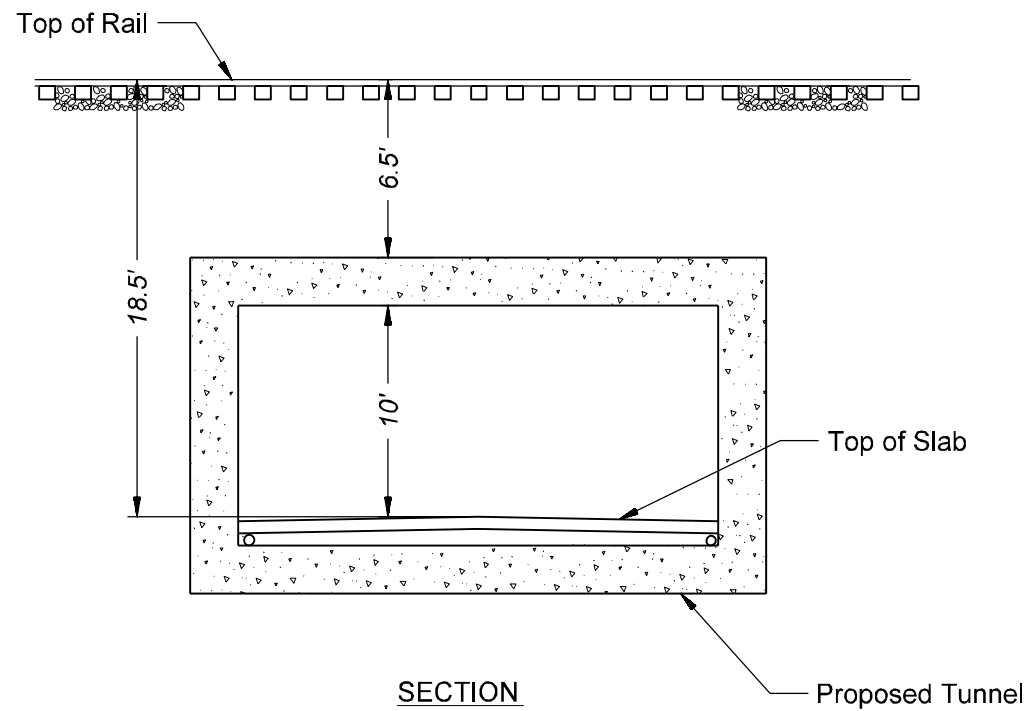
**TYPICAL LONGITUDINAL SECTION**

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: MJS	
		DATE: 05/24/2018	
		SHEET NUMBER: 001 of 001	
SHEET TITLE: OPTION 2 - PIPE ROOF CONSTRUCTION			

Color: table.t  
 T:\16950A NormalPhase I Study\CAD\_References\UPRR Standards\tables\Pen\UPRR\_V8\_Pentable.tbl  
 T:\16950A NormalPhase I Study\Struct\CADD\009-Cross Section-Tunnel\_HS.dgn  
 Default  
 6/1/2018



ELEVATION



SECTION



**TUNNEL CONSTRUCTION SEQUENCE**

- STEP 1. Construct jacking and retrieval pits at tunnel portals.
- STEP 2. Cast concrete box on site within jacking pit.
- STEP 3. Perform ground improvement and/or structural support of tracks above the tunnel profile.
- STEP 4. Hydraulically jack cast-in-place concrete box under track.

**ESTIMATED INTERRUPTION OF SERVICE**

Several work windows of 4 to 8 hours required for instrumentation & monitoring and ground improvement / structural support of tracks above the box based on contractor means and methods.

Potential for rail traffic to be stopped while work is being performed if ground deformations are observed.

		DRAWN BY:	JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY:	MJS	
		DATE:	05/24/2018	
		SHEET NUMBER	001 of 001	
			SHEET TITLE:	OPTION 3 - JACKED BOX CONSTRUCTION

Color table: T:\16950A NormalPhase 1 Study\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V8\_Pentable.tbl  
 T:\16950A NormalPhase 1 Study\Struct\CADD\010-Cross Section-Jacked Tunnel.dgn  
 Default: 5/31/2018



Conceptual Design Alternatives Report

Proposed Grade Separated Pedestrian Crossing, Normal, IL  
MP 124.10 Joliet Subdivision

(Near closed Crossing No. 290811W, 40.50869800/-88.98398600)

October 11, 2018

Prepared by WSP USA

Submitted to Union Pacific Railroad for Review

## Table of Contents

EXECUTIVE SUMMARY .....	1
INTRODUCTION .....	2
PROJECT HISTORY .....	2
DESIGN GUIDELINES .....	3
DESIGN ALTERNATIVES .....	5
Constructability, Construction Risks, and Construction Costs .....	6
Maintenance Requirements.....	6
Impacts to Access Ramps.....	6
Impacts to Railroad Operations (during construction) .....	7
RECOMMENDATIONS AND NEXT STEPS .....	9

## EXECUTIVE SUMMARY

The Normal Pedestrian Crossing project team previously submitted the Conceptual Design Alternatives Memorandum, dated June 12, 2018, to Union Pacific Railroad. Three design alternatives were provided with the June 12, 2018 memorandum for review:

- Option 1 – Open Cut Bridge Construction
- Option 2 – Pipe Roof Construction
- Option 3 – Jacked Box Construction

As requested by Union Pacific Railroad, the project team is resubmitting the design alternatives and providing additional details on estimated impacts to railroad operations and maintenance requirements.

OPTION	CONSTRUCTABILITY, CONSTRUCTION RISKS, CONSTRUCTION COSTS	MAINTENANCE REQUIREMENTS	IMPACTS TO ACCESS RAMPS	IMPACTS TO RAILROAD OPERATIONS
1) OPEN CUT BRIDGE CONSTRUCTION  RECOMMENDED ALTERNATIVE	Common construction methods Low risk Moderate cost	Typical for bridge structure with 70 to 100-year service life. Design can proactively address drainage to avoid future issues with water infiltration to the structure.	Shallowest elevation at 14'-8" Impacts are moderate with ramp lengths of approx. 194 ft. (North Plaza) and approx. 284 ft. (South Plaza)	Potential construction work windows: 1A. (6) 4 hr. + (2) 8 hr. 1B. (6) 4 hr. + (4) 6 hr. 1C. (4) 4 hr. + (2) 32 hr.
2) PIPE ROOF CONSTRUCTION	Requires specialty contractor Moderate risk Moderate cost	If joints experience leaking, the structure must be repaired from above; potential track removal during repair	Deeper profile at 18'-7" Impacts are significant with ramp lengths of approx. 275 ft. (North Plaza) and approx. 340 ft. (South Plaza)	Potential construction work windows: (4) 4 hr.
3) JACKED BOX CONSTRUCTION	Requires specialty contractor High risk High cost	Same concern as Option 2, especially if jointed precast units are used.	Deeper profile at 18'-6" Impacts are significant ramp lengths of approx. 275 ft. (North Plaza) and approx. 340 ft. (South Plaza)	Potential construction work windows: (3) 8 hr.

October 11, 2018

## INTRODUCTION

The 10% conceptual design, dated February 12, 2018, for the proposed grade separated pedestrian crossing at MP 124.10 (Joliet Subdivision) in Normal, Illinois was previously submitted to Union Pacific Railroad (UPRR) for review.

Based on UPRR's review comments, the Normal Pedestrian Crossing project team have reviewed additional alternatives to achieve a design that will meet the needs of the Town of Normal while also minimizing impacts to railroad operations during construction of the proposed pedestrian underpass at the Uptown Station in Normal.

These design alternatives were previously submitted to UPRR in a memorandum dated June 12, 2018, which included additional information on the project history, design guidelines, and design alternatives.

UPRR requested clarification on impacts to railroad operations during construction and expected maintenance requirements of the alternatives. Specific to railroad operations, UPRR requested a matrix of options for anticipated construction windows. The memorandum has been updated to address these questions and is being resubmitted to UPRR for review in this report format.

## PROJECT HISTORY

Through the Illinois High-Speed Rail program, the project team and stakeholders reviewed conditions and safety of existing at-grade crossings within the corridor. This included the existing at-grade pedestrian crossing (DOT No. 290811W, MP 124.08) at the Amtrak station in Normal, Illinois. In accordance with guidelines from Amtrak and Union Pacific Railroad for pedestrian and at-grade crossings near a station, as well as guidance from the project team, the decision was made to voluntarily close the existing crossing. The existing at-grade pedestrian crossing was closed on May 21, 2013.

Additionally, with the Illinois High-Speed Rail program, existing station conditions were evaluated in accordance with Amtrak and Union Pacific Railroad requirements for two-track station locations. IDOT and the High-Speed Rail project team determined that a second platform on the mainline was needed for High-Speed Rail operations as well as a pathway for passengers to safely travel between the platforms. The Town of Normal proceeded with designs for an overpass, with focus on accommodating the Amtrak passengers. On April 16, 2014, the Illinois Commerce Commission entered an Order (ICC Order No. T14-0014) authorizing replacement of the closed crossing with a pedestrian overpass to be completed by December 31, 2015.

Construction of the overpass was later postponed by the Town of Normal for several reasons, including the limited functionality for Amtrak passengers. Specifically, the overpass design, with two elevators and one stair tower, would not conveniently convey the estimated 150 passengers needing to cross the tracks at one time. Additionally, the overpass design was not suitable for trail users and cyclists because of the limited capacity and limited operating hours, which would have been restricted to Uptown Station hours of operation.

In 2015, the Normal Town Council approved an update to their master plan for the redevelopment of the 8-acre area south of the tracks, including a new 70,000 square foot public library and up to 500,000 square feet of residential, retail, and office space. The updated master plan outlines a vision for pedestrian and bicycle connectivity in Uptown and states that a non-deterred, safe, functional, and aesthetically compatible crossing is critical for the success of this redevelopment plan.



October 11, 2018

In September 2016, following filing of a Supplemental Petition by Normal and Status Hearing, the Illinois Commerce Commission entered a Supplemental Order extending the deadline for completion of an alternative design and construction of the project. The completion date was extended to December 31, 2021.

With the crossing closure and postponement of a grade separated crossing at Uptown Station, users of the Constitution Trail are re-routed to the Linden Street at-grade crossing. Amtrak passengers primarily use the Broadway Street at-grade crossing.

## DESIGN GUIDELINES

The proposed underpass will accommodate two-way traffic for train passengers, pedestrians, and cyclists between the Uptown North and Uptown South areas, including the Constitution Trail. The goals of the project are to:

- Improve safety by providing a crossing that separates pedestrian and cyclist traffic from vehicle and rail traffic.
- Provide convenient, safe, and accessible passage for users.
- Provide a facility that is convenient and intuitive to use.
- Minimize delays and adverse travel for pedestrians and cyclists.
- Improve mobility and connectivity for pedestrians and cyclists in the Uptown neighborhood and Bloomington-Normal communities.
- Provide a direct link between developments on the north and south side of Uptown, including the Children's Museum, Uptown Station, City Hall, and the proposed Normal Public Library.
- Maximize access to public transportation.
- Promote transportation opportunities for disadvantaged groups.

Conceptual designs for the underpass have been advanced utilizing guidelines from Union Pacific Railroad, the Town of Normal, American Association of State Highway and Transportation Officials (AASHTO), and Crime Prevention Through Environmental Design (CPTED).

The project will incorporate UPRR's Guidelines for Railroad Grade Separation Projects, dated May 2016, particularly sections:

- 4 – General Requirements for Grade Separation Projects
- 6 – Underpass Structures
- 7 – Trails

Additional guidelines being incorporated into the project design include:

From Town of Normal Bicycle Master Plan for Shared Use Path (Sidepath),

- Width
  - § Minimum 10 feet width for a two-way sidepath and is only recommended for segments with low traffic.
  - § Recommended width is 12 feet for most situations.
  - § 12 to 14 feet or wider is recommended for heavy-use situations where there is a strong presence of multiple users, such as joggers and bicyclists.
- Lateral Clearance
  - § 2 feet or wider shoulders on both sides.
- Overhead Clearance

October 11, 2018

§ Minimum 8 feet, but recommended 10 feet, for clearance of overhead obstructions.

From AASHTO Guide for Development of Bicycle Paths,

- Shared use paths should not be developed adjacent to roadways, unless it is generally separated from the roadway.
- As the shared use paths ends, cyclists who are traveling against traffic tend to continue to travel in the wrong direction, including those who are making their way to the shared use path. Wrong-way bicycle travel is a major cause of crashes.
- Shared use paths should have white-colored bicycle lane marking and be placed after an intersection and other appropriate locations.
- At intersections, shared use paths' crossings should be located where bicyclists would not be in blind spots.
- Whenever possible, separate bicycle and pedestrian paths to minimize bicycle/pedestrian conflicts.
- Provide directional signage to direct users to and from the shared use path.

From CPTED,

- Natural Surveillance – A person is less likely to commit a crime if he/she perceives someone would see him/her do it.
- Natural Access Control – Using and designing pathways, fences, lighting, signage, and landscaping to clearly direct traffic to and from the appropriate entrances. Having a proper flow of people can decrease opportunities for crime.
- Territorial Reinforcement – Physical designs, such as signage, pavement treatment, and landscaping enable users to develop a sense of ownership of the space. Clearly distinguishing public and private areas would discourage potential trespassers.
- Maintenance / “Broken Window Theory” – Neglected or poorly maintained properties are breeding ground for criminal activities.
- Activity Support – Design the space so it enhances or creates a new form of activities in the space. Diverse land uses around the space brings activity throughout the day.
- Image – Appearance that an area is not conducive to crime.
- Motivation Reinforcement – Utilizing physical design to improve the community’s social cohesion and sense of territory.

Based on the above sizing criteria, it is proposed that the design of the underpass accommodate an opening that is 20 feet wide and 10 feet high.

Additional design considerations include ramp lengths, subsurface conditions, constructability, and impact to freight and passenger operations.

As a public facility, the ramp grades to and from the underpass must be American with Disabilities Act (ADA) compliant. The underpass depth combined with the ADA grade requirements will influence the lengths of the access ramps. A greater underpass depth, for example, will require greater ramp lengths. Accommodating greater ramp lengths to meet ADA compliance may become an issue because of constraints on site with existing structures and facilities.

Greater ramp lengths will also adversely impact connectivity and mobility for pedestrians and cyclists, one of the project goals referenced above. Current conceptual designs include minimal turns to navigate the change in elevation on the north side.

Subsurface conditions on-site consist of soft to medium stiff clay, which is favorable for tunneling and other excavation methods. Although it varies, groundwater was observed at approximately 10 feet below the ground

October 11, 2018

surface. The presence of groundwater must be considered for any of the proposed design alternatives; however, the presence of the soft to medium stiff clay will limit the amount of water which will enter the excavations during construction. Long term water control will also need to be considered.

Regarding impacts to railroad operations, the project team is proposing three alternative designs to minimize freight disruptions and to limit construction work windows to one track per work window. In addition to review of the alternatives, the project team would appreciate guidance from Union Pacific on whether existing train schedules and limiting impacts to one track at a time would permit for work windows to be completed without further disruption to operations.

## DESIGN ALTERNATIVES

With the 10% design comments, UPRR had recommended further review of “jack and bore” methodologies for the underpass. The project team has reviewed conventional jacked pipe concepts, but the size limitations of the pipe restricted the viability for the underpass to meet the space requirements for an underpass serving both pedestrian and cyclist traffic safely. Pipe jacking or microtunneling methodologies typically use circular pipe with a maximum feasible diameter of 10 to 12 feet before it becomes “unconventional” and thus requires very specialized equipment and personnel to construct. The circular pipe of conventional sizes would not meet the sizing criteria described above including Union Pacific Railroad guidelines for new underpass trail crossings.

Alternatively, two additional trenchless/no-dig construction methodologies were considered feasible and further explored in addition to the 10% design open cut option. All three options presented have been identified as alternatives that potentially reduce impact to railroad operations while providing an underpass opening to safely accommodate all intended users. Three design alternatives are provided with this report for UPRR’s review. The alternatives are:

- Option 1 – Open Cut Bridge Construction (attached: dated May 24, 2018, Sheets 001-005 of 005)
- Option 2 – Pipe Roof Construction (attached: dated May 24, 2018, Sheet 001 of 001)
- Option 3 – Jacked Box Construction (attached: dated May 24, 2018, Sheet 001 of 001)

Option 1 is similar in concept to the design provided in the 10% submittal (dated February 12, 2018). The open cut concept has been modified to reduce initial work windows, when possible, affecting one track per work window. This would be achieved by installing a driven pile foundation and earth retention system instead of drilled shafts. We propose utilizing precast abutments and prefabricated bridge modules with ballast preinstalled to minimize the work windows.

Option 2 proposes use of an interlocking steel pipe system to construct a temporary roof for initial support of a tunnel structure beneath the UPRR right of way. Pits would be excavated on both sides of the UPRR right-of-way to facilitate installation of large diameter pipes to act as the temporary roof to support tunnel excavation. The pipes would be installed horizontally by either jacking, pulling, or directional drilling them beneath the tracks. Once pipe installation is completed, excavation beneath the temporary roof would then proceed in drifts with the pipe-arch system would acting as initial support of the soil above. After excavation of a single drift, additional internal support and a base slab would be installed within the drift to provide support of the pipe-arch system. A final lining for the tunnel would be constructed after excavation between the pits is completed.

Option 3 is a jacked box construction method. With this alternative, cast-in-place concrete box segments are thrust through the ground beneath the tracks via hydraulic jacks. Like Option 2, the jacked box method would require jacking and retrieval pits to be constructed on both sides of the UPRR right-of-way to cast the box and to

October 11, 2018

facilitate the jacking process. Ground improvement or structural support of the tracks above the box would be likely be required to minimize settlement and disturbance at the track level.

## Constructability, Construction Risks, and Construction Costs

While Options 2 and 3 could potentially reduce impacts to railroad operations, each option does present additional construction risks. Of concern with each is need for a specialty contractor to complete construction, which could impact the bid process, construction cost, and construction schedule. The availability for multiple specialty contractors during the bid process for work at the project location may be limited and could impact bidding results. Option 1, on the other hand, is a more common construction practice and multiple contractors within the region would be anticipated to be available during bidding thus providing competitive bids.

Also of concern, both Options 1 and 2 increase the risk of settlement and disturbance occurring during construction. If not properly mitigated, or if unanticipated ground conditions are encountered, settlement and ground disturbance could occur at the ground surface and impact the tracks. Option 1 reduces this risk by installing piles and transferring the loads to deep, stiff materials below the work area.

Construction costs are conceptual at this time. Options 1 is estimated to be moderate in comparison to the other options with Option 3 estimated at the highest cost.

## Maintenance Requirements

Option 1 will follow UPRR standards for design and construction practices. The Normal project team does not anticipate unusual maintenance costs and anticipates an overall service life of 70 to 100 years. Additionally, with Option 1, the design can proactively address drainage to avoid future issues with water infiltration to the structure. These efforts would reduce future maintenance requirements.

For Option 2, with a concrete box design, if joints experience leaking, the structure must be repaired from above, which will necessitate track removal and impacts to railroad operations

Option 3 – The same maintenance concerns exist as for Option 2, especially if jointed precast tunnel sections are used.

The Town of Normal is amenable to executing a reasonable maintenance agreement with the UPRR.

## Impacts to Access Ramps

Options 2 and 3 are approximately 4 feet deeper than Option 1, which will significantly impact the length of the access ramps to the underpass. Designing within the limited area available on either side of the tracks and to meet ADA compliance for the ramp slopes, switchbacks may be required for the access ramps and appear to be the only viable design for an ADA-compliant ramp within the north plaza. Excess lengths and non-direct routes may cause the path to be unfavorable for passengers and trail users, which heightens the risk of unauthorized crossing at-grade creating unsafe conditions on the tracks and railroad property. Elevators, in combination with stairs, could be considered to provide ADA-compliant alternative access for a deeper underpass elevation, but would be subject to additional maintenance and malfunction concerns; also, elevators would be unlikely to be used by bicyclists who would likely detour to one of the existing at-grade crossings, as compared to a passive ADA-compliant ramp design.

October 11, 2018

For Option 1, estimated ramp lengths are approximately 194 feet for the North Plaza and 284 feet for the South Plaza.

For Options 2 and 3, estimated ramp lengths are approximately 275 feet for the North Plaza and 340 feet for the South Plaza.

Details of the ramp configurations and lengths are provided in the attached figures for the three options.

### Impacts to Railroad Operations (during construction)

For Option 1, combinations of several work windows are proposed with ranges of 4-hour, 6-hour, 8-hour, and up to 32-hour durations for installation of each span of the precast concrete bridge system, affecting one track per window.

For Option 2, most of the work for this option would be isolated to the pits on both sides of the UPRR right-of-way and within the tunnel itself; however, it is anticipated that four, 4-hour work windows will be required, affecting one track per window, to allow for minor site work and monitoring which may encroach upon the right-of-way.

For Option 3, the ground improvement or structural support of the tracks would be performed at track level and would require several 8-hour work windows, possibly affecting both tracks per work window. Option 3 is highly dependent on the contractor's means and methods and shutdown periods may vary based on the contractor's approach. Based on conversations with a single, proprietary contractor, it is assumed there will be three, 8-hour work windows, affecting both tracks. Other contractor's work window requirements may vary.

It is noted that the potential for staged construction using work windows of less than 4 hours was considered; however, the temporary work required to take a track out of service, complete the work within a stage, restore the track, and ensure its safety prior to resuming rail operations would not allow for meaningful progress of work in a less than 4-hour period for any of the construction method options.

Construction work window details are provided in the below table.

Table 1. Construction Work Window Matrix

OPTION	EST. QUANTITY OF WORK WINDOW	MAX. LENGTH FOR WORK WINDOW (HOUR)	NOTES
1A. OPEN CUT BRIDGE CONSTRUCTION – MAX. 8 HR. WINDOW	6	4	Uses H piles, precast abutments, and individually placed stringers and bridge deck.
	2	8	Less than 4 hr. windows not feasible due to part of the time needed to remove track before construction, having enough time to make meaningful work progress, and to replace and inspect track prior to clearing it track for operations after stage construction.  Total time = 40 hr. in eight separate operations <i>(20 hr. in four separate operations per track)</i>

October 11, 2018

1B. OPEN CUT BRIDGE CONSTRUCTION – MAX. 6 HR. WINDOW	6	4	H piles installed in first stage
	4	6	Reduces 8 hour windows to 6 hour. Inefficiency of having to work under shorter work window for superstructure stage lengthens total time and number of stages as compared to Option 1A. Even though it reduces maximum window length, it increases construction time and worker exposure as compared to Option 1A.
			Total time = 48 hr. in ten separate operations <i>(24 hr. in five separate operations per track)</i>
1C. OPEN CUT BRIDGE CONSTRUCTION – MAX. 32 HR. WINDOW	4	4	H piles installed in first stage at each abutment location
	2	32	Excavate, install precast abutments and roll-in structure in one long stage. Exchanges several small windows for two short and two long windows.
			Total time = 80 hr. in six separate operations <i>(40 hr. in three separate operations per track)</i>
2. PIPE ROOF CONSTRUCTION	4	4	Limited flexibility in adjusting work windows; dependent on contractor means and methods.
			Total time = 16 hr. in four separate operations <i>(8 hr. in two separate operations per track)</i>
3. JACKED BOX CONSTRUCTION	3	8	Work window assumptions based on proprietary jacked box system and were provided by a specialty contractor capable of such construction services. Limited flexibility in adjusting work windows; dependent on contractor means and methods.
			Total time = 24 hr. in three separate operations <i>(Affecting both tracks)</i>

Notes:

- 1) Work window estimates for construction are conceptual at this 10% design stage and will be further refined as designs are developed. Additionally, the project team will work with Union Pacific Railroad to include work window specifications in the construction documents as appropriate.
- 2) For Option 1 Open Cut and Option 2 Pipe Roof, it is assumed only one track will be impacted per work window. The second track will be left in service under these construction options.
- 3) Option 3 Jacked Box requires simultaneous closure of both tracks during work windows.

October 11, 2018

## RECOMMENDATIONS AND NEXT STEPS

After evaluation of the three alternatives, the Normal Pedestrian Crossing project team is recommending Option 1. While Options 2 and 3 may potentially have less of a direct impact to railroad operations, there are greater risks related to the construction methods. Additionally, the depths for Options 2 and 3 would adversely affect access ramp lengths to and from the underpass and introduce ADA compliance challenges.

The project team requests that all appropriate departments at UPRR review the design alternatives and provide comments by November 30, 2018.

**BRIDGE CONSTRUCTION SEQUENCE**

**Step 1. Track Preparation**

- a. Set up two removable track panels and jump spans as needed on each track. Center each panel over each proposed abutment.
- b. The setup of track panels and jump span shall occur in four-hour work window or as approved by UPRR.

**Step 2. Abutment Installation**

Utilize the removable track panels as needed for the following steps.

- a. Excavate to bottom of cap beam.
- b. Install H piles, sheeting and T.S.R.S..
- c. Install precast cap beam.
- d. Repeat above steps for next track.
- e. The installation of abutment shall occur in four-hour work windows or as approved by UPRR.

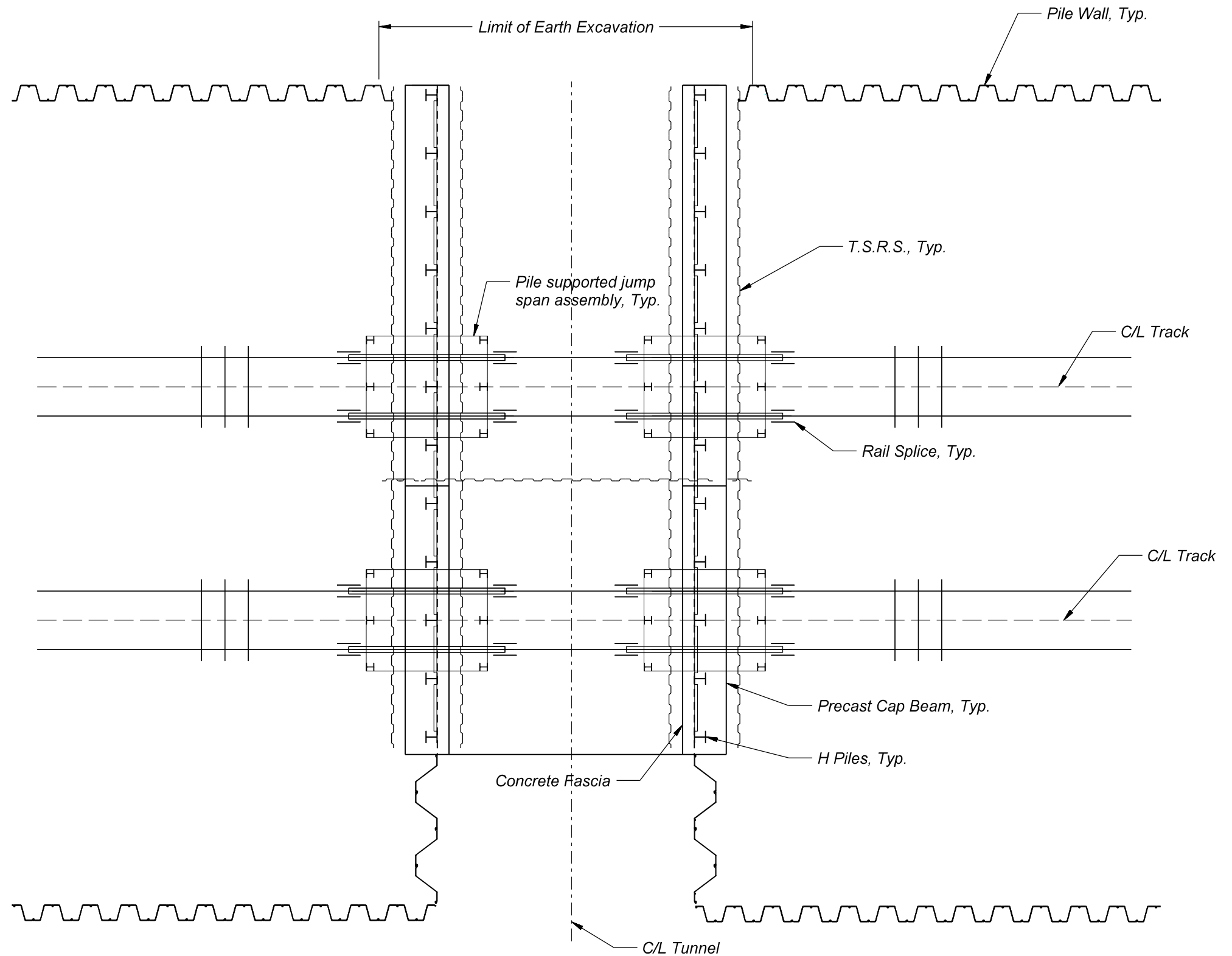
**Step 3. Bridge Installation**

- a. Remove one track (one track out of service).
- b. Remove jump span assemblies and inside T.S.R.S..
- c. Excavate to bridge seat elevation.
- d. Install precast abutment backwall, PPC deck beam, and waterproofing membrane.
- e. Remove outside T.S.R.S and backfill behind abutment.
- f. Place ballast, and track panels (track operation resumes).
- g. Repeat above steps for next track.
- h. Installation of each span will be completed in an eight-hour work window or as approved by UPRR.

**Step 4. Tunnel Construction**

- a. Excavate to the bottom of concrete slab.
- b. Place waterproofing membrane and drain pipe.
- c. Construct concrete slab.
- d. Construct concrete fascia
- e. Track operation is not affected during the tunnel construction.

**Step 5. Construct pedestrian bridges adjacent to mainline (track operation not affected).**



**ESTIMATED INTERRUPTION OF SERVICE**

Step	Duration
1	Max. 4 hr. per track
2a - 2c	Max. 4 hr. per abutment per track
3a - 3e	Max. 8 hr. per track



**PLAN**  
(N.T.S.)

C:\p\table1.tbl  
 T:\16950A\Normal\Phase 1\Study\CAD\Reference\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V8.1\_Pen.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\01-General\Note - Concrete Bridge.dgn  
 Defaulc  
 6/6/2018

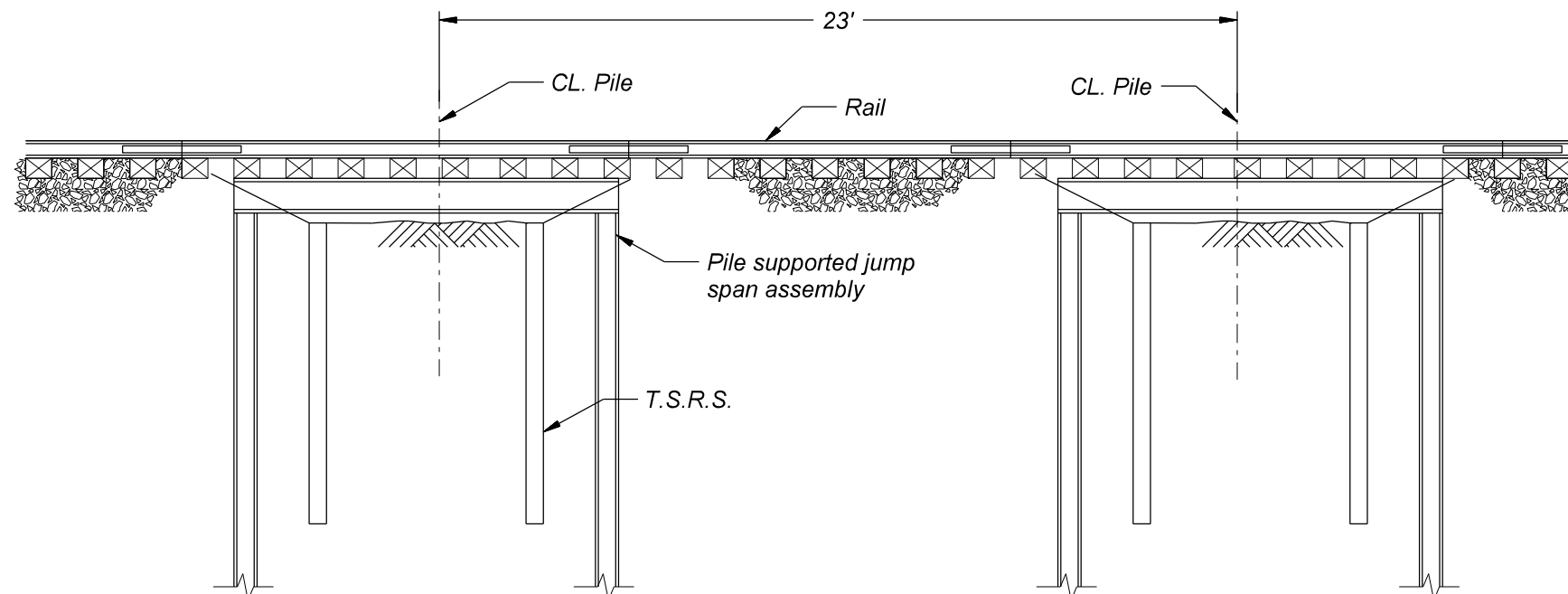
		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: P.JL	
		DATE: 05/24/2018	SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - GNERAL PLAN
		SHEET NUMBER: 001 of 005	



C:\or\_tables\T:\16950A\Normal\Phase 1\Study\CAD\_Reference\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\02a-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018

**Step 1. Track Preparation**

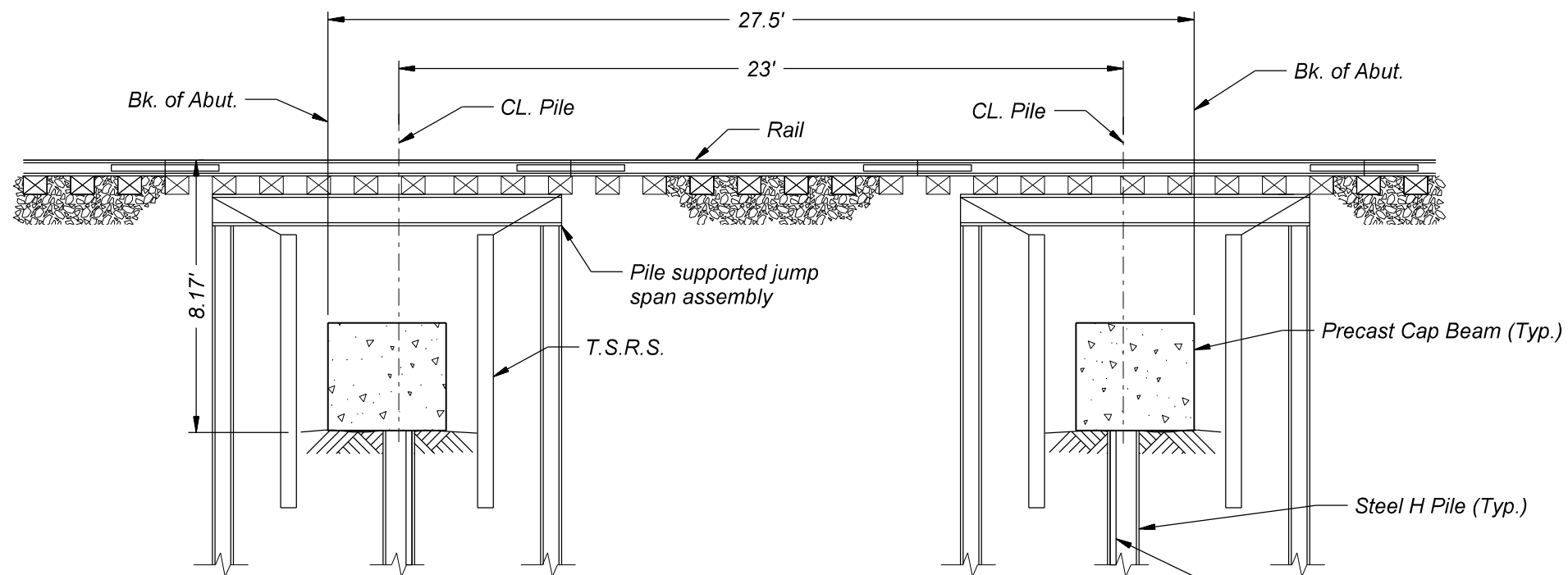
- a. Set up two removable panels and jump span as needed on each track. Center each panel over each proposed abutment.
- b. Install T.S.R.S..
- c. The setup of track panels and jump span shall occur in four-hour work window or as approved by UPRR.



**STEP 1**



**Step 2. Abutment Installation**

- Utilize the removable track panels as needed for the following steps.
- a. Excavate to bottom of cap beam.
  - b. Install H piles, and sheeting.
  - c. Install precast cap beam.
  - d. Repeat above steps for next track.
  - e. The installation of abutment shall occur in four-hour work windows or as approved by UPRR.



**STEP 2**

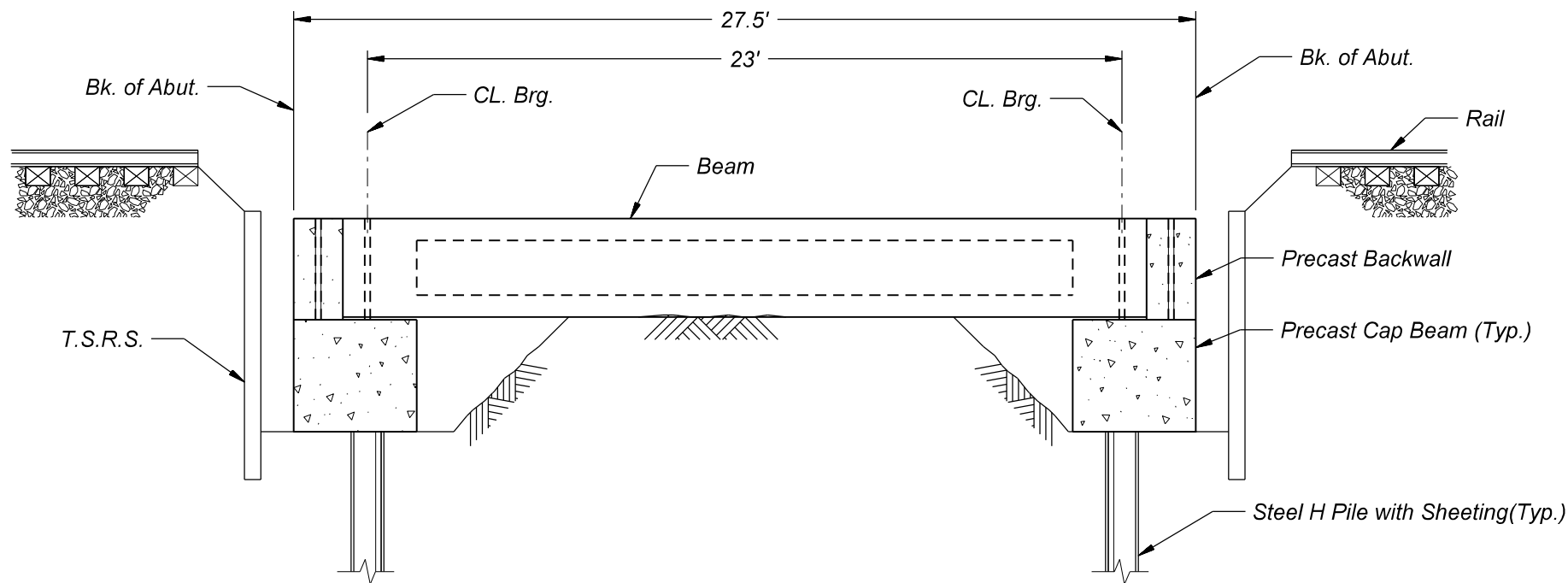
**Note:**  
Method of abutment pile cap attachment to be determined.

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 1
		CHECKED BY: PJL	
		DATE: 05/24/2018	
		SHEET NUMBER: 002 of 005	

C:\or- tables  
 T:\16950A\Normal\Phase 1 Study\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen table.tbl  
 T:\16950A\Normal\Phase 1 Study\Struct\CADD\02b-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018

**Step 3. Bridge Installation**

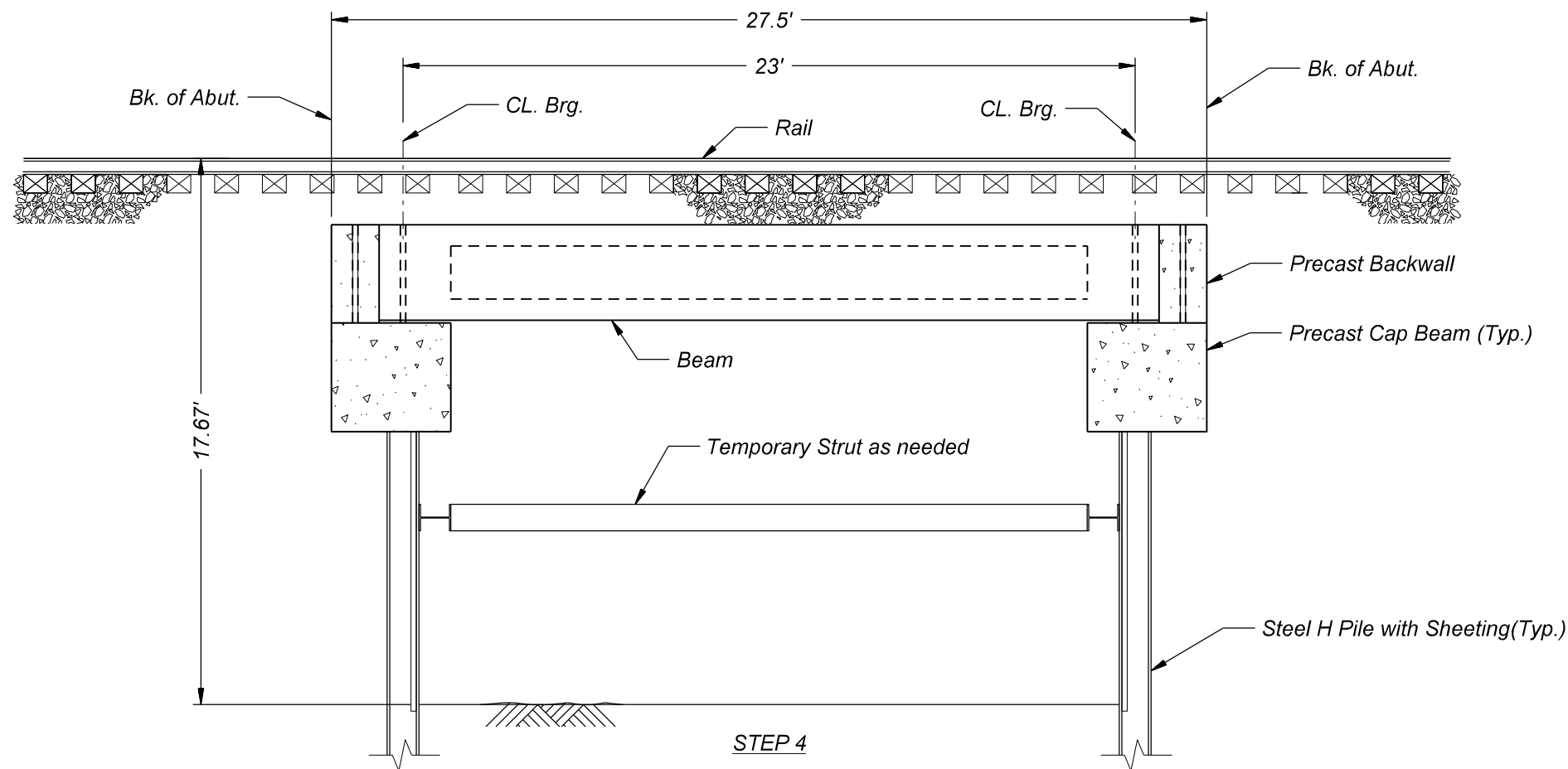
- a. Remove one track (one track out of service).
- b. Remove jump span assemblies and inside T.S.R.S.
- c. Excavate to bridge seat elevation.
- d. Install precast abutment backwall, PPC deck beam, and waterproofing membrane.
- e. Remove outside T.S.R.S and backfill behind abutment.
- f. Place ballast, and track panels (track operation resumes).
- g. Repeat above steps for next track.
- h. Installation of each span will be completed in an eight-hour work window or as approved by UPRR.



**STEP 3**

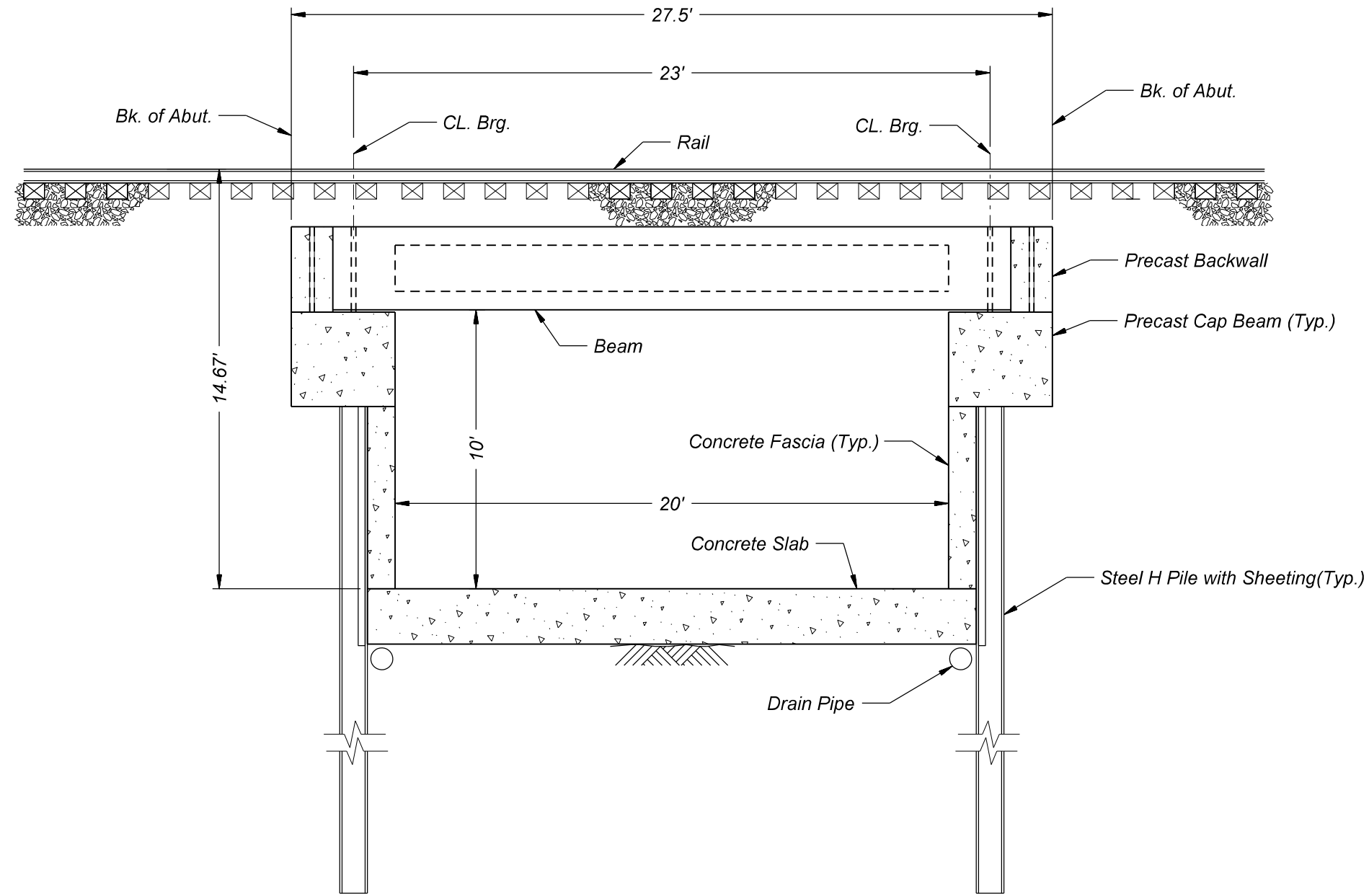
**Step 4. Tunnel Construction**

- a. Excavate to the bottom of concrete slab.
- b. Place waterproofing membrane and drain pipe.
- c. Construct concrete slab.
- d. Construct concrete fascia
- e. Track operation is not affected during the tunnel construction.





**STEP 4**

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 2
		CHECKED BY: PJL	
		DATE: 05/24/2018	
		SHEET NUMBER: 003 of 005	

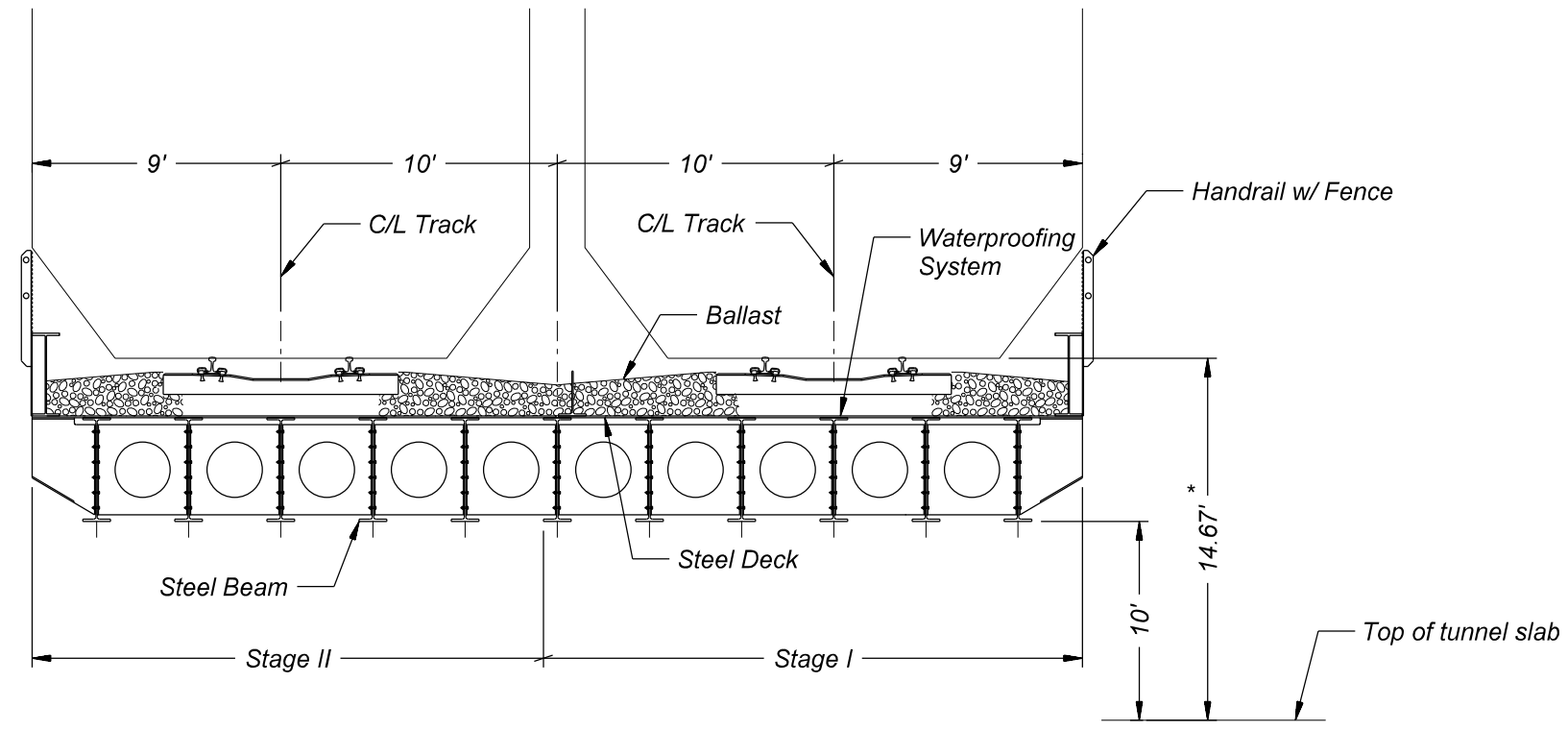


TYPICAL BRIDGE ELEVATION

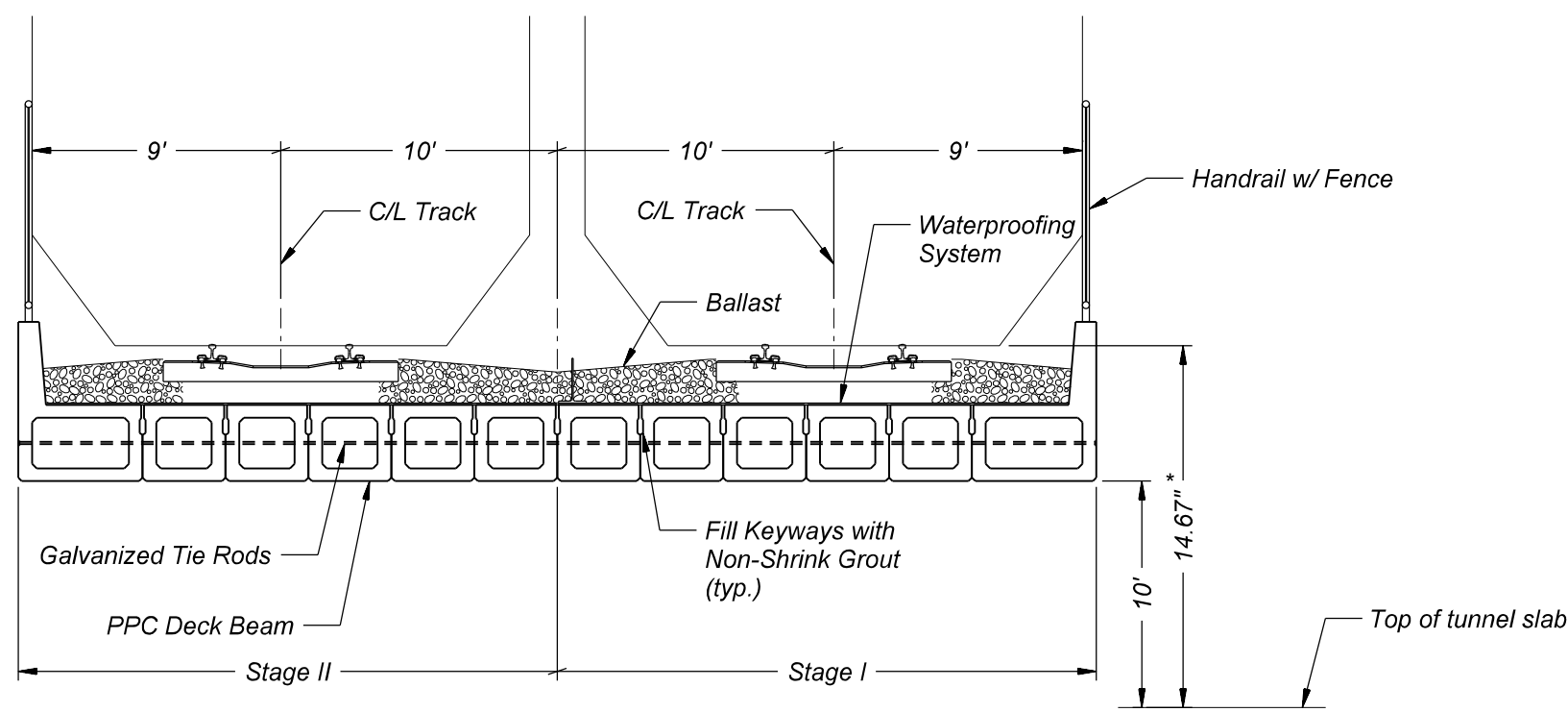
C:\p\tables  
 T:\16950A\Normal\Phase 1\Study\CAD\_Reference\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\02c-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018

		DRAWN BY:	JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 3
		CHECKED BY:	PJL	
		DATE:	05/24/2018	
		SHEET NUMBER	004 of 005	

C:\or\_t\bl\et  
 T:\16950A\Normal\Phase 1 Study\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pentable.tbl  
 T:\16950A\Normal\Phase 1 Study\Struct\CADD\03-Cross Section - Concrete Bridge.dgn  
 Default  
 6/6/2018





STEEL BEAM OPTION



CONCRETE BEAM OPTION

\* Approximate distance measured from top of rail to top of tunnel floor

Note:  
Pedestrian bridge superstructure to be determined.

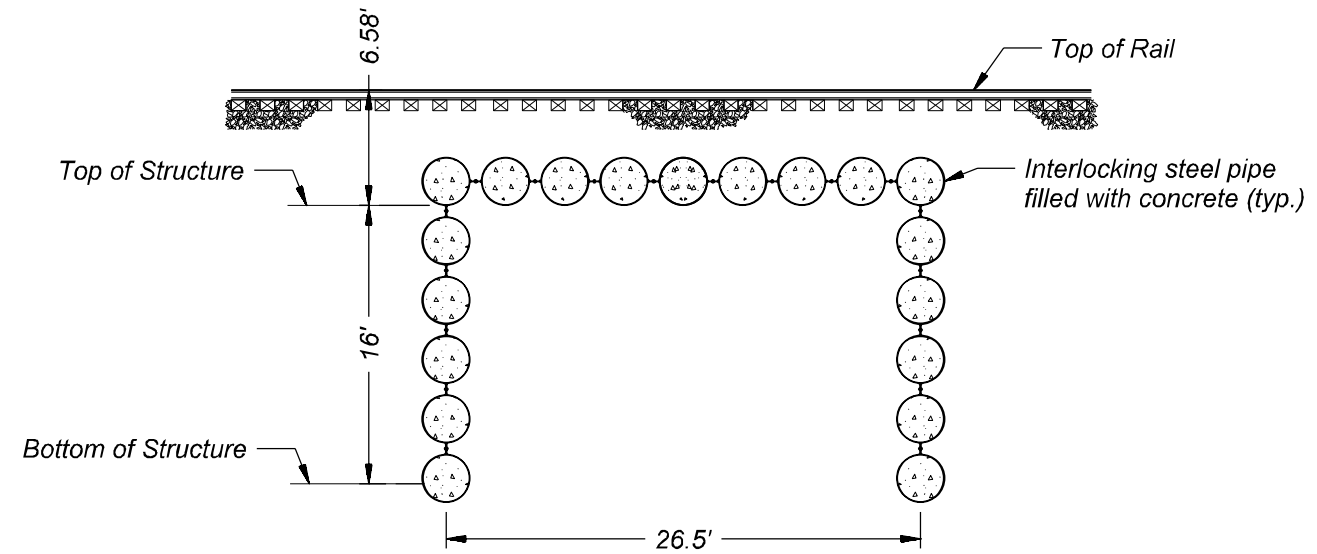
		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: PJL	
		DATE: 05/24/2018	
		SHEET NUMBER: 005 of 005	
SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - CROSS SECTION			

**TUNNEL CONSTRUCTION SEQUENCE**

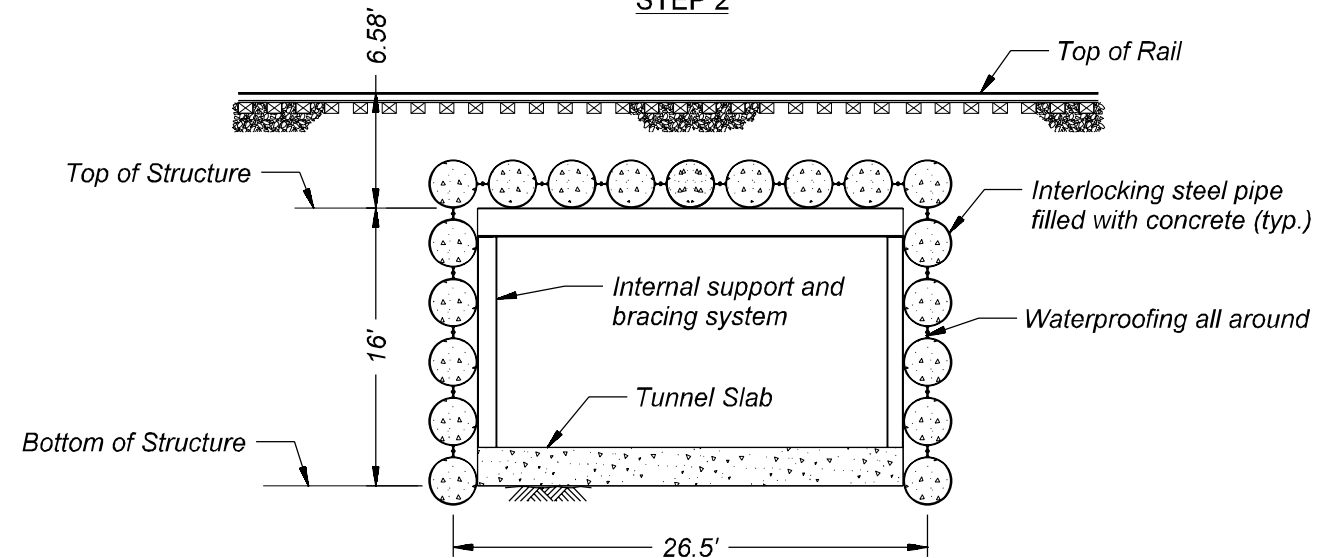
- Step 1: Construct jacking and retrieval pits at tunnel portals.
- Step 2: Install a "gate" type pipe arching around the proposed tunnel structure.
- Step 3: Excavate drifts in approximately 5 foot increments to permit the installation of the bottom tunnel slab, internal support and bracing sequentially along the length of the tunnel.
- Step 4: Install waterproofing, reinforcing steel, miscellaneous utilities and cast-in-place finish concrete.

**ESTIMATED INTERRUPTION OF SERVICE**

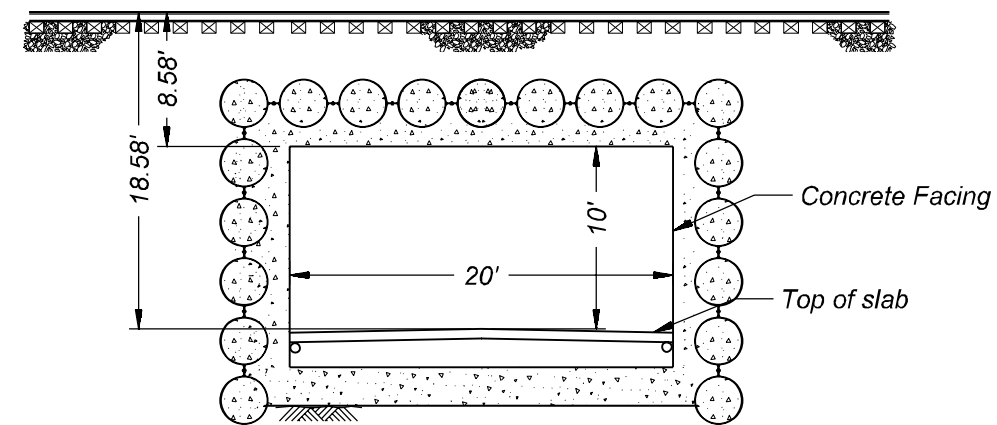
Work windows of 4 hours required for instrumentation and monitoring.  
 Potential for rail traffic to be stopped while work is being performed if ground deformations are observed.



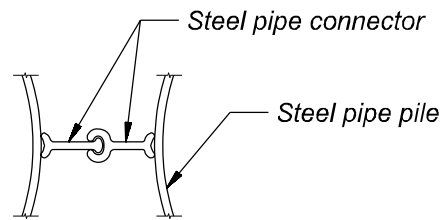
**STEP 2**



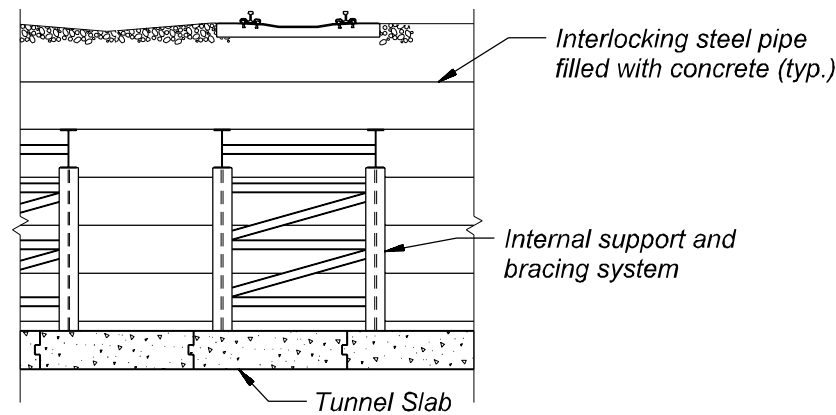
**STEP 3**



**STEP 4**



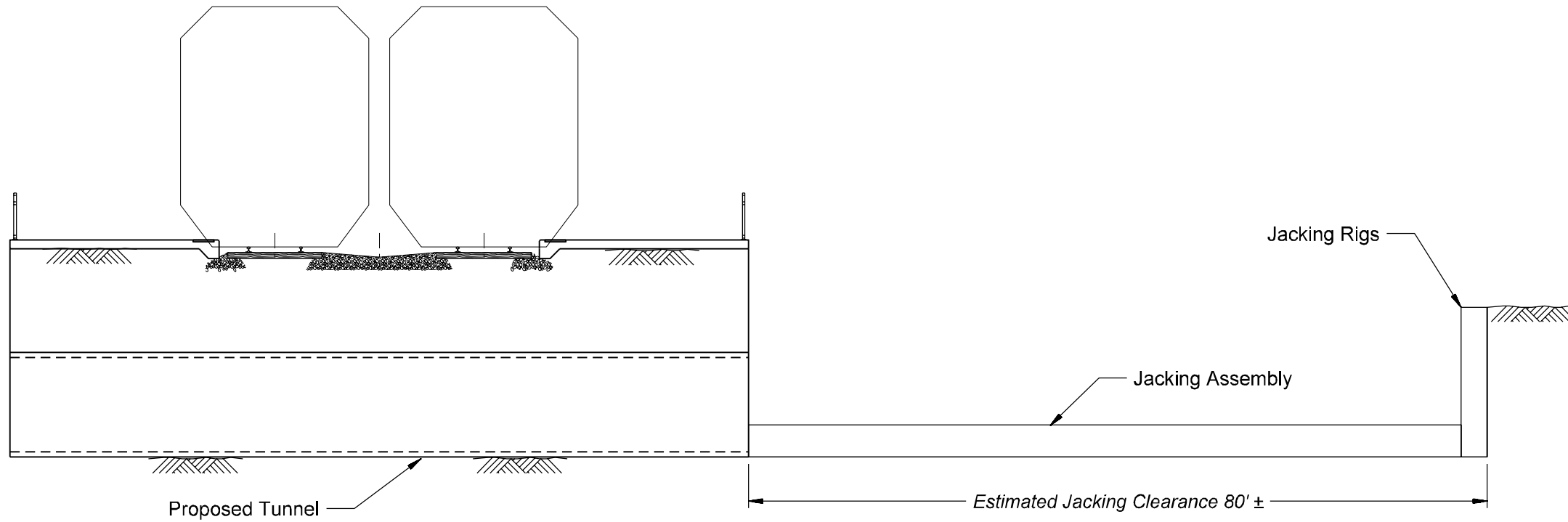
**INTERLOCKING DETAIL**



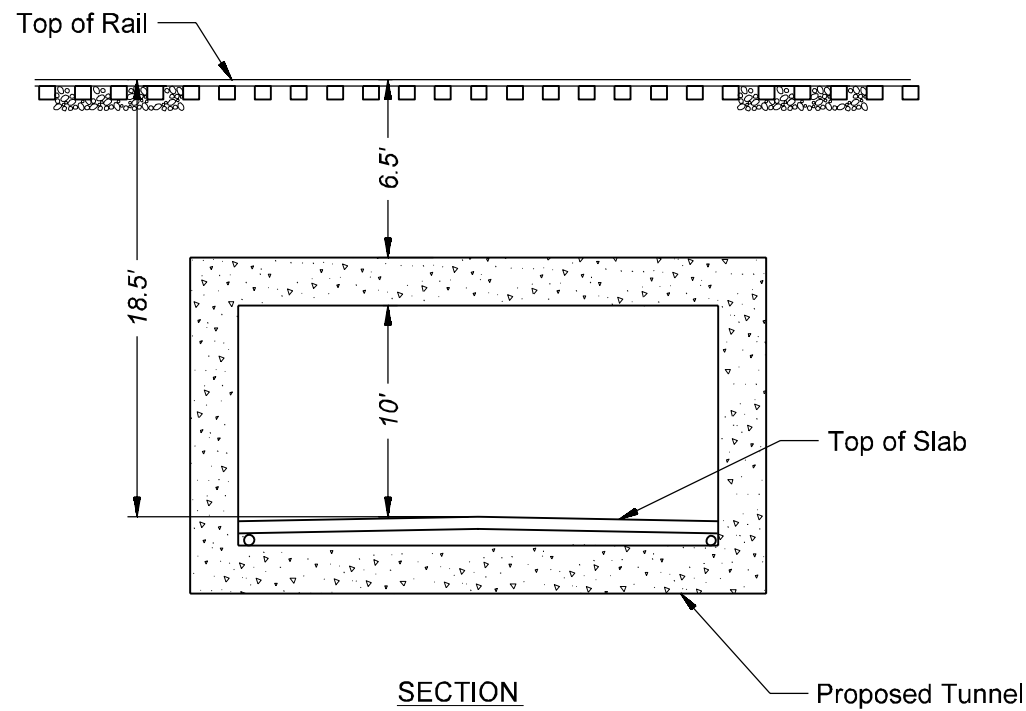
**TYPICAL LONGITUDINAL SECTION**

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: MJS	
		DATE: 05/24/2018	
		SHEET NUMBER: 001 of 001	
SHEET TITLE: OPTION 2 - PIPE ROOF CONSTRUCTION			

Color: table1  
 T:\16950A NormalPhase 1 Study\CAD\_References\UPRR Standards\tables\Pen\UPRR\_V8\_Pentable.tbl  
 T:\16950A NormalPhase 1 Study\Struct\CADD\009-Cross Section-Tunnel\_HS.dgn  
 Default  
 6/1/2018



ELEVATION



SECTION



**TUNNEL CONSTRUCTION SEQUENCE**

- STEP 1. Construct jacking and retrieval pits at tunnel portals.
- STEP 2. Cast concrete box on site within jacking pit.
- STEP 3. Perform ground improvement and/or structural support of tracks above the tunnel profile.
- STEP 4. Hydraulically jack cast-in-place concrete box under track.

**ESTIMATED INTERRUPTION OF SERVICE**

Several work windows of 4 to 8 hours required for instrumentation & monitoring and ground improvement / structural support of tracks above the box based on contractor means and methods.

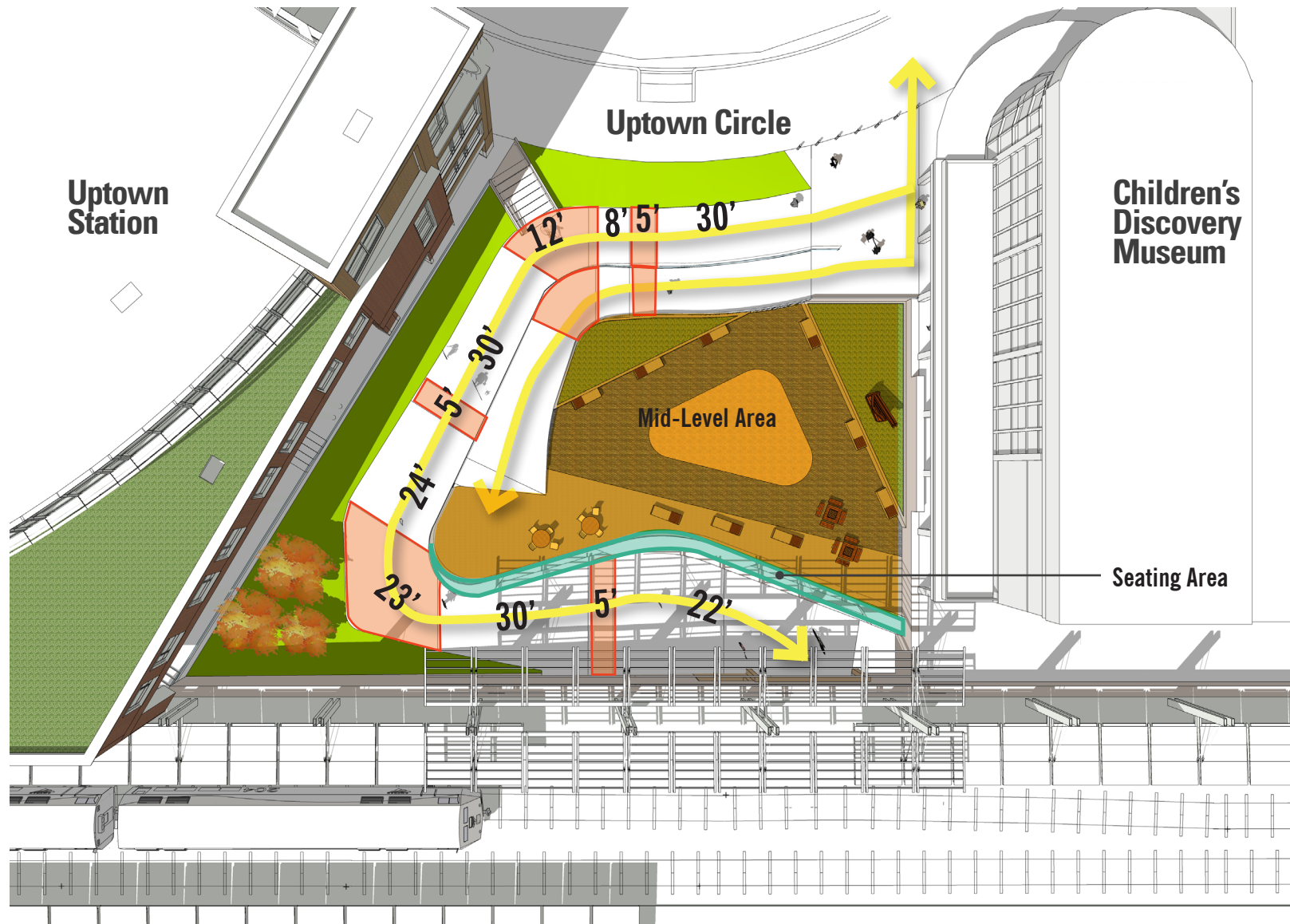
Potential for rail traffic to be stopped while work is being performed if ground deformations are observed.

		DRAWN BY:	JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY:	MJS	
		DATE:	05/24/2018	
		SHEET NUMBER	001 of 001	
			SHEET TITLE:	OPTION 3 - JACKED BOX CONSTRUCTION

Color table:  
 T:\16950A NormalPhase 1 Study\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V8\_Pentable.tbl  
 T:\16950A NormalPhase 1 Study\Struct\CADD\010-Cross Section-Jacked Tunnel.dgn  
 Default  
 5/31/2018

## Option Comparisons - North Plaza

# Option 1: Open-Cut Construction

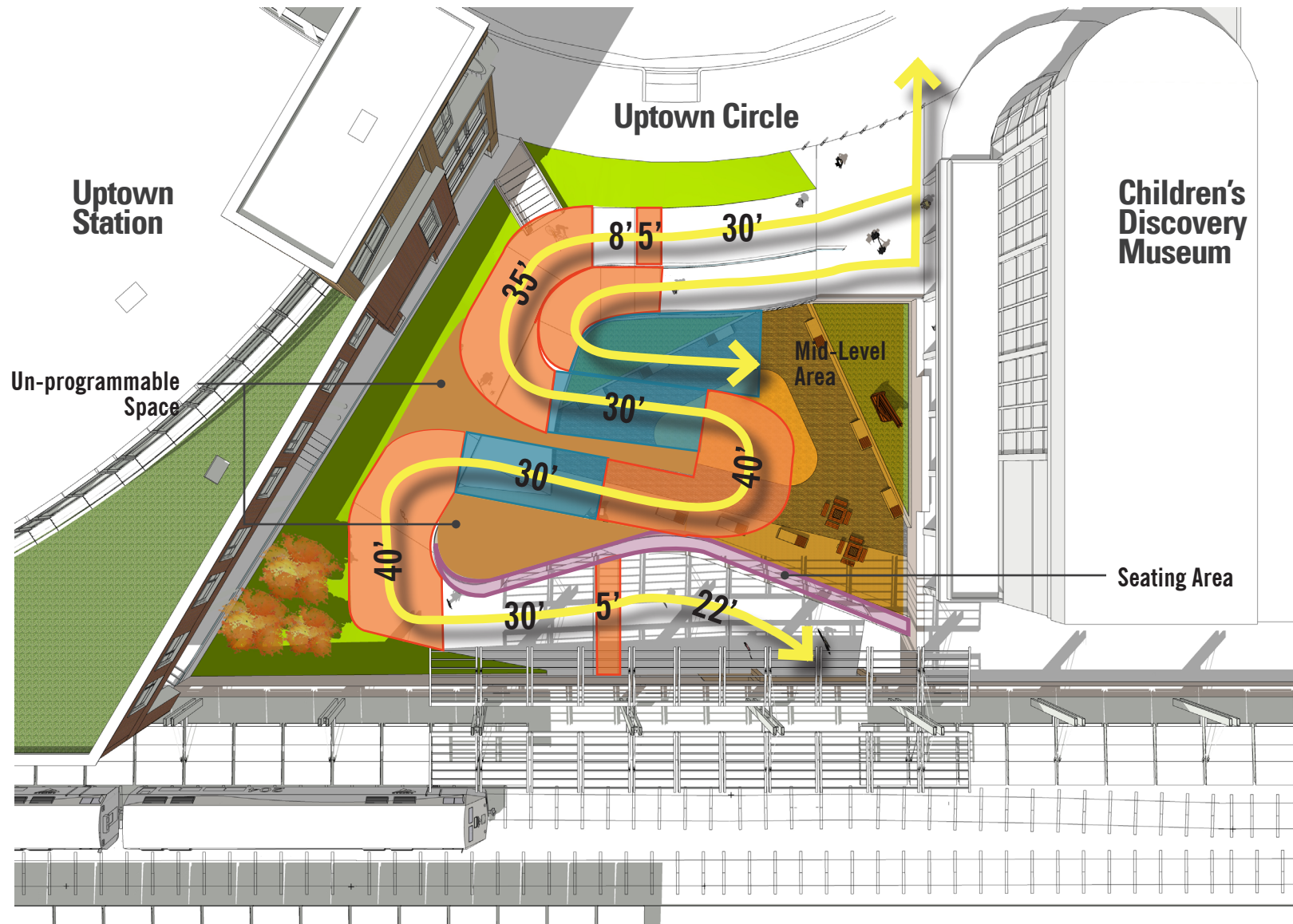


Aerial View - North Plaza

- Ramp Length (including landings): ~194'
- Mid-Level Area: ~4,157 SF
- Tunnel Height: 10'
- Elevation: -14.67' (top of rail to top of tunnel slab)

# Option Comparisons - North Plaza

## Option 2 & 3: Pipe Roof & Jacked Box



Aerial View - North Plaza

- Ramp Length (including landings): ~275'
- Mid-Level Area: ~1,553 SF  
(a reduction of ~2,604SF or ~63% compared to Option 1)
- Tunnel Height: 10'
- Elevation: -18.5' (top of rail to top of tunnel slab)



## Option Comparisons - South Plaza

# Option 1: Open-Cut Construction



- Ramp Length (including landings): ~284'
- Plaza: ~2,981SF
- Tunnel Height: 10'
- Elevation: -14.67' (top of rail to top of tunnel slab)

Aerial View - South Plaza

# Option Comparisons - South Plaza

## Option 2 & 3: Pipe Roof & Jacked Box



- Ramp Length (including landings): ~340'
- Plaza: ~1,268SF  
(a reduction of ~1,713SF or ~58% compared to Option 1)
- Tunnel Height: 10'
- Elevation: -18.5' (top of rail to top of tunnel slab)

Aerial View - South Plaza



## Underpass Design Variance White Paper

Proposed Grade Separated Pedestrian Crossing, Normal, IL

MP 124.10 Joliet Subdivision

(Near closed Crossing No. 290811W, 40.50869800/-88.98398600)

November 12, 2019

Prepared by WSP USA

Submitted to Union Pacific Railroad for Review

November 12, 2019

---

## Purpose of White Paper

For the proposed grade separated pedestrian crossing at MP 124.10 (Joliet Subdivision) in Normal, Illinois, the Town of Normal is requesting that Union Pacific Railroad (UPRR) review and approve the Town's request for an underpass design variance at this location.

## Project Background

**Project Funding:** The underpass project includes three phases. Phase I, which is entirely funded by the Town of Normal, is currently underway for preliminary engineering and National Environmental Policy Act (NEPA) documentation. Phase II, final design, and Phase III, construction, are also fully funded through a combination of local, state, and federal sources.

The underpass project was recently selected to receive \$13 million in funding for final design and construction phases through the U.S. Department of Transportation (USDOT) Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants Program for Fiscal Year (FY) 2019. Additionally, the Illinois Commerce Commission (ICC) has committed funding to the construction of an underpass through the ICC Grade Crossing Protection Funds Program.

**Design History:** Through the Illinois High-Speed Rail Program, the decision was made to voluntarily close the existing at-grade pedestrian crossing (DOT No. 290811W, MP 124.08) at the Amtrak Uptown Station in Normal, Illinois. The existing at-grade pedestrian crossing, which accommodated pedestrians and bicyclists using the north-south Constitution Trail as well as passengers accessing Uptown Station from the south, was closed on May 21, 2013.

Additionally, with the Illinois High-Speed Rail Program, existing station conditions were evaluated in accordance with Amtrak and Union Pacific Railroad requirements for two-track station locations. The Illinois Department of Transportation (IDOT) and the High-Speed Rail project team determined that a second platform on the mainline was needed for High-Speed Rail operations as well as a pathway for passengers to safely travel between the platforms. The Town of Normal proceeded with designs for an overpass with focus on accommodating the Amtrak passengers. On April 16, 2014, the Illinois Commerce Commission entered an Order (ICC Order No. T14-0014) authorizing replacement of the closed crossing with a pedestrian overpass to be completed by December 31, 2015.

Construction of the overpass was later postponed by the Town of Normal for several reasons, including the limited functionality for Amtrak passengers. Specifically, the overpass design, with two elevators and one stair tower, would not conveniently convey the estimated 150 passengers needing to cross the tracks at one time. Additionally, the overpass design was not suitable for trail users and cyclists because of the limited capacity and limited operating hours, which would have been restricted to Uptown Station hours of operation.

In September 2016, following filing of a Supplemental Petition by the Town of Normal and Status Hearing, the Illinois Commerce Commission entered a Supplemental Order extending the deadline for

November 12, 2019

---

completion of an alternative design and construction of the project. The completion date was extended to December 31, 2021.

With the crossing closure and postponement of a grade separated crossing at Uptown Station, users of the Constitution Trail are re-routed to the Linden Street at-grade crossing (DOT 290810P, MP 123.88). Amtrak passengers primarily use the Broadway Street at-grade crossing (DOT 290812D, MP 124.19).

The Town of Normal began Phase I planning and preliminary engineering work in Fall 2016. As part of the Phase I Study, an alternatives analysis was conducted to review underpass and overpass alternatives, which culminated with a public open house and comment period where over 70 percent of respondents supported the underpass alternative.

Union Pacific Railroad Review Status: The 10% conceptual design for an underpass, as identified as the preferred alternative through the alternatives analysis, was dated February 12, 2018 and was previously submitted to UPRR for review.

Based on UPRR's review comments, the Normal project team reviewed additional alternatives to achieve a design that will meet the needs of the Town of Normal while also minimizing impacts to railroad operations during construction of the proposed pedestrian underpass at the Uptown Station. These design alternatives were submitted to UPRR in a memorandum dated June 12, 2018, which included additional information on the project history, design guidelines, and design alternatives.

UPRR requested clarification on impacts to railroad operations during construction and expected maintenance requirements of the alternatives. Specific to railroad operations, UPRR requested a matrix of options for anticipated construction windows. The conceptual design alternatives report to address these questions was submitted to UPRR for review on October 11, 2018. On March 4, 2019, UPRR provided review comments stating no underpass structure is allowable at this location because of construction and future maintenance disruptions to UPRR's operations and in reference to UPRR *Design Guidelines for Railroad Grade Separation Projects*, Sections 4.1 and 4.2, for operations and construction requirements.

After further discussion with UPRR regarding grade separated alternatives, the Town of Normal is submitting this white paper to request that UPRR allow a variance to permit the Town to advance design for an underpass structure at the Uptown Station.

## Overpass vs. Underpass

Right-of-Way Constraints: The existing UPRR right-of-way is 72 feet in width at Uptown Station. Future expansion of UPRR facilities (such as the addition of a third track) is not seen as a potential limiting issue, due to the constraints of the existing Amtrak platforms within the right-of-way as well as nearby existing buildings such as Uptown Station, Children's Discovery Museum and the Amtrak Auxiliary Waiting Room.

Safety and Design Requirements for Shared-Use Path: Whether an underpass or overpass option is used, Americans with Disabilities Act (ADA) requirements must be met. In general, ADA PROWAG guidance for public rights-of-way requires the following components:

November 12, 2019

---

- A continuous clear width of 5 feet exclusive of curb width, unless passing spaces are provided.
- A maximum grade of 5%.
- A maximum cross-slope of 2%.
- Handrails are required on ramp runs with a rise greater than 6 inches; the height of the rail gripping surface shall be between 2.8 and 3.2 feet.

It is important to note that the underpass design would prevent unauthorized access of through pedestrian and bicycle traffic from the adjacent UPRR tracks, as a vertical retaining wall over 12 feet in height would be required on both sides of the tracks where the underpass approach path would run. Furthermore, protective railings would be required at the far edge of the Amtrak station platforms to protect the drop-off at the retaining walls. The only access to the tracks would be via the existing station platforms.

Height and Length of Ramps: Designing within the limited area available on either side of the tracks and to meet ADA compliance for the ramp slopes, switchbacks appear to be the only viable design for an ADA-compliant overpass/underpass within the north plaza (although they would be minimized with a shallow underpass design). Excess lengths and non-direct routes for either option may cause the path to be unfavorable for passengers and trail users, which heightens the risk of unauthorized crossing at-grade creating unsafe conditions on the tracks and railroad property.

According to UPRR's Design Guidelines for Railroad Grade Separation Projects, an overpass must have a vertical clearance of 23'-4" above top of rail and will require additional height for the overpass superstructure/deck, while a pedestrian underpass requires a minimum 1-foot ballast thickness below bottom of tie, plus additional superstructure/deck depth, and a minimum 8-foot (10-foot preferred) vertical clearance for pedestrians. Accordingly, a longer pedestrian approach path length is required for an overpass structure as compared to an underpass structure.

For an underpass, elevators, in combination with stairs, could be considered to provide ADA-compliant alternative access for a deeper underpass elevation, but would be subject to additional maintenance and operation concerns; also, elevators would be unlikely to be used by bicyclists who would likely detour to one of the existing at-grade crossings, as compared to a passive ADA-compliant ramp design.

Travel Distance & Times: In order to meet ADA requirements for pedestrian access, the conceptual path lengths for overpass and underpass designs were estimated at 1,040 feet for an overpass and 478 feet for an underpass (from North Plaza entrance north of UPRR to connection to Constitution Trail south of UPRR). At a walking speed of 4.5 feet/second, the underpass walk time would be 1 minute 46 seconds end-to-end and the overpass walk time would be 3 minutes 51 seconds. Less walking time is desirable from a user perspective and to promote use of the grade separation rather than diverting to one of the existing grade crossings.

Safety and Accessibility for the Disability Community: Convenience and accessibility of use is especially important to the disability community. Currently, Uptown Station personnel help with persons with

November 12, 2019

---

disabilities in crossing between platforms at-grade and boarding trains. Providing better access options will reduce the need for assistance, discourage use of existing grade crossings, and reduce the likelihood of disabled passengers missing their trains. The underpass option offers greater flexibility in meeting these goals due to its shorter access time as compared to an overpass.

**Service Life and Long-Term Maintenance:** The underpass project has an expected life of 100 years, compared to an average expected life of 50 years for the originally planned overpass. The 100-year lifespan for the underpass is based on AREMA standards for structures of this type. This lifespan will decrease the frequency and cost of maintenance for the facility. Long-term operations and maintenance of the underpass will be managed by the Town of Normal and will be incorporated into the Town's operating budget. Building the underpass versus the overpass is estimated to reduce annual operating and maintenance costs by about \$20,000 per year. Overall, lifecycle costs for the underpass are less than for the overpass. The greater costs for the overpass are in large part due to the conditioned space and are based on the Town's experience with other similar facilities.

## Studies and References

Studies on the topic of accessibility and preferred routes for pedestrians indicate longer routes and steeper slopes will have an adverse effect on whether the path will be traveled by the intended user. Adverse travel conditions could lead to a decrease in safety and an increase in likelihood of trespass on railroad property in an attempt by pedestrians to cross tracks. Key results from studies in this field have been provided below for UPRR's reference.

- *"An important measure of effectiveness for overpasses and underpasses is how much they are used by pedestrians. According to Moore and Older (1965), usage depends on walking distances and how convenient the overpass is for potential users (as cited in (1)). Moore and Older developed a measure of convenience (R), defined by the ratio of the time it took to cross the street on an overpass divided by the time it took to cross at street level. According to this study, about 95 percent of pedestrians opt for the overpass if R=1, meaning that it takes the same amount of time to cross using the overpass as it does at street level. If the overpass route takes 50 percent longer (R=1.5), almost no one uses it. For similar values of R, the use of underpasses by pedestrians was not as high as for overpasses (1)." Source: Mead et al.*
- *"The Americans with Disabilities Act (2) required gentler slopes to be used on approaches to crossing structures, which has enhanced accessibility for wheelchair users and bicyclists, but the resultant lengthening of ramps has also been found to discourage use of the facilities." Source: Mead et al.*
- *"Underpasses work best when designed to feel open and accessible." Source: PEDSAFE*
- *"Overpasses and underpasses must accommodate all persons, as required by the ADA... These measures include ramps or elevators. Extensive ramping accommodates wheelchairs and bicyclists, but results in long crossing distances and steep slopes that discourage use. Studies have shown that many pedestrians will not use an overpass or underpass if they can cross at street level in about the same amount of time." Source: PEDSAFE*

November 12, 2019

---

- *"Like all pedestrian crossings, any facility that is inconvenient or requires an indirect path will simply not be used. The effectiveness of a grade-separated crossing depends on its perceived ease of use by the users. Pedestrians will weigh the perceived safety benefit of using the bridge versus the extra effort and time it will require when making a decision about where to cross."*  
Source: Safe Routes to School (SRTS) Guide

Mead, J., C. Zegeer, and M. Bushell. April 2014. Evaluation of Pedestrian-Related Roadway Measures: A Summary of Available Research, Section 2.8: Pedestrian Overpasses/Underpasses.  
[http://www.pedbikeinfo.org/cms/downloads/PedestrianLitReview\\_April2014.pdf#page=37&zoom=100,69,513](http://www.pedbikeinfo.org/cms/downloads/PedestrianLitReview_April2014.pdf#page=37&zoom=100,69,513)

1. Campbell, B. J., C. V. Zegeer, H. H. Huang, and M. J. Cynecki. A Review of Pedestrian Safety Research in the United States and Abroad. Publication FHWA-RD-03-042, FHWA, U.S. Department of Transportation, 2004.
2. Americans with Disabilities Act (ADA) of 1990. Vol. S. 933, Washington, D.C., U.S. Department of Justice, 1990.

PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System.  
[http://www.pedbikesafe.org/PEDSAFE/countermeasures\\_detail.cfm?CM\\_NUM=10](http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=10)

Safe Routes to School (SRTS) Guide.  
[http://guide.saferoutesinfo.org/engineering/pedestrian\\_and\\_bicycle\\_bridges\\_and\\_tunnels.cfm](http://guide.saferoutesinfo.org/engineering/pedestrian_and_bicycle_bridges_and_tunnels.cfm)

## Benefits to Community and Railroad

**Safety:** The proposed underpass project will provide significant safety benefits for Amtrak passengers using Uptown Station as well as trail users. The Project provides a convenient grade-separated railroad crossing that allows for direct platform connectivity and reconnects the Constitution Trail to safely access public spaces on either side of Uptown. The Project also reduces travel time for Amtrak passengers between platforms, provides greater capacity when compared to the previously proposed overpass, and reduces delay by eliminating the safety precaution where Amtrak trains stop short of the station to allow straggling passengers to cross the tracks to the correct boarding platform.

Most bicycle and pedestrian traffic is expected to divert from the two at-grade road crossings to the underpass, resulting in improved safety for passengers, cyclists, and pedestrians. As many as 789,567 bicyclists and pedestrians may divert from the Linden and Broadway crossings annually once the underpass is constructed, which will significantly reduce the likelihood of crashes. At the Linden Street crossing, where 95 percent of pedestrians and cyclists will be diverted, the 0.19 yearly crash rate will decrease to 0.01. The Broadway crossing is expected to see 50 percent of pedestrians and bicyclists divert to the underpass, resulting in the annual crash rate decreasing from 0.083 to 0.041. These crash rate reductions equate to an estimated 6.35 avoided incidents in the first 30 years of operation.

**Travel Times for Freight and Passenger Rail:** As the midway point between Chicago and St. Louis, Uptown Station boasts the fourth-highest ridership on Amtrak's Midwest network with 241,844



November 12, 2019

---

passengers in FY 2017. The underpass project will provide a critical link for rail passengers to the south platform, which was opened in a limited capacity in 2018. To reduce the frequency of passengers crossing at-grade, the south platform is only used in exceptional circumstances at this time. This temporary solution places a burden on UPRR dispatch and ultimately service reliability for freight and passenger service in the corridor. A grade separated underpass will allow for directional running for passenger trains, which will improve throughput and predictability for both passenger and freight movements. Having two platforms with direct connectivity will improve service reliability, allow predictable, directional running, and reduce passenger delays on this busy track segment. The underpass will provide a safe, ADA-compliant path and reduce the time passengers require to move between platforms, better serving rail passengers.

The current interim condition creates a bottleneck in Normal. The need to route passenger trains to the north platform reduces the utility of the double track section, so any delay to Amtrak causes a cascading negative effect on Union Pacific's ability to move freight. Having unrestricted use of both platforms will allow both passenger and freight operations to recover more quickly from delays. Additionally, constructing the underpass is a prerequisite for directional running of Amtrak trains, a change that will lead to simpler boarding for Amtrak passengers, ultimately reducing station dwell times.

**Accessibility:** As stated above, the underpass provides the most attractive route for access between the Uptown Station platforms and for bicycle and pedestrian traffic continuing along the Constitution Trail, including better accessibility for disabled persons. The underpass will discourage use of the existing grade crossings by providing a more convenient grade-separated alternative, and its design will discourage unauthorized access to the UPRR tracks by through trail users and others.

In a joint letter of support addressed to USDOT Secretary Elaine Chao, dated October 18, 2019, AMVETS, the American Legion, and the Veterans of Foreign Wars expressed support for the underpass project to *"allow safe and efficient access for all veterans, including those with disabilities, to navigate the transportation system safely through the Normal-Bloomington community."*

Marcfirst, an organization that supports over 800 children and adults with developmental disabilities in McLean County has also expressed support for the underpass project. In a letter addressed to USDOT Secretary Elaine Chao, dated October 17, 2019, Marcfirst's CEO Brian Wipperman stated:

*"Many of the families and individuals we support rely heavily on community provided transportation to work, live, learn and recreate in our community. The underpass will allow safe access for people with disabilities to navigate community transportation safely."*

## Impacts to Railroad

Site constraints limit shoofly options: With Uptown Station buildings, passenger platforms, drainage facilities, sidewalks and parking areas constraining the tracks on one or both sides, it would be disruptive and cost-prohibitive to install a shoo-fly to allow diversion of rail traffic while an underpass or overpass would be constructed. Therefore, all construction options are limited to construction on existing rail alignment.

November 12, 2019

Disruption to rail operations during construction: There will be some work that requires work windows for either an overpass or underpass option. Setting an overhead structure in place would require a simultaneous track outage for both tracks. For the various underpass methodologies, work options would require track outages for track removal, foundation and structure work, and re-installation and inspection of removed track. The underpass work could be done one track at a time (allowing train passage on the opposite track), and be timed to take advantage of natural windows of train operations to minimize traffic disruptions.

Estimated work windows: A comparison of the estimated work windows for overpass and open-cut underpass methods are shown in Tables 1 and 2 below.

Table 1: Work Window Requirements - Overpass

Work Operation	Estimated # of Work Windows	Maximum Window Length (hr.)	Cumulative Window Time (hr.)	Notes
Overhead span installation	1	6	6	Simultaneous closure of both tracks required.
TOTAL	1	--	6	

Table 2: Work Window Requirements – Open-Cut Underpass (8-hr. Maximum Window)

Work Operation	Estimated # of Work Windows	Maximum Window Length (hr.)	Cumulative Window Time (hr.)	Notes
Track Preparation and Abutment Installation	6 (3 per track)	4	24	Uses H piles, precast abutments, and individually placed stringers and bridge deck.
Bridge Installation	2 (1 per track)	8	16	Less than 4 hr. windows not feasible due to part of the time needed to remove track before construction, having enough time to make meaningful work progress, and to replace and inspect track prior to clearing it track for operations after stage construction.
TOTAL	8	--	40	

## Examples of Successful Underpass Projects

Similar underpass crossings for pedestrian use have been completed with the U.S., including underpass projects on UPRR right-of-way. The Town of Normal intends to build upon successes and lessons

November 12, 2019

---

learned from these projects to successfully construct an underpass at the Uptown Station. Examples include:

- West B Street Pedestrian Underpass, Dixon, CA
  - Relevance to the underpass project in Normal includes ADA compliant approaches, planned track outages, and UPRR double track location  
(<https://static.tti.tamu.edu/conferences/rail15/presentations/s3-woods.pdf>)
- Route 71 Pedestrian Tunnel at Monmouth University, West Long Branch, NJ
  - Pedestrian path under roadway to replace existing roadway crosswalk with known traffic delays and safety concerns
  - Relevance to the underpass project in Normal includes high student population and use, site constraints, drainage issues, and safety and security requirements  
([http://www.pedbikesafe.org/PEDSAFE/casestudies\\_detail.cfm?CM\\_NUM=10&CS\\_NUM=83](http://www.pedbikesafe.org/PEDSAFE/casestudies_detail.cfm?CM_NUM=10&CS_NUM=83))
- Various Commuter Rail Pedestrian Underpasses, Metra Lines on UPRR Territory, IL
  - Woodstock Station at IL 47 on Union Pacific Northwest (UP-NW) Metra Line
  - Glen Ellyn Station at Taylor Avenue on Union Pacific West (UP-W) Metra Line
  - Lombard Station on Union Pacific West (UP-W) Metra Line

## Next Steps

The Town of Normal is requesting that UPRR review and approve this design variance white paper to allow for an underpass design to proceed at the proposed grade separated crossing location at Uptown Station. Subsequently, with approval of the design variance, the Town will request that UPRR review conceptual underpass design alternatives and participate in discussions with the Town to determine preferred method of construction for an underpass so that preliminary engineering design can proceed.

With the successful BUILD FY 2019 funding selection for the underpass project, the Town of Normal intends to complete preliminary engineering in spring of 2020, which will allow the underpass project to move into final design and construction utilizing the USDOT BUILD grant award and ICC Grade Crossing Protection Funds.



Conceptual Design – Method of Construction Alternatives Report

Grade Separated Pedestrian Crossing, Normal, IL  
MP 124.10 Joliet Subdivision

(Near closed Crossing No. 290811W, 40.50869800/-88.98398600)

June 16, 2020

Prepared by WSP USA

Submitted to Union Pacific Railroad for Review

## TABLE OF CONTENTS

Purpose of Report .....	2
Project Background .....	2
Pedestrian Safety .....	3
Benefits to Community and Railroad .....	4
Design Guidelines.....	5
Design Alternatives.....	7
Option 1 – Open Cut Bridge Construction .....	7
Option 2 – Pipe Roof Construction .....	9
Option 3 – Jacked Box Construction .....	10
Option 4 – Box Culvert Construction .....	11
Summary Matrix.....	13
Recommendations and Next Steps .....	14

## ATTACHMENTS

Conceptual Plans for Options 1-4

Ramp Length Exhibits for Options 1-4

June 16, 2020

## PURPOSE OF REPORT

For the grade separated pedestrian crossing project at MP 124.10 (Joliet Subdivision) in Normal, Illinois, the Town of Normal is requesting that Union Pacific Railroad (UPRR) review this report which presents alternatives for four types of underpass construction. Following review, the Town of Normal requests that Union Pacific Railroad (UPRR) provide comments as well as attend a meeting to discuss alternatives and comments. At this time, Normal understands that the meeting format may be remote rather than in person and will work with UPRR to schedule and facilitate such a meeting.

## PROJECT BACKGROUND

**Project Funding:** The underpass project includes three phases. Phase I, which is funded by the Town of Normal, is currently underway for preliminary engineering and National Environmental Policy Act (NEPA) documentation. Phase II, final design, and Phase III, construction, are funded through a combination of local, state, and federal sources.

The underpass project was recently selected to receive \$13 million in funding for final design and construction phases through the U.S. Department of Transportation (USDOT) Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants Program for Fiscal Year (FY) 2019. Additionally, the Illinois Commerce Commission (ICC) has committed funding to the construction of an underpass through the ICC Grade Crossing Protection Funds Program.

**Design History:** Through the Illinois High-Speed Rail Program, the decision was made to voluntarily close the existing at-grade pedestrian crossing (DOT No. 290811W, MP 124.08) at the Amtrak Uptown Station in Normal, Illinois. The existing at-grade pedestrian crossing, which accommodated pedestrians and bicyclists using the north-south Constitution Trail as well as passengers accessing Uptown Station from the south, was closed on May 21, 2013.

Additionally, with the Illinois High-Speed Rail Program, existing station conditions were evaluated in accordance with Amtrak and UPRR requirements for two-track station locations. The Illinois Department of Transportation (IDOT) and the High-Speed Rail project team determined that a second platform on the mainline was needed for High-Speed Rail operations as well as a pathway for passengers to safely travel between the platforms. The Town of Normal proceeded with designs for an overpass with focus on accommodating the Amtrak passengers. On April 16, 2014, the ICC entered an Order (ICC Order No. T14-0014) authorizing replacement of the closed crossing with a pedestrian overpass to be completed by December 31, 2015.

Construction of the overpass was later postponed by the Town of Normal for several reasons, including the limited functionality for Amtrak passengers. Specifically, the overpass design, with two elevators and one stair tower, would not conveniently convey the estimated 150 passengers needing to cross the tracks at one time. Additionally, the overpass design was not suitable for trail users and cyclists (who formerly used the at-grade pedestrian crossing connecting the Constitution Trail) because of the limited capacity and limited operating hours, which would have been restricted to Uptown Station hours of operation.

In September 2016, following filing of a Supplemental Petition by the Town of Normal and Status Hearing, the ICC entered a Supplemental Order extending the deadline for completion of an alternative design and construction of the project. The completion date was extended to December 31, 2021.

With the crossing closure and postponement of a grade separated crossing at Uptown Station, users of the Constitution Trail have been re-routed to the Linden Street at-grade crossing (DOT 290810P, MP 123.88). Amtrak passengers primarily use the Broadway Street at-grade crossing (DOT 290812D, MP 124.19).

June 16, 2020

The Town of Normal began Phase I planning and preliminary engineering work in Fall 2016. As part of the Phase I Study, an alternatives analysis was conducted to review underpass and overpass alternatives, which culminated with a public open house and comment period where over 70 percent of respondents supported an underpass alternative.

Union Pacific Railroad Review Status: The 10% conceptual design for an underpass, as identified as the preferred alternative through the alternatives analysis, was submitted to UPRR for review on February 12, 2018.

Based on UPRR's review comments, the Normal project team reviewed additional alternatives to achieve a design that will meet the needs of the Town of Normal while also minimizing impacts to railroad operations during construction of the proposed pedestrian underpass at the Uptown Station. These design alternatives were submitted to UPRR in a memorandum dated June 12, 2018, which included additional information on the project history, design guidelines, and design alternatives.

UPRR requested clarification on impacts to railroad operations during construction and expected maintenance requirements of the alternatives. Specific to railroad operations, UPRR requested a matrix of options for anticipated construction windows. The conceptual design alternatives report to address these questions was submitted to UPRR for review on October 11, 2018. On March 4, 2019, UPRR provided review comments stating no underpass structure is allowable at this location because of construction and future maintenance disruptions to UPRR's operations and in reference to UPRR Design Guidelines for Railroad Grade Separation Projects, Sections 4.1 and 4.2, for operations and construction requirements.

On November 12, 2019, the Town of Normal submitted a white paper requesting that UPRR allow a variance to permit the Town to advance design for an underpass structure at the Uptown Station. UPRR responded to the Town of Normal on March 9, 2020 and March 10, 2020 stating that UPRR takes no exception to the design variance request and that a total of eight work windows, at five hours or less each, would be permitted for construction of an underpass.

## PEDESTRIAN SAFETY

Studies on the topic of accessibility and preferred routes for pedestrians indicate longer routes and steeper slopes will have an adverse effect on whether the path will be traveled by the intended user. Adverse travel conditions could lead to a decrease in safety and an increase in likelihood of trespass on railroad property in an attempt by pedestrians to cross tracks. Key results from studies in this field have been provided below for UPRR's reference.

- "The Americans with Disabilities Act (2) required gentler slopes to be used on approaches to crossing structures, which has enhanced accessibility for wheelchair users and bicyclists, but the resultant lengthening of ramps has also been found to discourage use of the facilities." Source: Mead et al.
- "Underpasses work best when designed to feel open and accessible." Source: PEDSAFE
- "Overpasses and underpasses must accommodate all persons, as required by the ADA... These measures include ramps or elevators. Extensive ramping accommodates wheelchairs and bicyclists, but results in long crossing distances and steep slopes that discourage use. Studies have shown that many pedestrians will not use an overpass or underpass if they can cross at street level in about the same amount of time." Source: PEDSAFE
- "Like all pedestrian crossings, any facility that is inconvenient or requires an indirect path will simply not be used. The effectiveness of a grade-separated crossing depends on its perceived ease of use by the users. Pedestrians will weigh the perceived safety benefit of using the bridge versus the extra effort and time it will require when making a decision about where to cross." Source: Safe Routes to School (SRTS) Guide

June 16, 2020

Mead, J., C. Zegeer, and M. Bushell. April 2014. Evaluation of Pedestrian-Related Roadway Measures: A Summary of Available Research, Section 2.8: Pedestrian Overpasses/Underpasses.

[http://www.pedbikeinfo.org/cms/downloads/PedestrianLitReview\\_April2014.pdf#page=37&zoom=100,69,513](http://www.pedbikeinfo.org/cms/downloads/PedestrianLitReview_April2014.pdf#page=37&zoom=100,69,513)

2. Americans with Disabilities Act (ADA) of 1990. Vol. S. 933, Washington, D.C., U.S. Department of Justice, 1990.

PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System.

[http://www.pedbikesafe.org/PEDSAFE/countermeasures\\_detail.cfm?CM\\_NUM=10](http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=10)

Safe Routes to School (SRTS) Guide.

[http://guide.saferoutesinfo.org/engineering/pedestrian\\_and\\_bicycle\\_bridges\\_and\\_tunnels.cfm](http://guide.saferoutesinfo.org/engineering/pedestrian_and_bicycle_bridges_and_tunnels.cfm)

## BENEFITS TO COMMUNITY AND RAILROAD

**Safety:** The underpass project will provide significant safety benefits for Amtrak passengers using Uptown Station as well as trail users. The project will provide a convenient grade-separated railroad crossing that allows for direct platform connectivity and reconnects the Constitution Trail to safely access public spaces on either side of Uptown. The project will also reduce travel time for Amtrak passengers between platforms, provide greater capacity when compared to the previously proposed overpass, and reduce delay by eliminating the safety precaution where Amtrak trains stop short of the station to allow straggling passengers to cross the tracks to the correct boarding platform.

Most bicycle and pedestrian traffic is expected to divert from the two at-grade road crossings to the underpass, resulting in improved safety for passengers, cyclists, and pedestrians. As many as 789,567 bicyclists and pedestrians may divert from the Linden and Broadway crossings annually once the underpass is constructed, which will significantly reduce the likelihood of crashes. At the Linden Street crossing, where 95 percent of pedestrians and cyclists will be diverted to the underpass, the 0.19 yearly crash rate will decrease to 0.01. The Broadway crossing is expected to see 50 percent of pedestrians and bicyclists diverted to the underpass, resulting in the annual crash rate decreasing from 0.083 to 0.041. These crash rate reductions equate to an estimated 6.35 avoided incidents in the first 30 years of operation.

**Travel Times for Freight and Passenger Rail:** As the midway point between Chicago and St. Louis, Uptown Station boasts the fourth-highest ridership on Amtrak's Midwest network with 241,844 passengers in FY 2017. The underpass project will provide a critical link for rail passengers to the south platform, which was opened in a limited capacity in 2018. To reduce the frequency of passengers crossing at-grade, the south platform is only used in exceptional circumstances at this time. This temporary solution places a burden on UPRR dispatch and ultimately service reliability for freight and passenger service in the corridor. A grade separated underpass will allow for directional running for passenger trains, which will improve throughput and predictability for both passenger and freight movements. Having two platforms with direct connectivity will improve service reliability; allow predictable, directional running; and reduce passenger delays on this busy track segment. The underpass will provide a safe, ADA-compliant path and reduce the time passengers require to move between platforms, better serving rail passengers.

The current interim condition creates a bottleneck in Normal. The need to route passenger trains to the north platform reduces the utility of the double track section, so any delay to Amtrak causes a cascading negative effect on UPRR's ability to move freight. Having unrestricted use of both platforms will allow both passenger and freight operations to recover more quickly from delays. Additionally, constructing the underpass is a prerequisite for directional running of Amtrak trains, a change that will lead to simpler boarding for Amtrak passengers, ultimately reducing station dwell times.



June 16, 2020

**Accessibility:** The underpass project will provide the most attractive route for access between the Uptown Station platforms and for bicycle and pedestrian traffic continuing along the Constitution Trail, including better accessibility for disabled persons. The underpass will discourage use of the existing grade crossings by providing a more convenient grade-separated alternative and its design will discourage unauthorized access to the UPRR tracks by trail users and passengers.

In a joint letter of support addressed to USDOT Secretary Elaine Chao, dated October 18, 2019, AMVETS, the American Legion, and the Veterans of Foreign Wars expressed support for the underpass project to “allow safe and efficient access for all veterans, including those with disabilities, to navigate the transportation system safely through the Normal-Bloomington community.”

Marcfirst, an organization that supports over 800 children and adults with developmental disabilities in McLean County has also expressed support for the underpass project. In a letter addressed to USDOT Secretary Elaine Chao, dated October 17, 2019, Marcfirst’s CEO Brian Wipperman stated:

“Many of the families and individuals we support rely heavily on community provided transportation to work, live, learn and recreate in our community. The underpass will allow safe access for people with disabilities to navigate community transportation safely.”

## DESIGN GUIDELINES

**Project Goals:** The underpass project will accommodate two-way traffic for train passengers, pedestrians, and cyclists between the Uptown North and Uptown South areas, including the Constitution Trail. The goals of the project are to:

- Improve safety by providing a crossing that separates pedestrian and cyclist traffic from vehicle and rail traffic.
- Provide convenient, safe, and accessible passage for users.
- Provide a facility that is convenient and intuitive to use.
- Minimize delays and adverse travel for pedestrians and cyclists.
- Improve mobility and connectivity for pedestrians and cyclists in the Uptown neighborhood and Bloomington-Normal communities.
- Provide a direct link between developments on the north and south side of Uptown, including the Children’s Museum, Uptown Station, City Hall, and the proposed Normal Public Library.
- Maximize access to public transportation.
- Promote transportation opportunities for disadvantaged groups.

**Guidelines:** Conceptual designs for the underpass have been advanced utilizing guidelines from Union Pacific Railroad, the Town of Normal, American Association of State Highway and Transportation Officials (AASHTO), and Crime Prevention Through Environmental Design (CPTED).

The project incorporates UPRR’s Guidelines for Railroad Grade Separation Projects, dated May 2016, particularly sections:

- 4 – General Requirements for Grade Separation Projects
- 6 – Underpass Structures
- 7 – Trails

Additional guidelines being incorporated into the project design include:

June 16, 2020

From Town of Normal Bicycle Master Plan for Shared Use Path (Sidepath),

- Width
  - Minimum 10 feet width for a two-way sidepath and is only recommended for segments with low traffic.
  - Recommended width is 12 feet for most situations.
  - 12 to 14 feet or wider is recommended for heavy-use situations where there is a strong presence of multiple users, such as joggers and bicyclists.
- Lateral Clearance
  - 2 feet or wider shoulders on both sides.
- Overhead Clearance
  - Minimum 8 feet, but recommended 10 feet, for clearance of overhead obstructions.

From AASHTO Guide for Development of Bicycle Paths,

- Shared use paths should not be developed adjacent to roadways, unless it is generally separated from the roadway.
- As the shared use paths ends, cyclists who are traveling against traffic tend to continue to travel in the wrong direction, including those who are making their way to the shared use path. Wrong-way bicycle travel is a major cause of crashes.
- Shared use paths should have white-colored bicycle lane marking and be placed after an intersection and other appropriate locations.
- At intersections, shared use paths' crossings should be located where bicyclists would not be in blind spots.
- Whenever possible, separate bicycle and pedestrian paths to minimize bicycle/pedestrian conflicts.
- Provide directional signage to direct users to and from the shared use path.

From CPTED,

- Natural Surveillance – A person is less likely to commit a crime if he/she perceives someone would see him/her do it.
- Natural Access Control – Using and designing pathways, fences, lighting, signage, and landscaping to clearly direct traffic to and from the appropriate entrances. Having a proper flow of people can decrease opportunities for crime.
- Territorial Reinforcement – Physical designs, such as signage, pavement treatment, and landscaping enable users to develop a sense of ownership of the space. Clearly distinguishing public and private areas would discourage potential trespassers.
- Maintenance / “Broken Window Theory” – Neglected or poorly maintained properties are considered breeding grounds for criminal activities.
- Activity Support – Design the space so it enhances or creates a new form of activities in the space. Diverse land uses around the space brings activity throughout the day.
- Image – Appearance that an area is not conducive to crime.
- Motivation Reinforcement – Utilizing physical design to improve the community’s social cohesion and sense of territory.

Underpass Sizing: Based on the above sizing criteria, it is proposed that the design of the underpass accommodate an opening that is 20 feet wide and 10 feet high.

Access Ramps: As a public facility, the ramp grades to and from the underpass must be ADA compliant. The underpass depth combined with the ADA grade requirements will influence the lengths of the access ramps. A greater underpass depth, for example, will require greater ramp lengths. Accommodating greater ramp lengths to meet ADA compliance may become an issue because of constraints on site with existing structures and facilities.

June 16, 2020

Greater ramp lengths will also adversely impact connectivity and mobility for pedestrians and cyclists, one of the project goals referenced above. Current conceptual designs include minimal turns to navigate the change in elevation on the north side.

**Subsurface Conditions:** Subsurface conditions on-site consist of soft to medium stiff clay, which is favorable for tunneling and other excavation methods. Although it varies, groundwater was observed at approximately 10 feet below the ground surface. The presence of groundwater must be considered for any of the proposed design alternatives; however, the presence of the soft to medium stiff clay will limit the amount of water which will enter the excavations during construction. Long term water control will also need to be considered.

**Additional Considerations:** Additional design, construction, and long-term considerations include constructability, construction risks, construction costs, maintenance requirements, and impact to freight and passenger operations during construction, which will be further discussed in the subsequent sections.

## DESIGN ALTERNATIVES

Four alternatives are presented with this report for review. The first three options have been submitted previously and new or modified information is included with this report. A new, fourth alternative is also presented. The alternatives are:

- Option 1 – Open Cut Bridge Construction
- Option 2 – Pipe Roof Construction
- Option 3 – Jacked Box Construction
- Option 4 – Box Culvert Construction

Conceptual plans are provided for these options. See attached.

A summary matrix of the options is provided in the subsequent section.

As noted previously, UPRR has stated that a total of eight work windows, at five hours or less each, would be permitted for construction of an underpass. The Normal project team used these parameters as a baseline for reviewing impacts to railroad operations for each alternative. Based on further questions from the Normal design team regarding parameters for the work windows, UPRR noted:

- UPRR cannot confirm whether the windows would be during the day or night at this time. It should be assumed the windows could be day or night at UPRR discretion at the time of construction. This will be determined a couple of months prior to construction as UPRR's train schedule is changing daily.
- Due to the track spacing UPRR understands that both tracks would be out of service during each 5-hour window.
- Each track will need to be back in service and operational prior to the 5-hour window expiration.
- No more than a quantity of one 5-hour window may be taken in a 24-hour period.
- No additional windows will be available in a 24-hour period if a 5-hour window is utilized.
- Additional 2-hour windows may be available after the 24-hour period the 5-hour window is utilized. This will be subject to current operations.

### Option 1 – Open Cut Bridge Construction

Option 1 proposes use of an open cut method of construction to install a bridge structure. The construction would be approached in four steps: track preparation, abutment installation, bridge installation, and tunnel construction. The Normal project team proposes utilizing a driven pile foundation, earth retention system, precast concrete

June 16, 2020

abutments, and prefabricated bridge modules with ballast preinstalled to minimize the work windows. The bridge beams may be either steel or concrete. Benefits of each material can be further reviewed as the designs advance.

There is an opportunity to explore staging the construction so that one track remains in service to minimize impacts to rail operations. This may be achieved through use of sheet piling between the tracks for track support and to minimize track disturbance during the construction stages.

**Underpass Sizing:** With this method of construction, the underpass dimensions would be 20 feet wide x 10 feet high, which meets Normal's recommended design guidelines.

These underpass dimensions are conceptual estimates. Finished dimensions will be defined as designs advance and will account for features such as architectural finishing, lighting, and drainage.

**Access Ramps:** With the lowest depth of the alternatives (underpass slab elevation at -14.67), Option 1 provides the most favorable ramp lengths. Estimated ramp lengths are approximately 194 feet for the North Plaza and 284 feet for the South Plaza.

These ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

**Constructability, Construction Risks, and Construction Costs:** Option 1 is a more common construction practice and multiple contractors within the region are anticipated to be available during bidding thus providing competitive bids.

Of concern, Options 1 may increase the risk of settlement and disturbance occurring during construction. If not properly mitigated, or if unanticipated ground conditions are encountered, settlement and ground disturbance could occur at the ground surface and impact the tracks. This risk can be reduced by installing piles and transferring the loads to deep, stiff materials below the work area.

Construction costs are conceptual at this time. Option 1 is estimated to be moderate in comparison to the other options.

**Maintenance:** Option 1 will follow UPRR standards for design and construction practices. The Normal project team does not anticipate unusual maintenance costs and anticipates an overall service life of 70 to 100 years. Additionally, with Option 1, the design can proactively address drainage to avoid future issues with water infiltration to the structure. These efforts would reduce future maintenance requirements. As noted for all options, the Town of Normal is amenable to executing a reasonable maintenance agreement with UPRR.

**Impacts to Railroad Operations during Construction:** For construction of Option 1 with both tracks out of service, it is estimated that required work windows would include between 24 to 40 at 8 hours each. Geotechnical activities, such as pile driving, are expected to require 8-hour windows to provide efficiency during construction.

The required work windows for both tracks out of service would exceed the allowable limits provided by UPRR. To address this, an alternative would be to stage the construction between the two tracks and keep one track in service. There is an opportunity to stage construction by driving sheet piling between tracks to allow for one track to remain in service during construction. This would minimize impacts to railroad operations and allow for the underpass construction to occur in stages beneath each track.

Sheet pile installation between tracks may be completed between train movements, with UPRR flaggers and under UPRR direction, or during two to three 5-hour windows while both tracks are out of service.

June 16, 2020

## Option 2 – Pipe Roof Construction

Option 2 proposes use of an interlocking steel pipe system to construct a temporary roof for initial support of a tunnel structure beneath the UPRR right of way. Pits would be excavated on both sides of the UPRR right-of-way to facilitate installation of large diameter pipes to act as the temporary roof to support tunnel excavation. The pipes would be installed horizontally by either jacking, pulling, or directional drilling them beneath the tracks. Once pipe installation is completed, excavation beneath the temporary roof would then proceed in drifts with the pipe-arch system would acting as initial support of the soil above. After excavation of a single drift, additional internal support and a base slab would be installed within the drift to provide support of the pipe-arch system. A final lining for the underpass would be constructed after excavation between the pits is completed.

**Underpass Sizing:** With this method of construction, the underpass dimensions would be 20 feet wide x 10 feet high, which meets Normal's recommended design guidelines.

These underpass dimensions are conceptual estimates. Finished dimensions will be defined as designs advance and will account for features such as architectural finishing, lighting, and drainage.

**Access ramps:** The underpass slab elevation for Option 2 is at -18.58, which is approximately 4 feet deeper than Option 1. This greater depth will significantly impact the length of the access ramps to the underpass. Designing within the limited area available on either side of the tracks and to meet ADA compliance for the ramp slopes, switchbacks may be required for the access ramps and appear to be the only viable design for an ADA-compliant ramp within the north plaza. Excess lengths and non-direct routes may cause the path to be unfavorable for passengers and trail users, which heightens the risk of unauthorized crossing at-grade creating unsafe conditions on the tracks and railroad property.

Elevators, in combination with stairs, could be considered to provide ADA-compliant alternative access for a deeper underpass elevation, but would be subject to additional maintenance and malfunction concerns; also, elevators would be unlikely to be used by bicyclists who would likely detour to one of the existing at-grade crossings, as compared to a passive ADA-compliant ramp design.

For Option 2, estimated ramp lengths are approximately 280 feet for the North Plaza and 360 feet for the South Plaza. Of the alternatives, these are the longest ramps and may be prohibitive to users.

Again, as previously noted regarding pedestrian safety and behavior:

- "Overpasses and underpasses must accommodate all persons, as required by the ADA... These measures include ramps or elevators. Extensive ramping accommodates wheelchairs and bicyclists, but results in long crossing distances and steep slopes that discourage use. Studies have shown that many pedestrians will not use an overpass or underpass if they can cross at street level in about the same amount of time." Source: PEDSAFE
- "Like all pedestrian crossings, any facility that is inconvenient or requires an indirect path will simply not be used. The effectiveness of a grade-separated crossing depends on its perceived ease of use by the users. Pedestrians will weigh the perceived safety benefit of using the bridge versus the extra effort and time it will require when making a decision about where to cross." Source: Safe Routes to School (SRTS) Guide

These ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

**Constructability, construction risks, and construction costs:** This option does present potential construction risks. Of concern is need for a specialty contractor to complete construction, which could impact the bid process,

June 16, 2020

construction cost, and construction schedule. The availability for multiple specialty contractors during the bid process for work at the project location may be limited and could impact bidding results.

Also of concern, Option 2 may increase the risk of settlement and disturbance occurring during construction. If not properly mitigated, or if unanticipated ground conditions are encountered, settlement and ground disturbance could occur at the ground surface and impact the tracks.

Construction costs are conceptual at this time. Compared to the other alternatives, Option 2 costs are estimated to be moderate.

Maintenance requirements: Leaking may be a concern. If joints experience leaking, the structure must be repaired from above, which will necessitate track removal and impacts to railroad operations. As noted for all options, the Town of Normal is amenable to executing a reasonable maintenance agreement with UPRR.

Impacts to railroad operations during construction: For Option 2, most of the work for this option would be isolated to the pits on both sides of UPRR right-of-way and within the tunnel itself; however, it is anticipated that four, 4-hour work windows will be required, affecting one track per window, to allow for minor site work and monitoring which may encroach upon the right-of-way.

These estimated work windows would meet the allowable limits provided by UPRR.

### Option 3 – Jacked Box Construction

Option 3 is a jacked box construction method. With this alternative, cast-in-place concrete box segments are thrust through the ground beneath the tracks via hydraulic jacks. The jacked box method would require jacking and retrieval pits to be constructed on both sides of the UPRR right-of-way to cast the box and to facilitate the jacking process. Ground improvement or structural support of the tracks above the box would be required to minimize settlement and disturbance at the track level.

Underpass Sizing: With this method of construction, two sizes are considered. The underpass dimensions would be either 20 feet wide x 10 feet high, which meets Normal's recommended design guidelines, or 20 feet wide x 9 feet high, which presents a height less than the recommended guidelines but within UPRR's 8-foot minimum vertical clearance for trail underpasses.<sup>1</sup>

As noted previously from Town of Normal Bicycle Master Plan for Shared Use Path (Sidepath), for overhead clearance:

- Minimum 8 feet, but recommended 10 feet, for clearance of overhead obstructions.

The 9 feet height option is included as an alternative to review feasibility of achieving acceptable ramp lengths.

These underpass dimensions are conceptual estimates. Finished dimensions will be defined as designs advance and will account for features such as architectural finishing, lighting, and drainage. For example, soffit material may be 5 inches, which would be in addition to thickness required for material such as insulation or waterproofing.

Access ramps: The slab elevation is estimated to be -15.43 for the 9 feet tall underpass and -16.43 for the 10 feet tall underpass. These slab elevations are based on the guidance of a single, proprietary contractor. Elevations may vary based on other contractors' requirements. For the purpose of this study, these assumed elevations were used to calculate the estimated ramp lengths.

---

<sup>1</sup> Section 7.3.2.1, "Guidelines for Railroad Grade Separation Projects, May 2016"

June 16, 2020

For the 9 feet underpass height, the estimated ramp lengths are approximately 198 feet for the North Plaza and 296 feet for the South Plaza.

For the 10 feet underpass height, the estimated ramp lengths are approximately 222 feet for the North Plaza and 340 feet for the South Plaza.

These ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

As noted previously, longer ramp lengths may result in reduced use by pedestrians, cyclists, and train passengers.

**Constructability, Construction Risks, and Construction Costs:** This option does present potential construction risks. Of concern is need for a specialty contractor to complete construction, which could impact the bid process, construction cost, and construction schedule. The availability for multiple specialty contractors during the bid process may be limited and could impact bidding results.

Construction costs are conceptual at this time. Option 3 is estimated as the highest cost.

If precast concrete segments are used instead of cast-in-place concrete, material availability could impact the construction costs and schedule. If local precast concrete plants are unavailable or unable to supply the required sizes, shipping fees to use plants outside the region may be cost prohibitive.

**Maintenance requirements:** Leaking may be a concern, especially if jointed precast concrete sections are used. If joints experience leaking, the structure must be repaired from above, which will necessitate track removal and impacts to railroad operations. As noted for all options, the Town of Normal is amenable to executing a reasonable maintenance agreement with UPRR.

**Impacts to railroad operations during construction:** For Option 3, the ground improvement or structural support of the tracks would be performed at track level and would require several work windows ahead of the box jacking activities. These work windows are likely to affect both tracks.

Option 3 is highly dependent on the contractor's means and methods and shutdown periods may vary based on the contractor's approach. Based on conversations with a single, proprietary contractor, it is assumed there will be seven 4-hour work windows, affecting both tracks. Other contractors' work window requirements may vary.

These estimated work windows would meet the allowable limits provided by UPRR.

## Option 4 – Box Culvert Construction

Option 4 would be a box culvert construction similar to the West B Street-UPRR Pedestrian Underpass in Dixon, California. It is understood that the Dixon project used staged construction with sheet piling centered between the two mainline tracks to allow building the underpass half at a time, leaving one track in service during each stage of construction. As an active rail corridor, this allowed for movement of an estimated 2 to 3 trains per hour, which includes both freight and passenger rail. The Dixon box structure used precast concrete segments under the tracks and cast-in-place concrete sections on the ends.

**Underpass Sizing:** The proposed underpass dimensions would be 20 feet wide x 10 feet high to meet Normal's recommended design guidelines.

These underpass dimensions are conceptual estimates. Finished dimensions will be defined as designs advance and will account for features such as architectural finishing, lighting, and drainage.

June 16, 2020

Access Ramps: Designs would need to be further advanced to determine the ramp lengths for this option, however, the goal would be to achieve ramp lengths similar to Option 1.

For reference, the estimated ramp lengths for Option 1 are approximately 194 feet for the North Plaza and 284 feet for the South Plaza.

These ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

Constructability, Construction risks, and Construction Costs: Option 4 is a more common construction practice and multiple contractors within the region are anticipated to be available during bidding thus providing competitive bids.

Of concern, Options 4 may increase the risk of settlement and disturbance occurring during construction. If not properly mitigated, or if unanticipated ground conditions are encountered, settlement and ground disturbance could occur at the ground surface and impact the tracks.

Construction costs are conceptual at this time. Option 4 is estimated to be moderate in comparison to the other options.

If precast concrete segments are used instead of cast-in-place concrete, material availability could impact the construction costs and schedule. If local precast concrete plants are unavailable or unable to supply the required sizes, shipping fees to use plants outside the region may be cost prohibitive.

Maintenance Requirements: If the box joints experience leaking, the structure must be repaired from above, which will necessitate track removal and impacts to railroad operations. As noted for all options, the Town of Normal is amenable to executing a reasonable maintenance agreement with UPRR.

With the West B Street underpass in Dixon, waterproofing measures were used to address risk of leaks with the box culvert structure. Similar measures could be applicable for the Normal project.

Impacts to Railroad Operations during Construction: Construction would be staged so that one track remains in service to minimize impacts to rail operations. This can be achieved through use of sheet piling between the tracks for track support and to minimize track disturbance during the construction stages.

Sheet pile installation between tracks may be completed between train movements, with UPRR flaggers and under UPRR direction, or during two to three 5-hour windows while both tracks are out of service.

For the box culvert installation, it is estimated that each track would be out of service for a 48 to 60-hour window, such as a weekend closure, and assuming precast concrete units are used in a manner similar to the Dixon project to expedite construction.



## SUMMARY MATRIX

	Underpass floor slab elevation (for top of rail El. 0)	Underpass dimensions	Access ramp length (approximate)	Constructability and cost	Work windows on UPRR ROW (affecting both tracks)	Work windows on UPRR ROW (affecting one track while second track remains in service)	Benefits, risks, and notes
Option 1 – Open Cut Bridge Construction	-14.67	10 ft height x 20 ft width	194 ft (North Plaza) 284 ft (South Plaza)	Conventional construction method Moderate construction cost	24 to 40 windows at 8 hours each - Geotech activities, such as pile driving, expected to require 8-hour windows to provide efficiency during construction - Work windows exceed UPRR guidelines if both tracks out of service	Sheet pile installation: between train movements, under UPRR direction, or during 2 to 3 5-hour windows Bridge installation: 8 to 10-day closure, for each track	- Shortest ramp lengths of options - Ramp lengths most desirable for users - If staged construction permitted, impacts to UPRR operations could be limited to one track
Option 2 – Pipe Roof Construction	-18.58	10 ft height x 20 ft width	280 ft (North Plaza) 360 ft (South Plaza)	Specialty constructor required Moderate construction cost expected	N/A – work would be limited to one track per window rather than impacting both tracks	4 windows at 4 hours each	- Longest ramp lengths of options - Ramp lengths may be prohibitive for users - Work windows within UPRR guidelines - Requires specialty contractor, which could impact construction cost
Option 3a – Jacked Box Construction (9 ft height)	-15.43	9 ft height x 20 ft width	198 ft (North Plaza) 296 ft (South Plaza)	Specialty constructor required High construction cost expected	Support structure installation: 5 windows at 4 hours each Jacked box installation: 7 days with no impact to rail traffic Dismantling support structure: 2 windows at 4 hours each (Total: 7 windows at 4 hours each)	N/A – both tracks will be impacted with this option	- Underpass height reduced from 10 ft to 9 ft - Ramp lengths may be acceptable for users - Work windows within UPRR guidelines - Requires specialty contractor, which could impact construction cost
Option 3b – Jacked Box Construction (10 ft height)	-16.43	10 ft height x 20 ft width	222 ft (North Plaza) 340 ft (South Plaza)	Specialty constructor required High construction cost expected	Support structure installation: 5 windows at 4 hours each Jacked box installation: 7 days with no impact to rail traffic Dismantling support structure: 2 windows at 4 hours each (Total: 7 windows at 4 hours each)	N/A – both tracks will be impacted with this option	- Ramp lengths may be prohibitive for users - Work windows within UPRR guidelines - Requires specialty contractor, which could impact construction cost
Option 4 – Box Culvert Construction	-14.67	10 ft height x 20 ft width	194 ft (North Plaza) 284 ft (South Plaza)	Conventional construction method Moderate construction cost	N/A – construction would be staged to avoid impact to both tracks	Sheet pile installation: between train movements, under UPRR direction, or during 2 to 3 5-hour windows Box culvert installation: 48 to 60-hour window, such as a weekend closure, for each track	- Ramp lengths identical to Option 1; most desirable for users - If staged construction permitted, impacts to UPRR operations could be limited to one track - Dixon project successes and lessons learned may be utilized to support the Normal underpass project

Notes:

- 1) Details provided are approximations based on conceptual plans. Information will be updated and refined as designs progress.
- 2) Slab elevations for the jacked box options are based on guidance of a single, proprietary contractor. Elevations may vary based on other contractors' requirements.
- 3) Work windows for the jacked box options are based on guidance of a single, proprietary contractor. Work windows may vary based on other contractors' requirements.

June 16, 2020

## RECOMMENDATIONS AND NEXT STEPS

For Options 1 (open cut bridge) and 4 (box culvert), these methods would allow for optimal ramp lengths, are anticipated to solicit a competitive bid process because of the conventional construction methods, and could limit impacts to railroad operations if staged construction is permitted to allow building the underpass half at a time. Of the two alternatives, staged construction of Option 4 would require less construction time within railroad right-of-way.

Option 3a, a jacked box with a 9-foot underpass height, is also a favorable alternative. This method would result in desirable ramp lengths and could meet UPRR work window guidelines. Of concern, however, is this option reduces the underpass ceiling height and, because of need for a specialty contractor, could bring an added risk of higher construction costs.

Option 2, the pipe roof, would result in lengthy access ramps, which could impact accessibility and functionality for users. Undesirable ramp lengths are likely to result in safety and trespass risks. This option is the least favorable and the Town of Normal recommends eliminating it as an alternative.

Similarly, Option 3b (jacked box with 10-foot underpass height) would result in prohibitive ramp lengths. Additionally, construction costs may be high because of the need for a specialty contractor. This option, therefore, is not favorable and the Town of Normal recommends eliminating it as an alternative.

After evaluation of the remaining alternatives, the Town of Normal is recommending two alternatives as favorable solutions:

First Preference: Option 4 Box Culvert Construction– If staged construction is permitted, the Town of Normal recommends the box culvert construction method.

Second Preference: Option 3a Jacked Box Construction- If staged construction is not permitted, the Town of Normal recommends the jacked box construction method, with a 9-foot underpass height to achieve desirable ramp lengths.

The project team requests that all appropriate departments at UPRR review the alternatives and provide comments end of July 2020. The Town of Normal will then schedule a meeting with UPRR to discuss comments and reach concurrence on the recommended alternative at the beginning of August 2020.

Additionally, as required through the ICC order and hearing process, the project is due for an ICC status hearing. There will be opportunity for all parties to discuss the alternatives at that time as well in the event that a separate meeting between Normal and UPRR has not yet occurred.

**BRIDGE CONSTRUCTION SEQUENCE**

**Step 1. Track Preparation**

- a. Set up two removable track panels and jump spans as needed on each track. Center each panel over each proposed abutment.

**Step 2. Abutment Installation**

- Utilize the removable track panels as needed for the following steps.
  - a. Excavate to bottom of cap beam.
  - b. Install H piles, sheeting and Temporary Soil Retention System (TSRS).
  - c. Install precast cap beam.
  - d. Repeat above steps for next track.

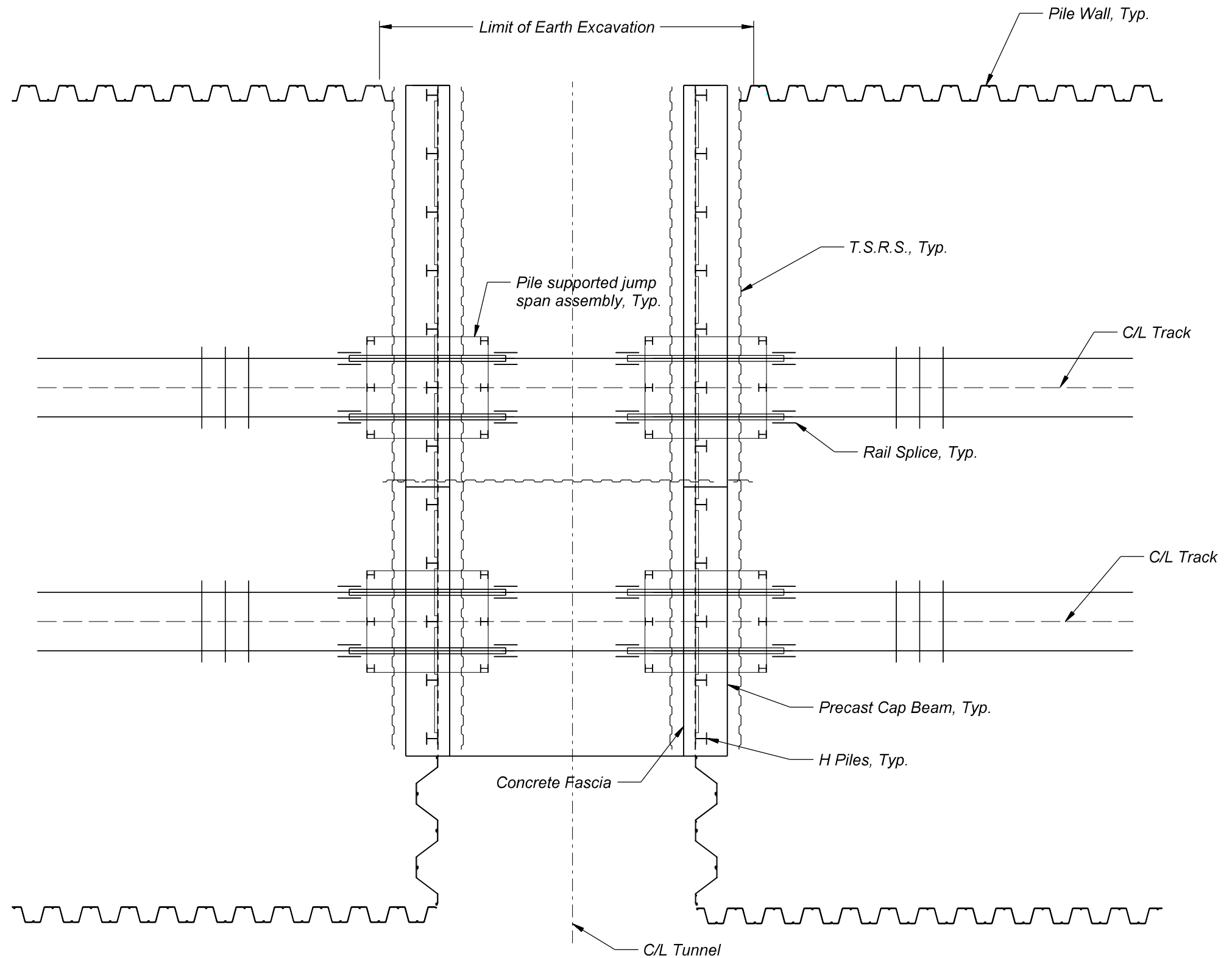
**Step 3. Bridge Installation**

- a. Remove one track (one track out of service).
- b. Remove jump span assemblies and inside TSRS.
- c. Excavate to bridge seat elevation.
- d. Install precast abutment backwall, PPC deck beam, and waterproofing membrane.
- e. Remove outside TSRS and backfill behind abutment.
- f. Place ballast, and track panels (track operation resumes).
- g. Repeat above steps for next track.

**Step 4. Tunnel Construction**

- a. Excavate to the bottom of concrete slab.
- b. Place waterproofing membrane and drain pipe.
- c. Construct concrete slab.
- d. Construct concrete fascia

**Step 5. Construct pedestrian bridges adjacent to mainline.**



**NOTES:**  
 Design and construction sequence are conceptual. Information presented is subject to change as designs are advanced.

See Method of Construction Report for further information on construction staging and impacts to railroad operations.



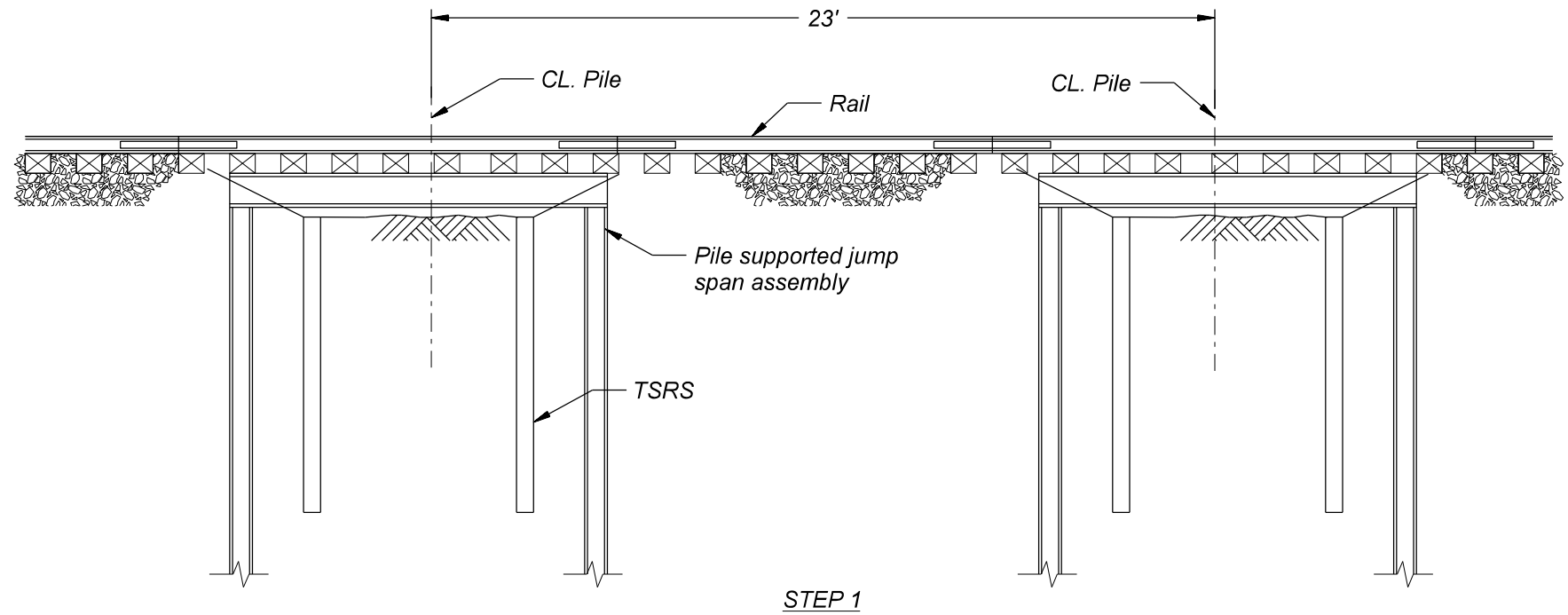
**PLAN**  
(N.T.S.)

C:\or - table1  
 T:\16950A\Normal\Phase 1\Study\CAD\_Referenc\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V8.1\_Pen.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\General\Note - Concrete Bridge.dgn  
 Defaulc  
 6/8/2020

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: PJL	
		DATE: 06/08/2020	
		SHEET NUMBER: 001 of 005	
		SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - GNERAL PLAN	

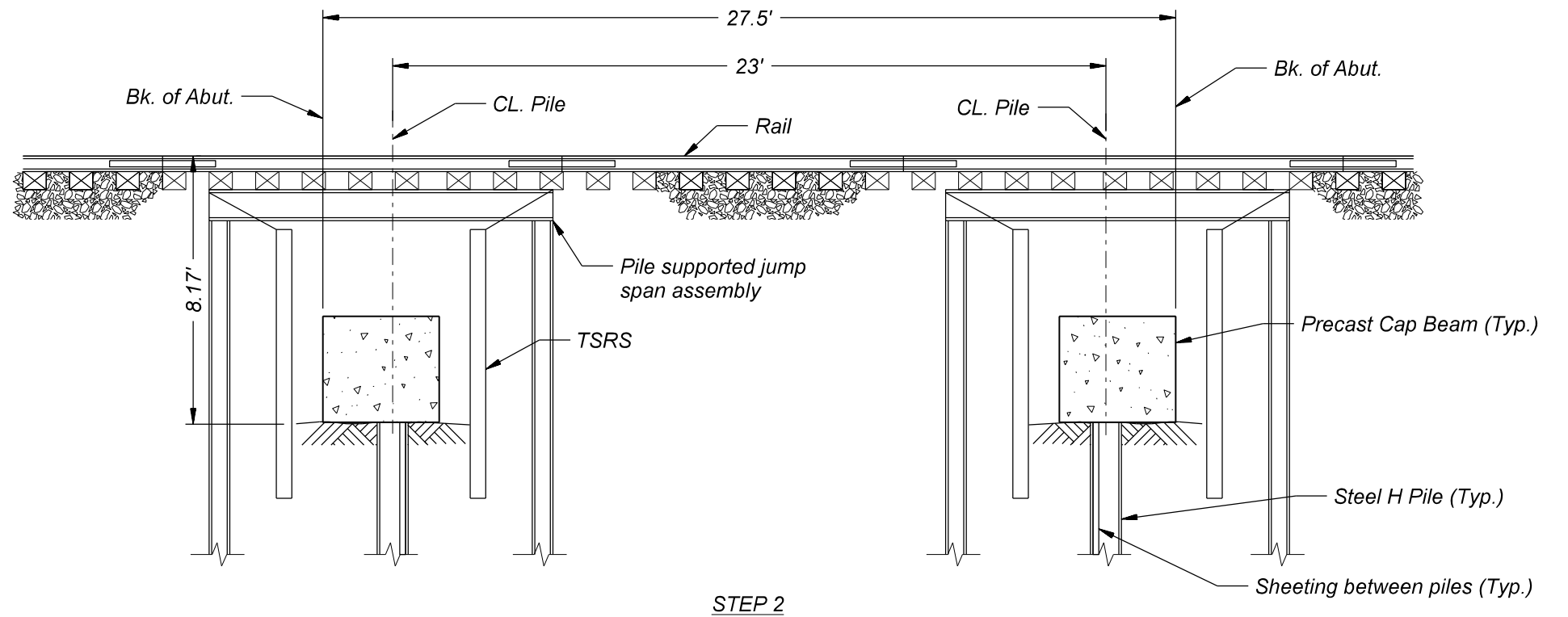
**Step 1. Track Preparation**

- a. Set up two removable panels and jump span as needed on each track. Center each panel over each proposed abutment.
- b. Install TSRS.



**Step 2. Abutment Installation**

- Utilize the removable track panels as needed for the following steps.
- a. Excavate to bottom of cap beam.
  - b. Install H piles, and sheeting.
  - c. Install precast cap beam.
  - d. Repeat above steps for next track.





**NOTES:**

Design and construction sequence are conceptual. Information presented is subject to change as designs are advanced.

Method of abutment pile cap attachment to be determined.

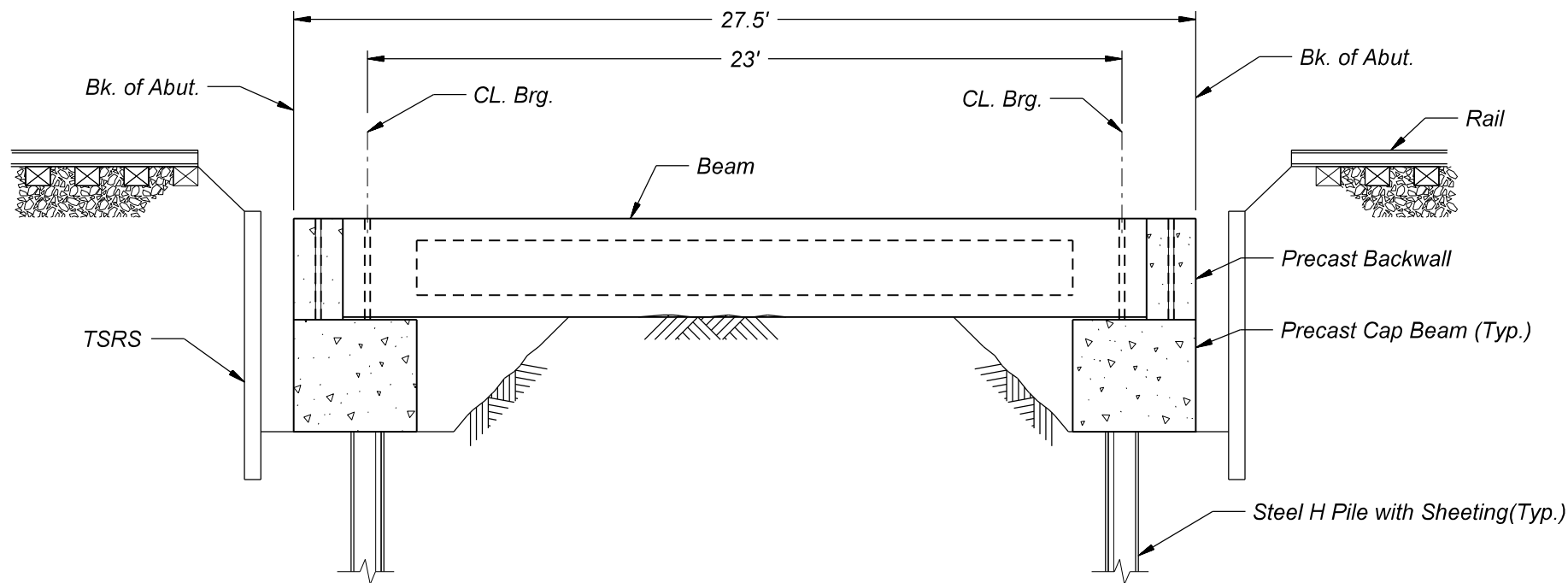
C:\or - tables  
 T:\169504 Normal\Phase 1 Study\CAD\_Refernce\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen table.tbl  
 T:\169504 Normal\Phase 1 Study\Struct\CADD\02a-Cross Section - Concrete Bridge.dgn  
 Default  
 6/8/2020

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 1
		CHECKED BY: P.JL	
		DATE: 06/08/2020	
		SHEET NUMBER: 002 of 005	

C:\or...tbl\es  
 T:\16950A\Normal\Phase 1 Study\CAD\_Referenc\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen.tbl  
 T:\16950A\Normal\Phase 1 Study\Struct\CADD\02b-Cross Section - Concrete Bridge.dgn  
 Default  
 6/8/2020

**Step 3. Bridge Installation**

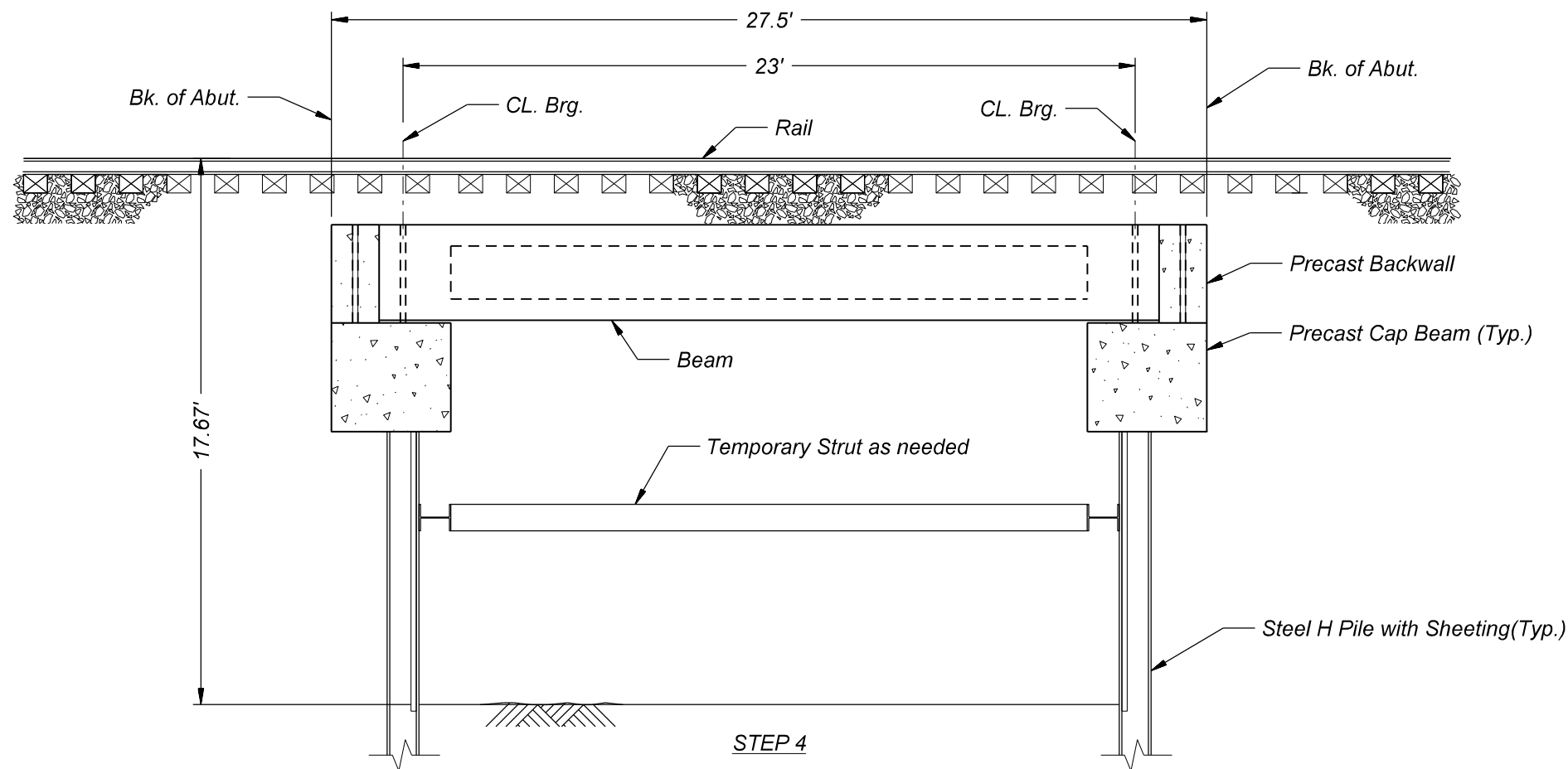
- a. Remove one track (one track out of service).
- b. Remove jump span assemblies and inside TSRS.
- c. Excavate to bridge seat elevation.
- d. Install precast abutment backwall, PPC deck beam, and waterproofing membrane.
- e. Remove outside TSRS and backfill behind abutment.
- f. Place ballast, and track panels (track operation resumes).
- g. Repeat above steps for next track.



**STEP 3**

**Step 4. Tunnel Construction**

- a. Excavate to the bottom of concrete slab.
- b. Place waterproofing membrane and drain pipe.
- c. Construct concrete slab.
- d. Construct concrete fascia.

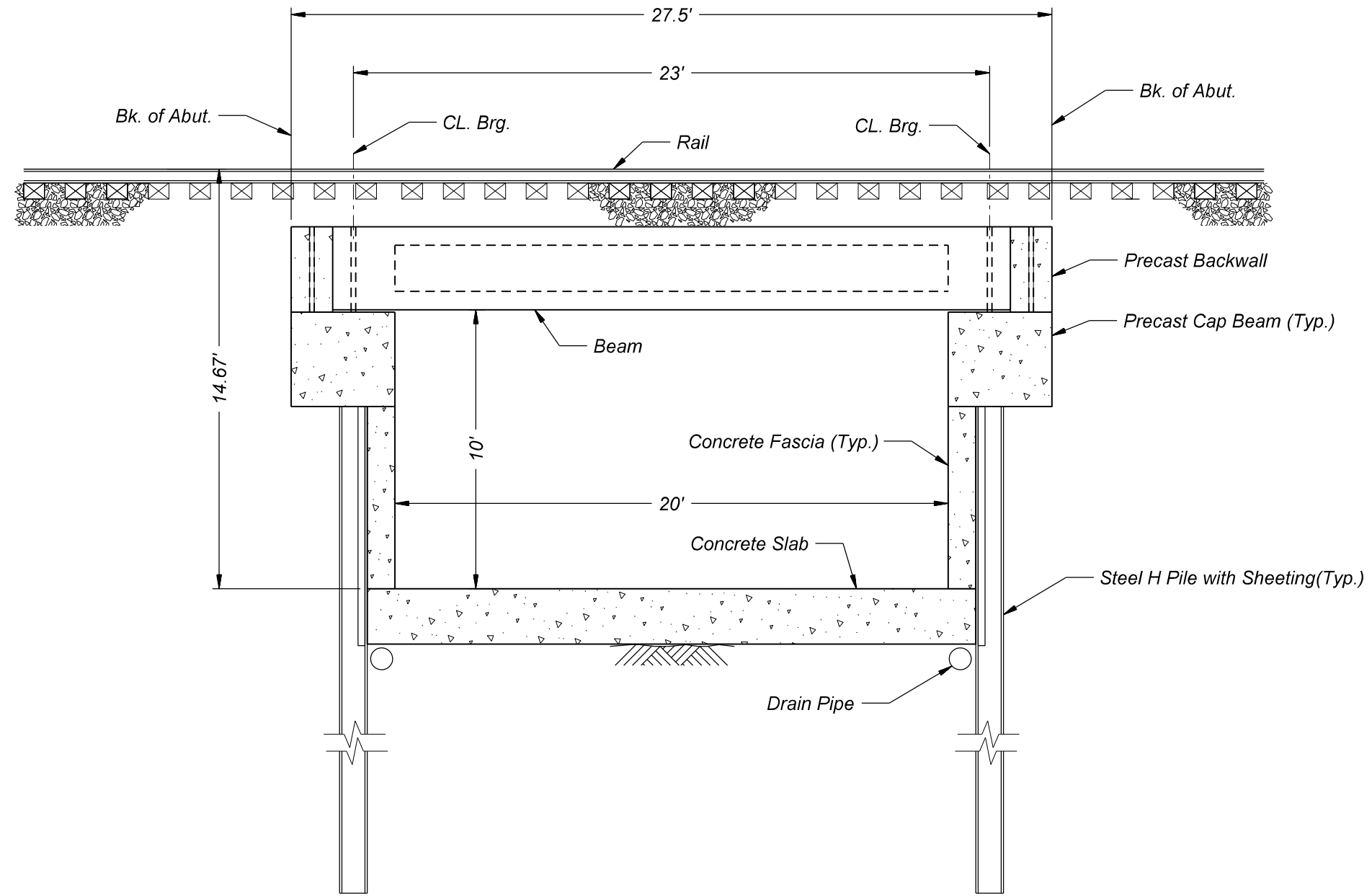


**STEP 4**

**NOTES:**  
 Design and construction sequence are conceptual. Information presented is subject to change as designs are advanced.

Dimensions are approximate and subject to change as designs are advanced.



		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: PJL	
		DATE: 06/08/2020	SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 2
		SHEET NUMBER: 003 of 005	

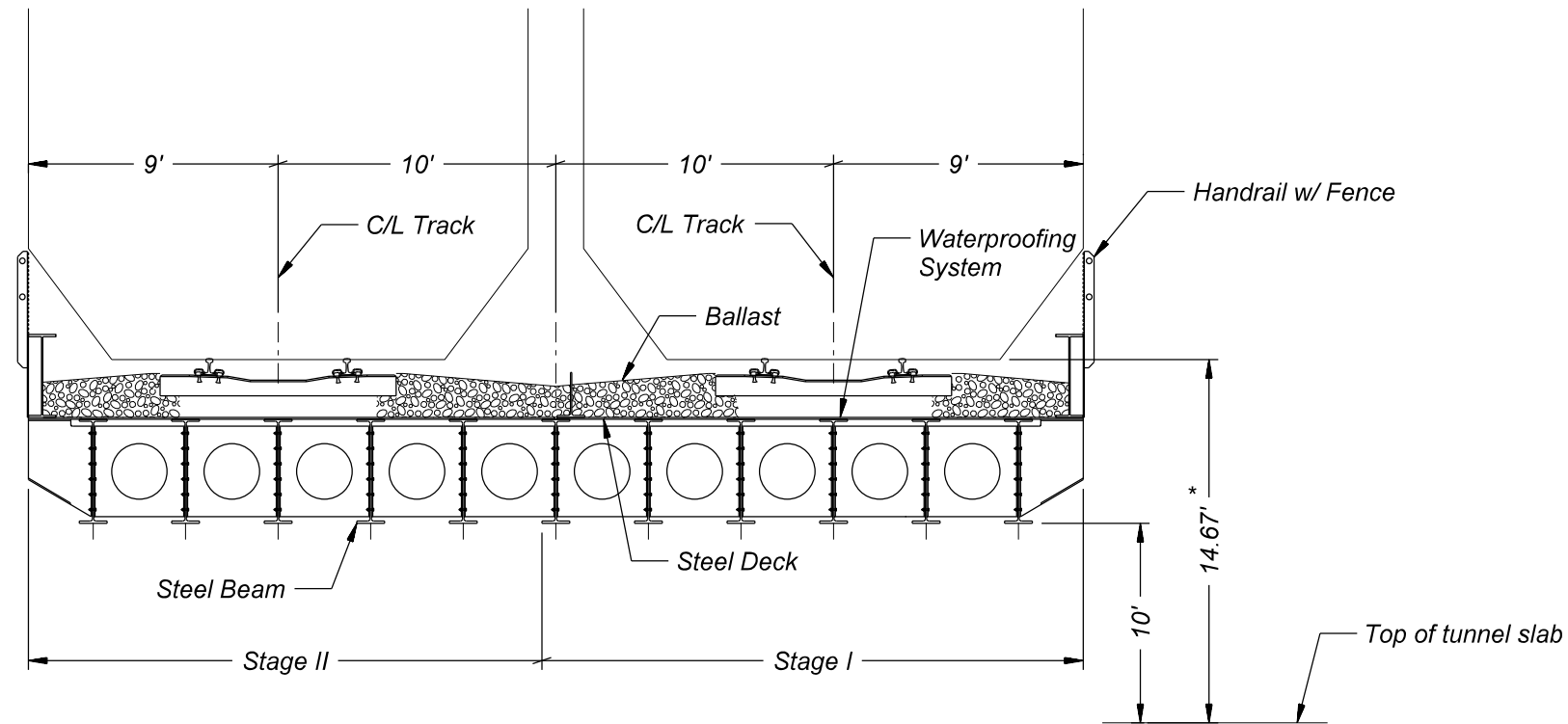


TYPICAL BRIDGE ELEVATION

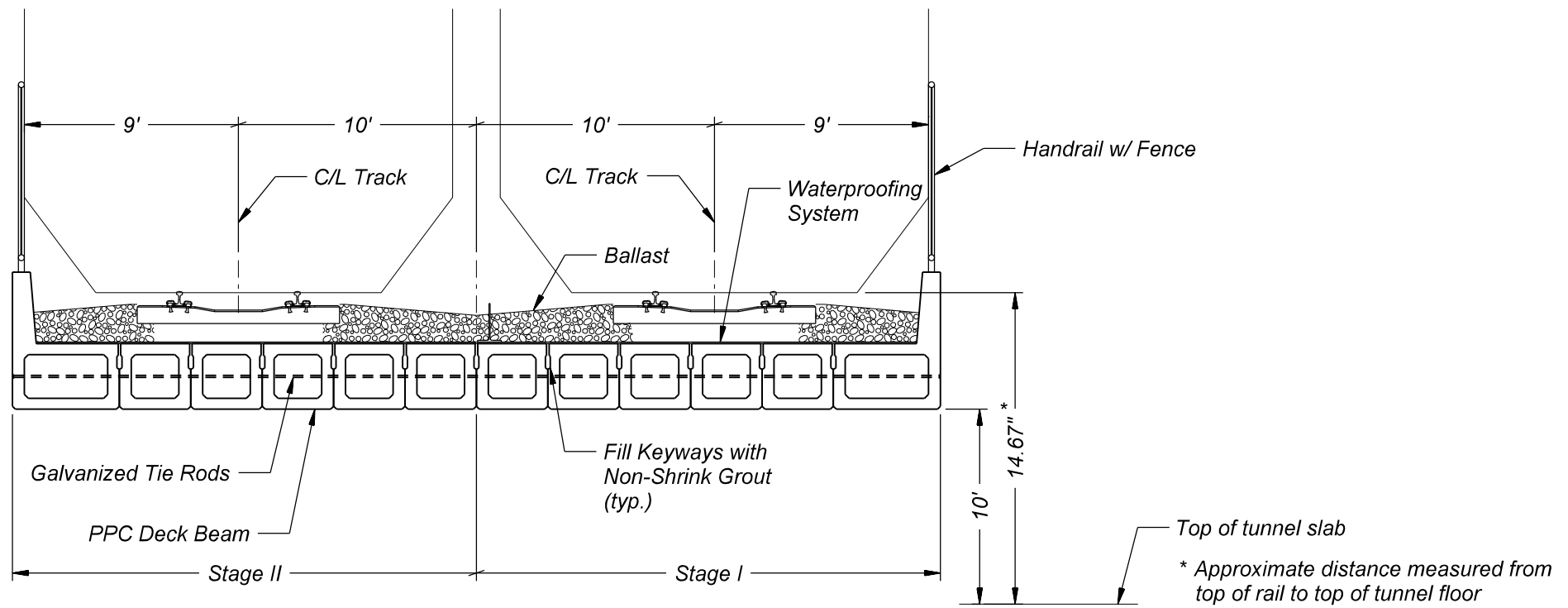
**NOTE:**  
 Dimensions are approximate and subject to change as designs are advanced.

C:\or - tables  
 T:\16950A\Normal\Phase 1\Study\CAD\_Refernce\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen table.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\02c-Cross Section - Concrete Bridge.dgn  
 Default  
 6/8/2020

		DRAWN BY:	JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - ELEVATION 3
		CHECKED BY:	PJL	
		DATE:	06/08/2020	
		SHEET NUMBER	004 of 005	





STEEL BEAM OPTION



CONCRETE BEAM OPTION

NOTES:  
 Dimensions are approximate and subject to change as designs are advanced.

Pedestrian bridge superstructure to be determined.

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: PJL	
		DATE: 06/08/2020	
		SHEET NUMBER: 005 of 005	
SHEET TITLE: OPTION 1 - OPEN CUT BRIDGE CONSTRUCTION - CROSS SECTION			

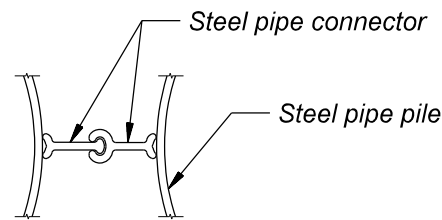
C:\p\tbl\et  
 T:\169504\Normal\Phase 1\Study\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V8\_Pentable.tbl  
 T:\169504\Normal\Phase 1\Study\Struct\CADD\03-Cross Section - Concrete Bridge.dgn  
 Default  
 6/8/2020

**TUNNEL CONSTRUCTION SEQUENCE**

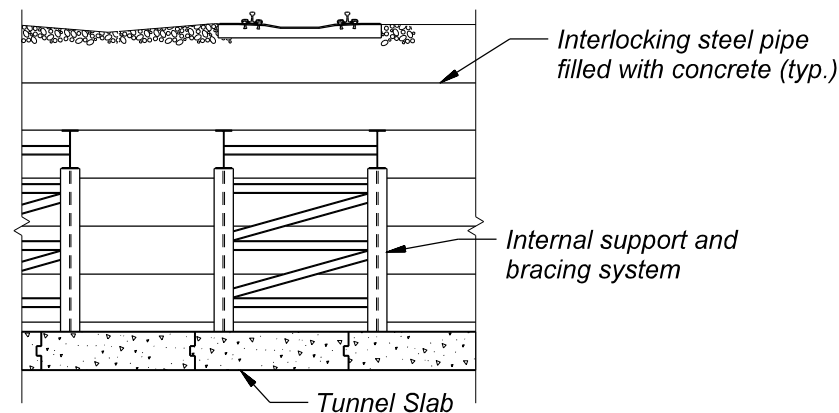
- Step 1: Construct jacking and retrieval pits at tunnel portals.
- Step 2: Install a "gate" type pipe arching around the proposed tunnel structure.
- Step 3: Excavate drifts in approximately 5 foot increments to permit the installation of the bottom tunnel slab, internal support and bracing sequentially along the length of the tunnel.
- Step 4: Install waterproofing, reinforcing steel, miscellaneous utilities and cast-in-place finish concrete.

**NOTES:**  
 Design and construction sequence are conceptual. Information presented is subject to change as designs are advanced.

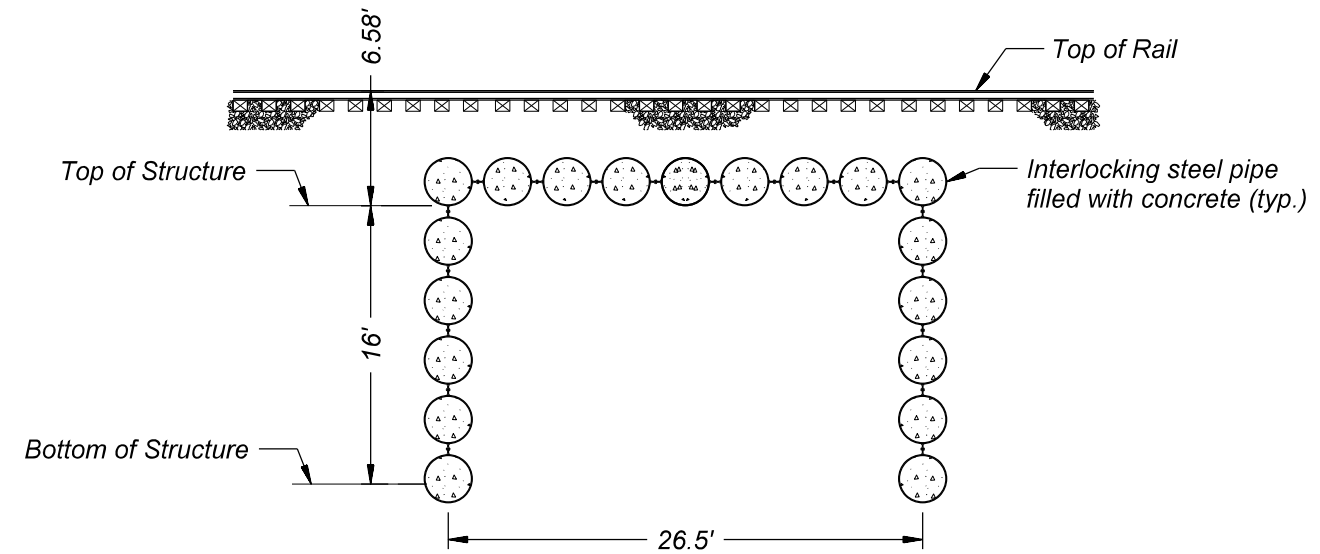
See Method of Construction Report for further information on construction staging and impacts to railroad operations.



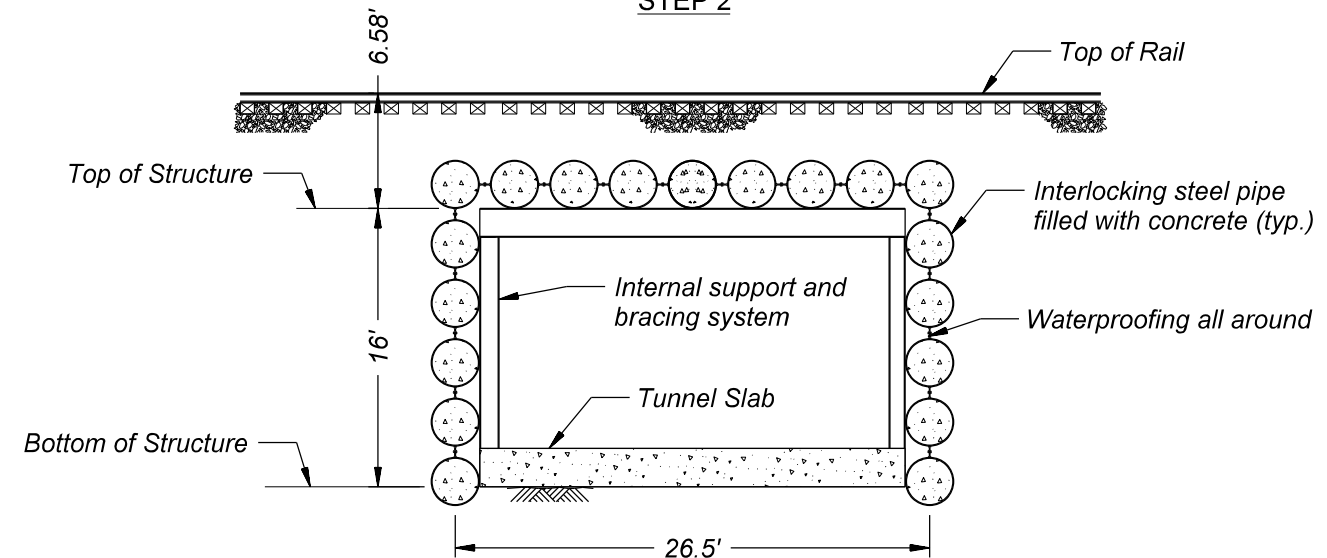
**INTERLOCKING DETAIL**



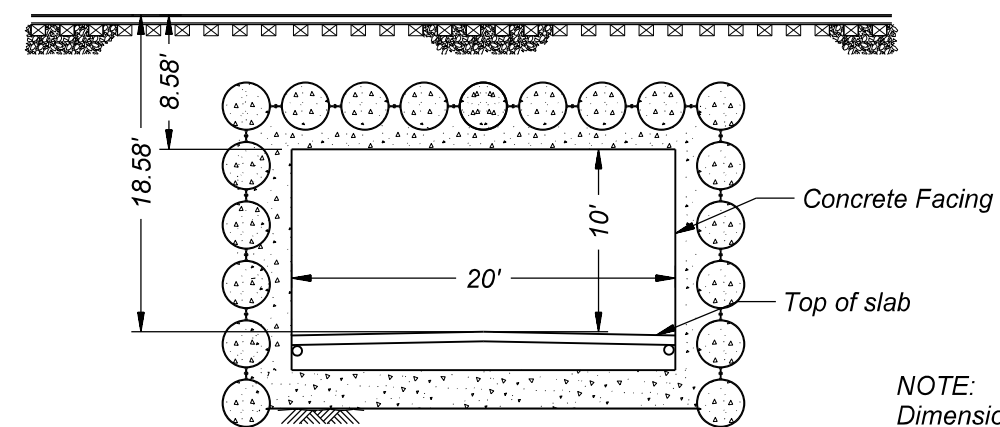
**TYPICAL LONGITUDINAL SECTION**



**STEP 2**



**STEP 3**



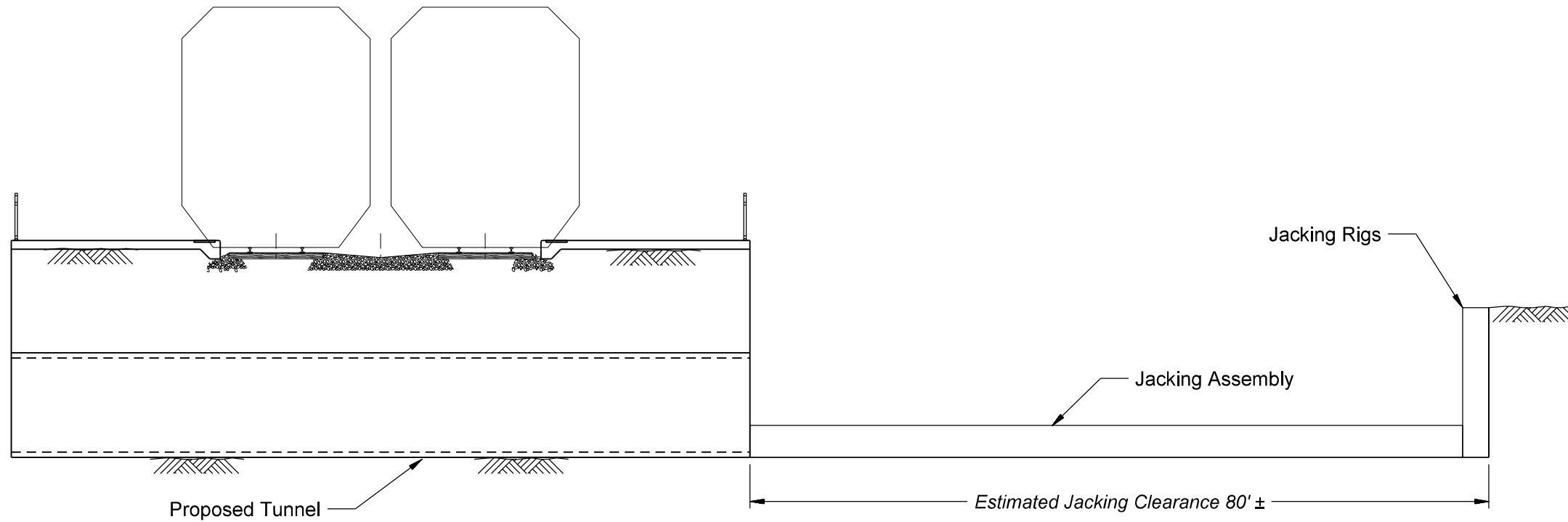
**STEP 4**

**NOTE:**  
 Dimensions are approximate and subject to change as designs are advanced.

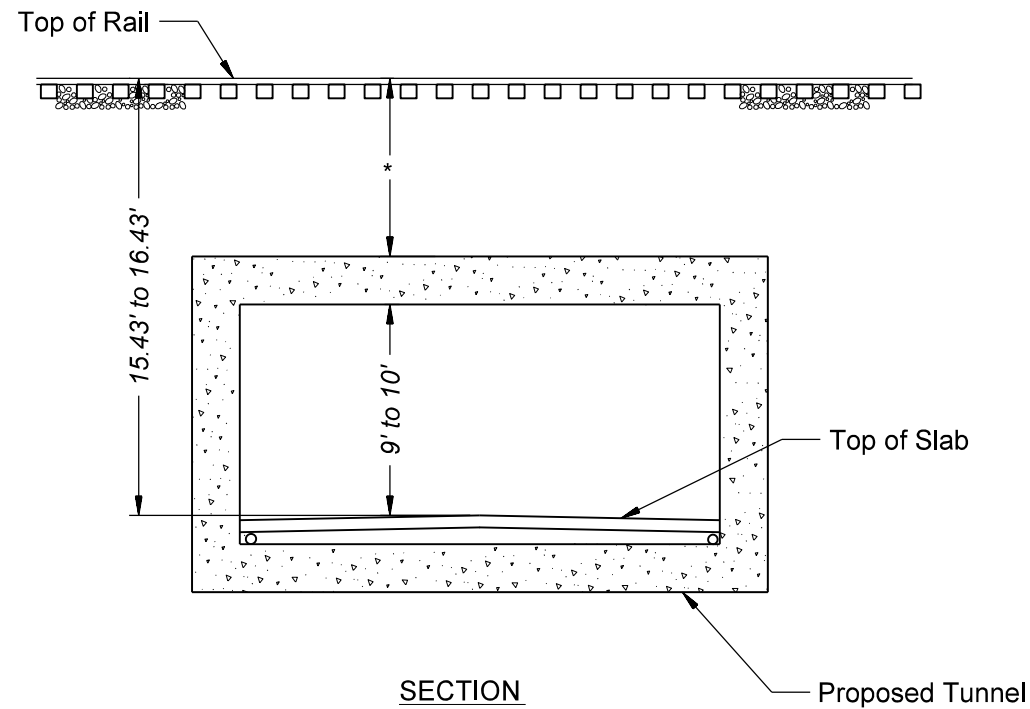
		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: MJS	
		DATE: 06/08/2020	
		SHEET NUMBER: 001 of 001	
SHEET TITLE: OPTION 2 - PIPE ROOF CONSTRUCTION			

C:\or- tabl\et  
 T:\169504 Normal Phase 1 Study\CAD\CAD\_References\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V8\_Pentable.tbl  
 T:\169504 Normal Phase 1 Study\Struct\CADD\Cross Section-Tunnel.ms.dgn  
 Default  
 6/8/2020





ELEVATION



SECTION

**TUNNEL CONSTRUCTION SEQUENCE**

- STEP 1. Construct jacking and retrieval pits at tunnel portals.
- STEP 2. Cast concrete box on site within jacking pit.
- STEP 3. Perform ground improvement and/or structural support of tracks above the tunnel profile.
- STEP 4. Hydraulically jack cast-in-place concrete box under track.



**NOTES:**

Design and construction sequence are conceptual. Information presented is subject to change as designs are advanced.

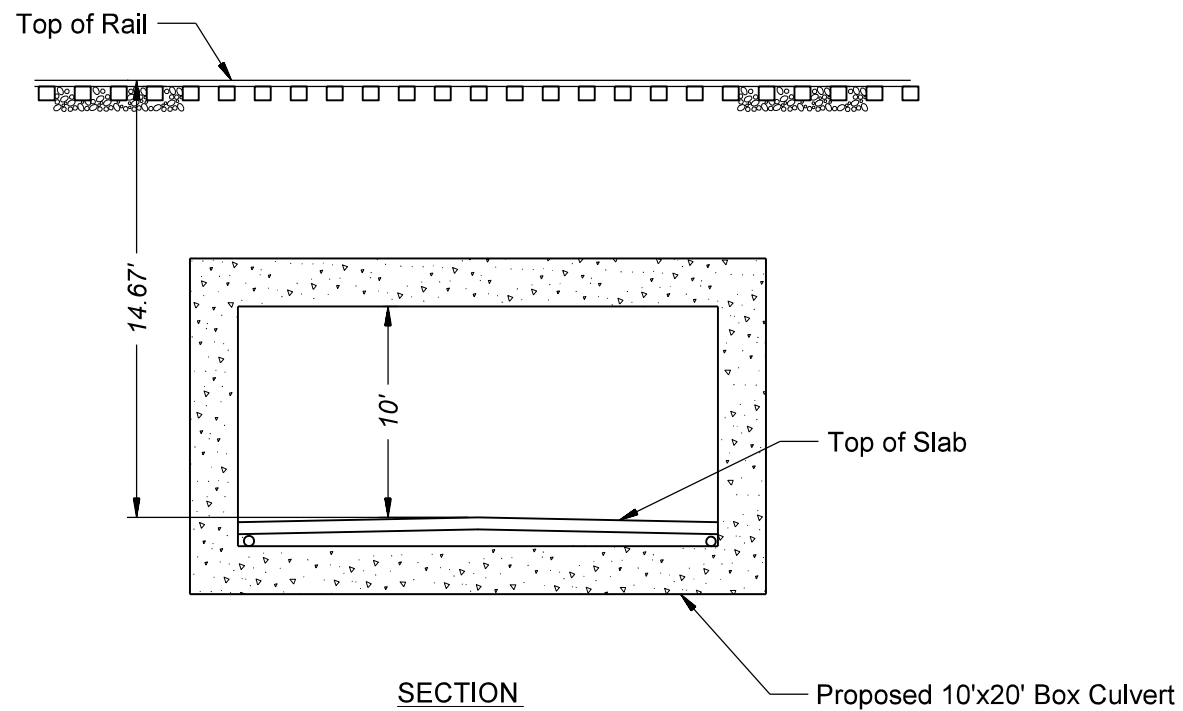
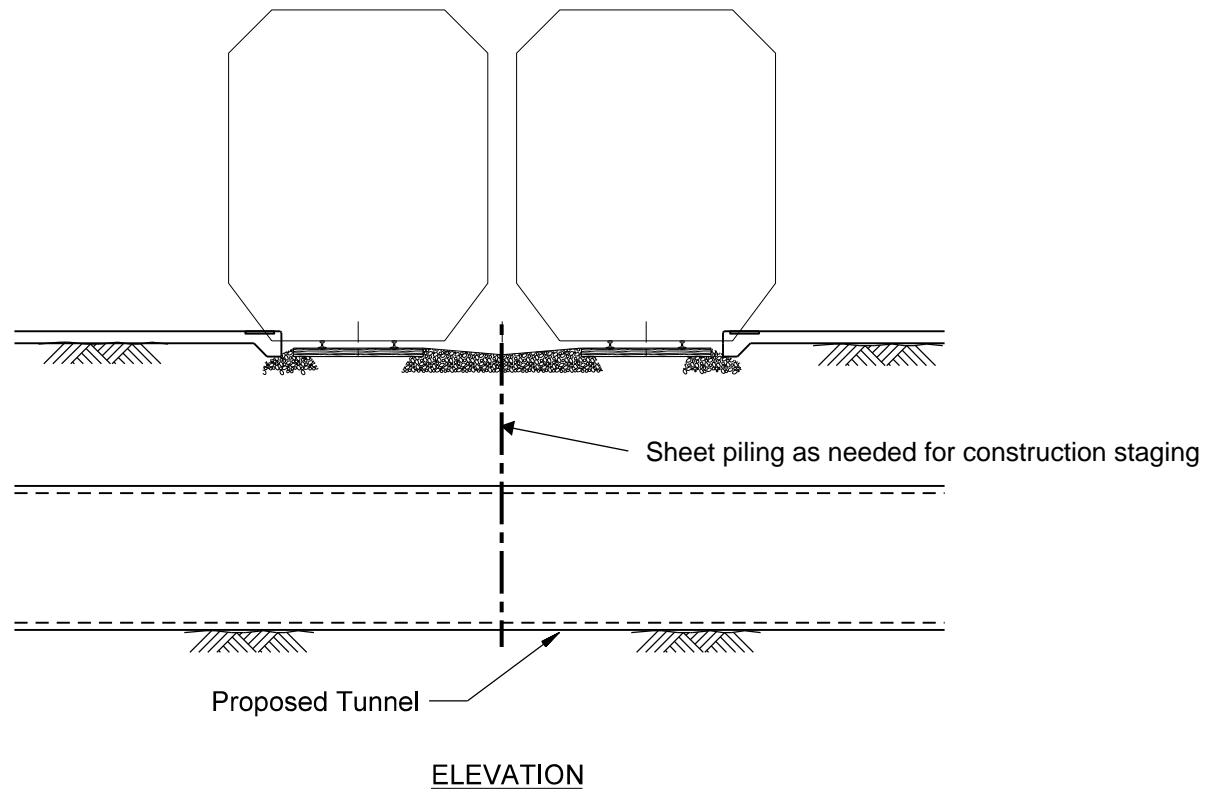
See Method of Construction Report for further information on construction staging and impacts to railroad operations.

**NOTE:**  
Dimensions are approximate and subject to change as designs are advanced.

\* Dimension varies depending on structural support system.

		DRAWN BY: JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10
		CHECKED BY: MJS	
		DATE: 06/08/2020	
		SHEET NUMBER: 001 of 001	
SHEET TITLE: OPTION 3 - JACKED BOX CONSTRUCTION			

C:\or\_t\table1  
 T:\16950A\Normal\Phase 1\Study\CAD\_Reference\UPRR\UPRR\_Standards\tables\Pen\UPRR\_V81\_Pen\_table.tbl  
 T:\16950A\Normal\Phase 1\Study\Struct\CADD\010-Cross Section-Jacked Tunnel.dgn  
 Default  
 6/12/2020



**TUNNEL CONSTRUCTION SEQUENCE**



- Step 1. Sheet piling installation down the center of the tracks to leave one track in service during construction.
- Step 2. Track removal (one track only), shoring installation, excavation and preparation of subgrade, installation of precast concrete box culvert segments, track re-installation.
- Step 3. Repeat Step 2 on second track.
- Step 4. Complete box culvert with cast-in-place concrete segments at tunnel entrances.

**NOTES:**

Design and construction sequence are conceptual. Information presented is subject to change as designs are advanced.

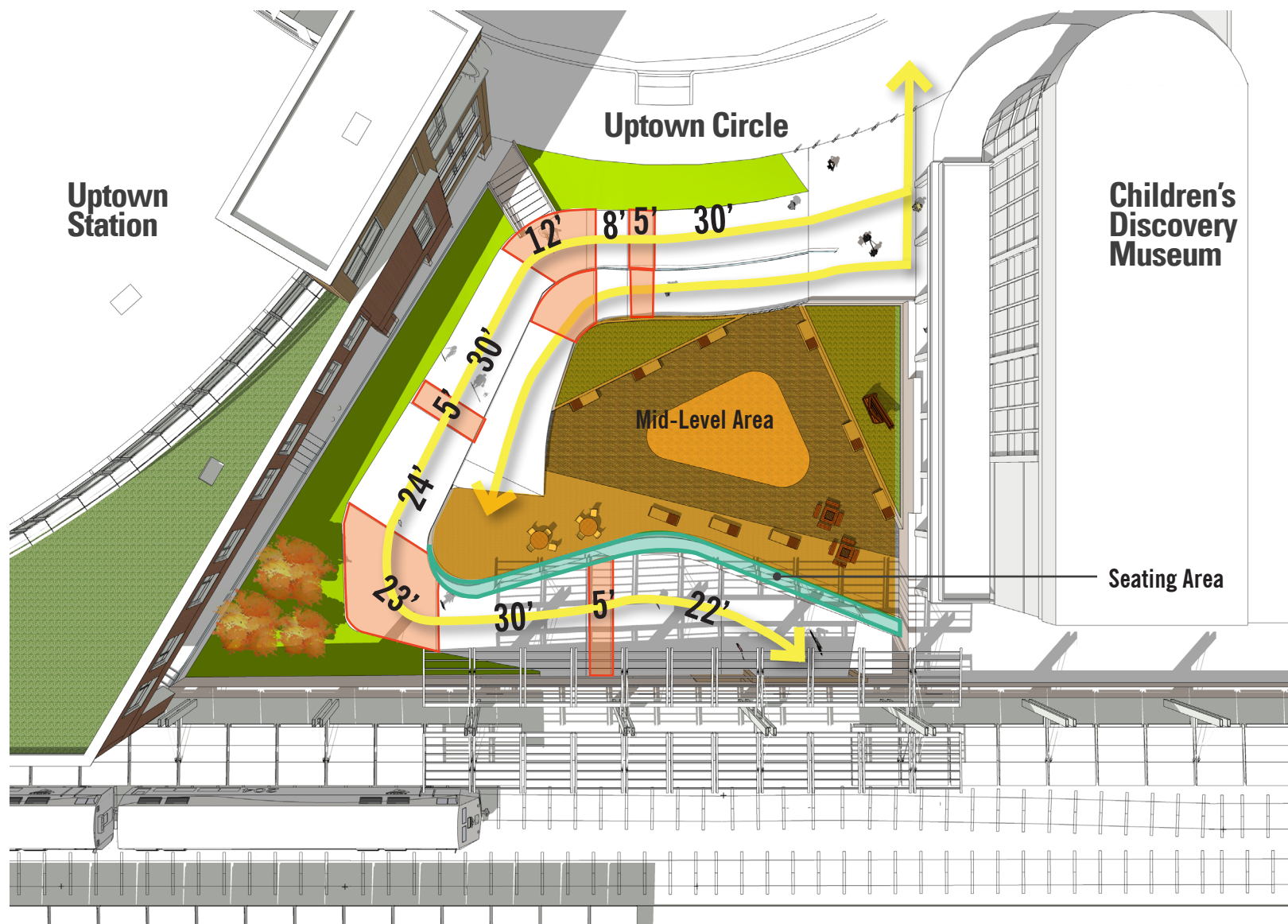
See Method of Construction Report for further information on construction staging and impacts to railroad operations.

Dimensions are approximate and subject to change as designs are advanced.

		DRAWN BY:	JZ	LOCATION & DESCRIPTION: Normal, Illinois Underpass Project at Uptown Station Joliet Sub MP 124.10 SHEET TITLE: OPTION 4 - PRECAST BOX CULVERT CONSTRUCTION
		CHECKED BY:	MJS	
		DATE:	06/08/2020	
		SHEET NUMBER	001 of 001	

# Option Comparisons - North Plaza

## Option 1 Open Cut Bridge, Option 3a Jacked Box (9' height), and Option 4 Box Culvert



- Ramp Length (including landings):
  - ~194' for Options 1 and 4
  - ~198' for Option 3
- Mid-Level Area: ~4,157 SF
- Tunnel Height:
  - 10' for Options 1 and 4
  - 9' for Option 3a
- Elevation (top of rail to top of tunnel slab):
  - 14.67' for Options 1 and 4
  - 15.43' for Option 3a

*Note:*  
Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

*Figure conceptually represents ramp length for Options 1 and 4. Dimensions shown in figure are estimates.*

# Option Comparisons - South Plaza

## Option 1 Open Cut Bridge, Option 3a Jacked Box (9' height), and Option 4 Box Culvert



- Ramp Length (including landings):  
~284' for Options 1 and 4  
~296' for Option 3a
- Plaza: ~2,981 SF
- Tunnel Height:  
10' for Options 1 and 4  
9' for Option 3a
- Elevation (top of rail to top of tunnel slab):  
-14.67' for Options 1 and 4  
-15.43' for Option 3a

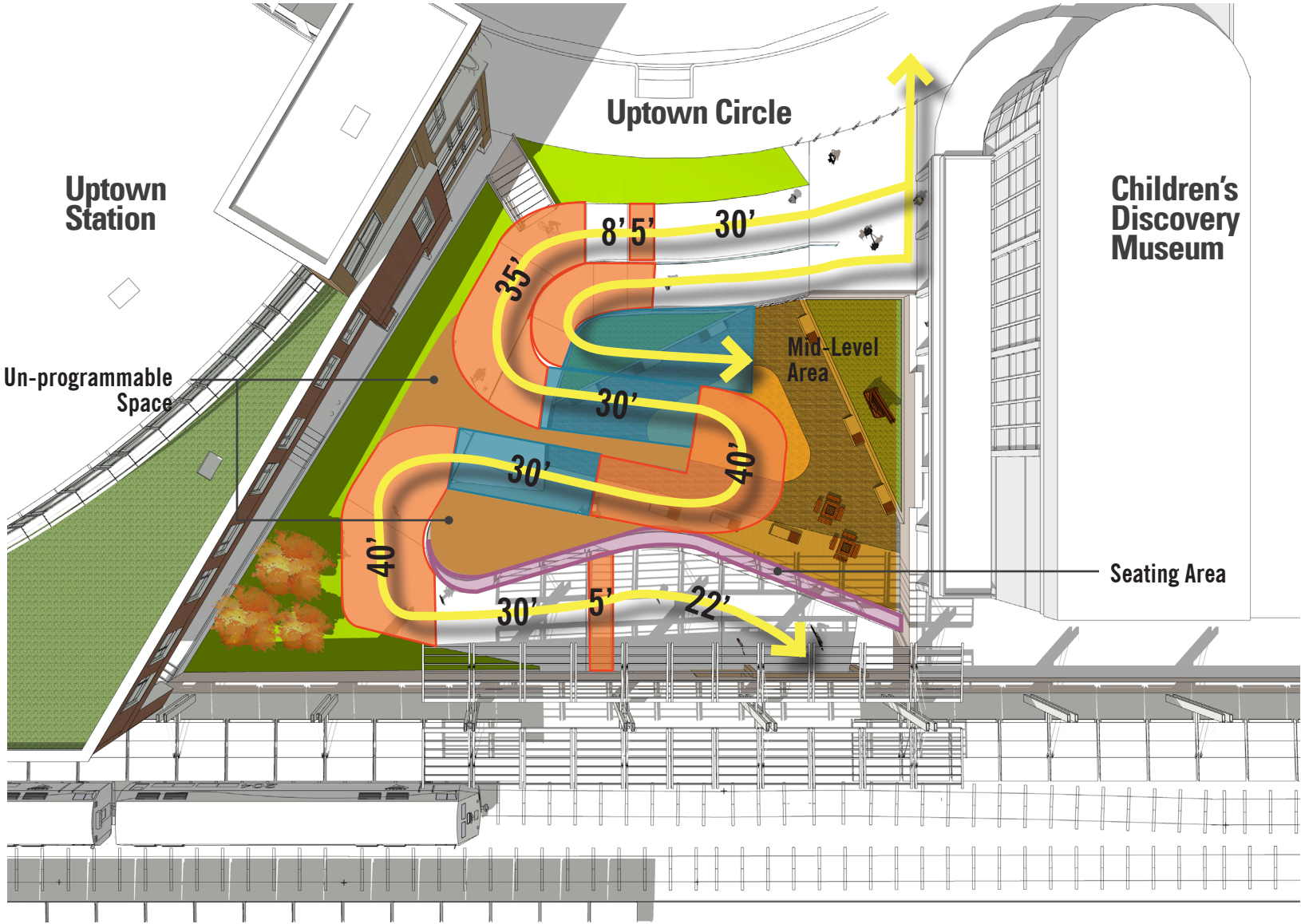
*Note:*  
Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

*Figure conceptually represents ramp length for Options 1 and 4. Dimensions shown in figure are estimates.*

# Option Comparisons - North Plaza

## Option 2 Pipe Roof and

## Option 3b Jacked Box (10' height)



- Ramp Length (including landings):
  - ~280' for Option 2
  - ~222' for Option 3b
- Mid-Level Area: ~1,553 SF
- Tunnel Height:
  - 10' for Options 2 and 3b
- Elevation (top of rail to top of tunnel slab):
  - 18.58' for Option 2
  - 16.43' for Option 3b

*Note:*  
 Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

*Figure conceptually represents ramp length for Option 2. Dimensions shown in figure are estimates.*

# Option Comparisons - South Plaza

## Option 2 Pipe Roof and Option 3b Jacked Box (10' height)



- Ramp Length (including landings):  
 ~360' for Option 2  
 ~340' for Option 3b
- Plaza: ~1,268SF
- Tunnel Height:  
 10' for Options 2 and 3b
- Elevation (top of rail to top of tunnel slab):  
 -18.58' for Option 2  
 -16.43' for Option 3b

*Note:*  
 Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

*Figure conceptually represents ramp length for Option 2. Dimensions shown in figure are estimates.*

# Uptown Connector Grade Separated Pedestrian Crossing, Normal, IL MP 124.10 Joliet Subdivision

Conceptual Design - Method of Construction Alternatives  
Meeting with Union Pacific, Illinois Commerce Commission,  
and the Town of Normal  
August 27, 2020

# Project Intent

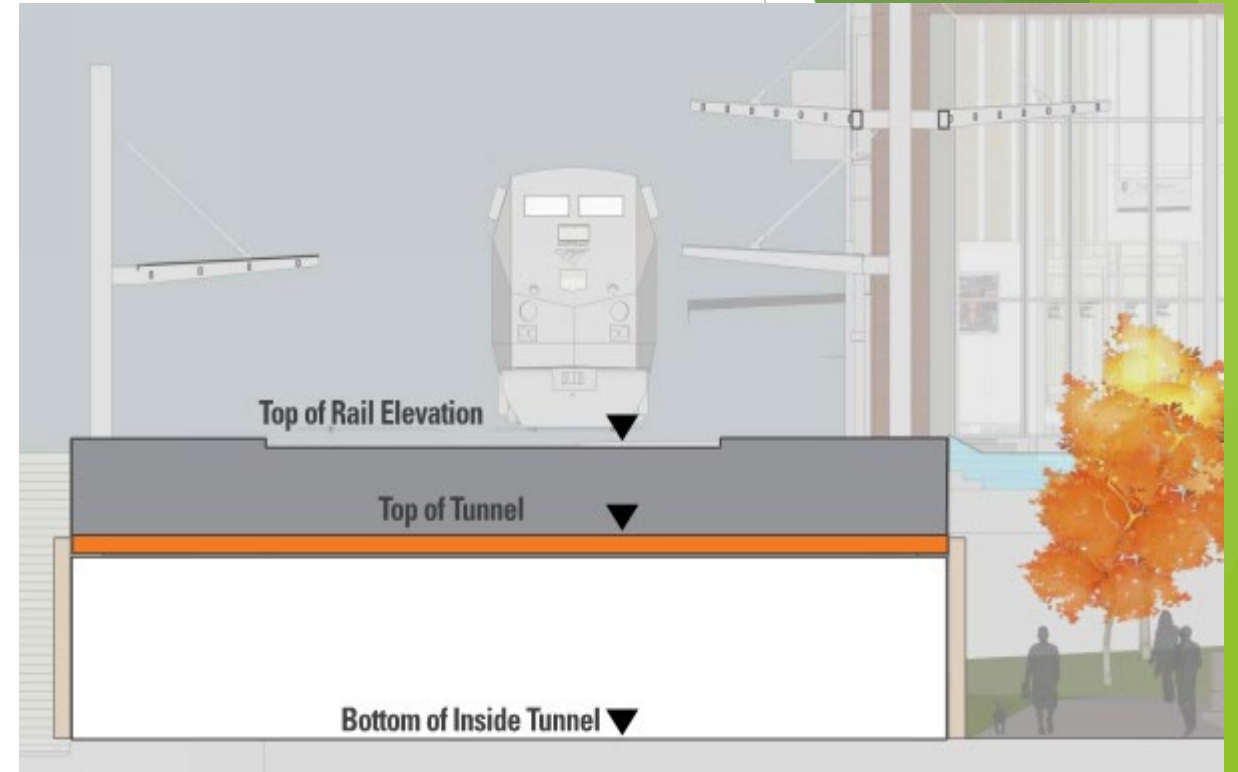
- ▶ Improve safety - Minimize Pedestrian Trespass
- ▶ Provide convenient safe and accessible passage
- ▶ Convenient and Intuitive to use
- ▶ Minimize Delays and Adverse Travel
- ▶ Improve Mobility and Connectivity
- ▶ Access for Economic Development
  - ▶ Direct Link between Uptown North and South
- ▶ Maximize Access to Public Transportation
- ▶ Promote transportation alternatives to disadvantaged groups





# Primary Design Parameters

- ▶ Cooper E80 Loading
- ▶ Wide, unrestricted cross section of 20 ft. x 10 ft.
  - ▶ Both bike and pedestrian traffic
  - ▶ Includes required side clearances
- ▶ Minimize depth of structure
  - ▶ Necessary to minimize ramp length
  - ▶ Reduced adverse impact to connectivity and mobility
  - ▶ Minimize path turns on north side



# Other Important Considerations

- ▶ Constructability
- ▶ Construction Risk
- ▶ Costs
- ▶ Maintenance
- ▶ Durability
- ▶ Impact to operations
- ▶ Other site restrictions/conflicts



# Project Funding

- ▶ USDOT 2019 BUILD GRANT - \$13M
  - ▶ Federal Railroad Administration
- ▶ ICC GRADE CROSSING PROTECTION FUNDS
- ▶ TOWN OF NORMAL
- ▶ ILLINOIS DEPARTMENT OF TRANSPORTATION

# Project Schedule

Key project milestones include:

<b>Phase I</b>	
NEPA	Completion Dec. 2020
Preliminary Engineering	Completion Dec. 2020
<b>BUILD Grant Obligation <sup>A</sup></b>	
Completion of grant documentation	Dec. 2020 to Jan 2021
<b>Phase II</b>	
Final Design Plans, Specifications, & Estimates	Jan. 2021 to Dec. 2021
Contractor Procurement	Dec. 2021 to Mar. 2022
<b>Phase III</b>	
Construction	Mar. 2022 to Dec. 2023

Notes:

- A. The underpass project was selected by the US Department of Transportation to receive \$13 million in funding for final design and construction through the 2019 BUILD Grant Program (Better Utilizing Investments to Leverage Development Transportation Discretionary Grants Program). The grant will be administered through the Federal Railroad Administration and the deadline for grant obligation is September 30, 2021. Phase I (Preliminary Engineering and NEPA) of the project must be complete and approved by project partners prior to the obligation of the grant.

# UPRR Review Process

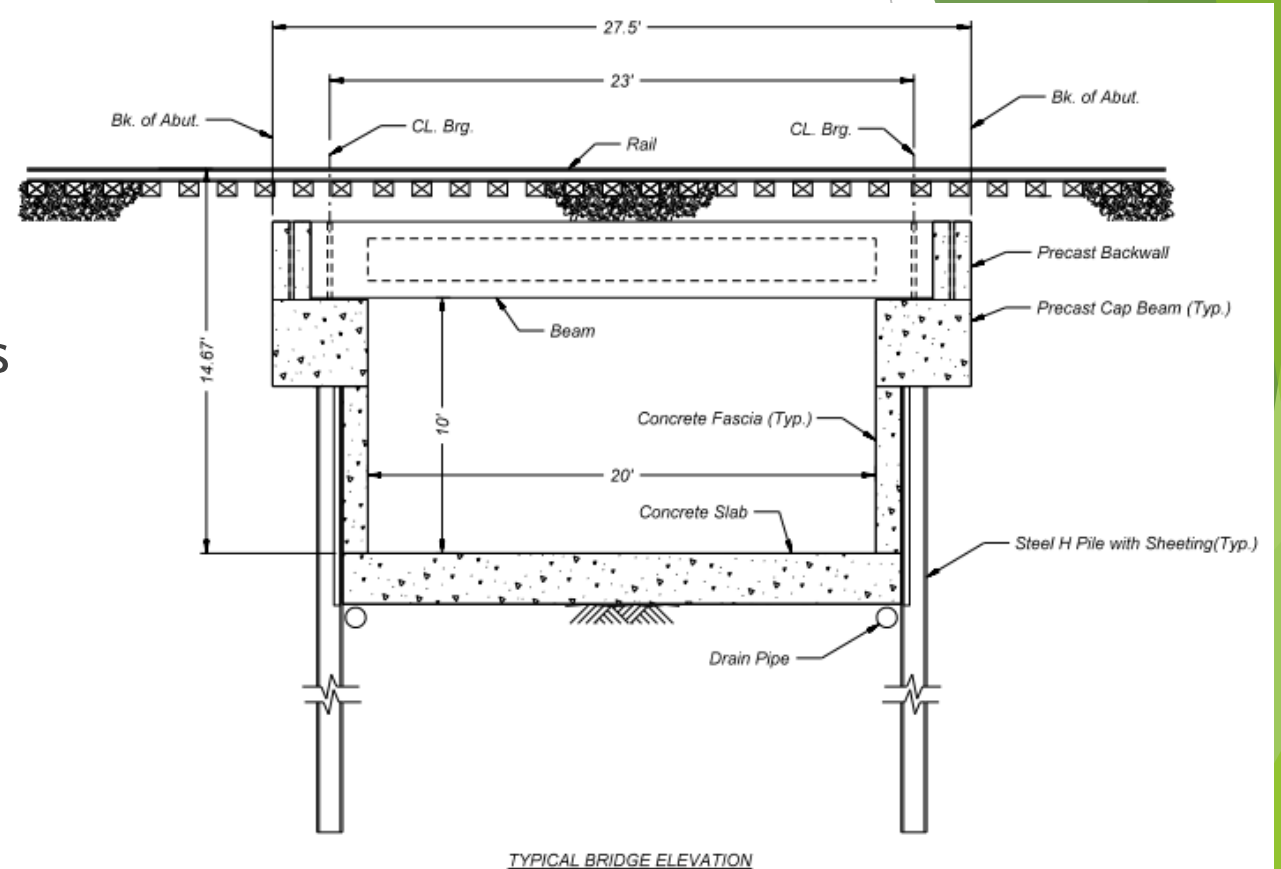
- ▶ UPRR Responses
  - ▶ Design Variance Request for Underpass - Approved
  - ▶ Allowed 8 work windows - 5 hours each
- ▶ Outstanding Questions
  - ▶ Can the work windows be applied if one track is kept open (i.e. staged construction)?
    - ▶ This would allow the primary construction operations to be performed with one track open to traffic with little disruption to rail operations.
  - ▶ Can the necessary cross section be reasonably built with these work windows?

# Design Alternatives

- ▶ Option 1 - Open Cut Bridge Construction
- ▶ Option 2 - Pipe Roof Construction
- ▶ Option 3 - Jacked Box Construction
- ▶ Option 4 - Box Culvert Construction

# Option 1 - Open Cut Bridge Construction

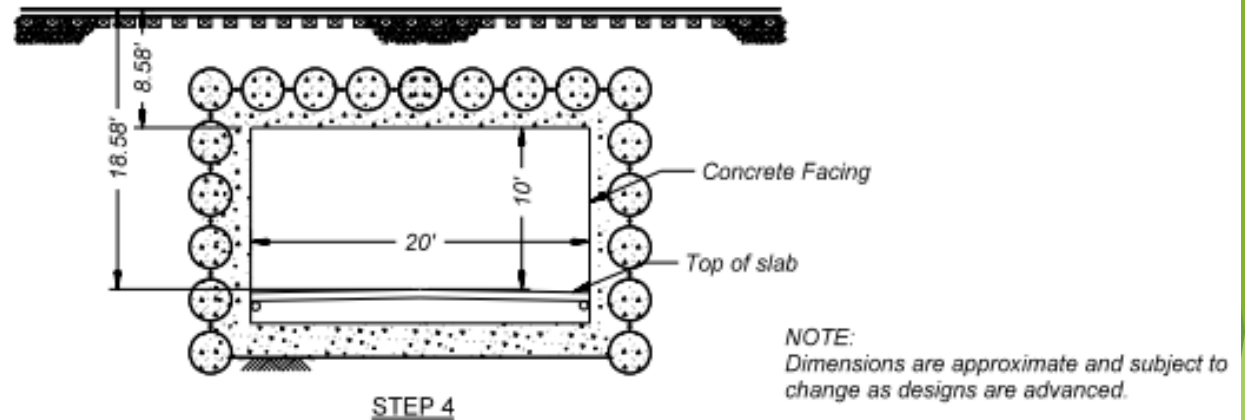
- ▶ Shortest ramp lengths - most desirable for users
- ▶ Common Construction Method
- ▶ Ease of Maintenance
- ▶ May have greater Impact on Utilities
- ▶ Moderate Construction Costs
- ▶ Work windows if STAGED
  - ▶ Sheet piles: 2 to 3 5-hour windows
  - ▶ Bridge: 8 to 10-day closure for each track
- ▶ Work windows if NOT STAGED
  - ▶ 24 to 40 windows to 8 hours each



# Option 2 - Pipe Roof Construction

- ▶ Longest ramp lengths - may be prohibitive for users
- ▶ Specialty Construction
- ▶ Settlement Potential
- ▶ Maintenance Concerns
- ▶ High Construction Cost
- ▶ Work windows
  - ▶ 4 windows at 4 hours each

Town of Normal recommends eliminating option because of lengthy ramps

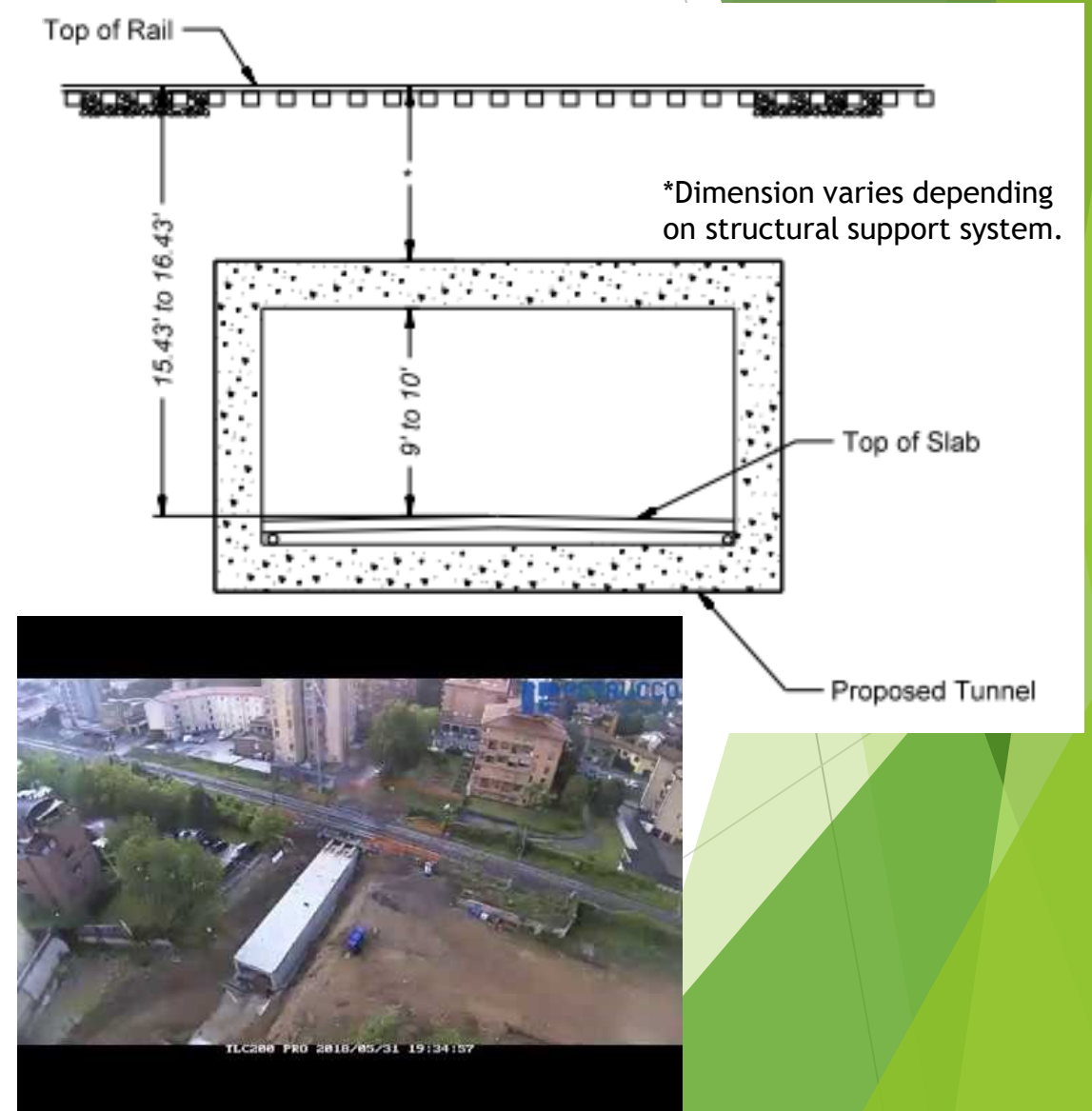




# Option 3 - Jacked Box Construction

- ▶ Ramp lengths may be acceptable if underpass reduced from 10 ft. to 9 ft.
- ▶ High Relative Construction Cost
- ▶ Specialty Construction
- ▶ May be Constructed within work windows
- ▶ Work windows:
  - ▶ Support structure: 5 windows at 4 hours each
  - ▶ Jacked box: 7 days no impact to rail traffic
  - ▶ Remove support structure: 2 windows at 4 hours each

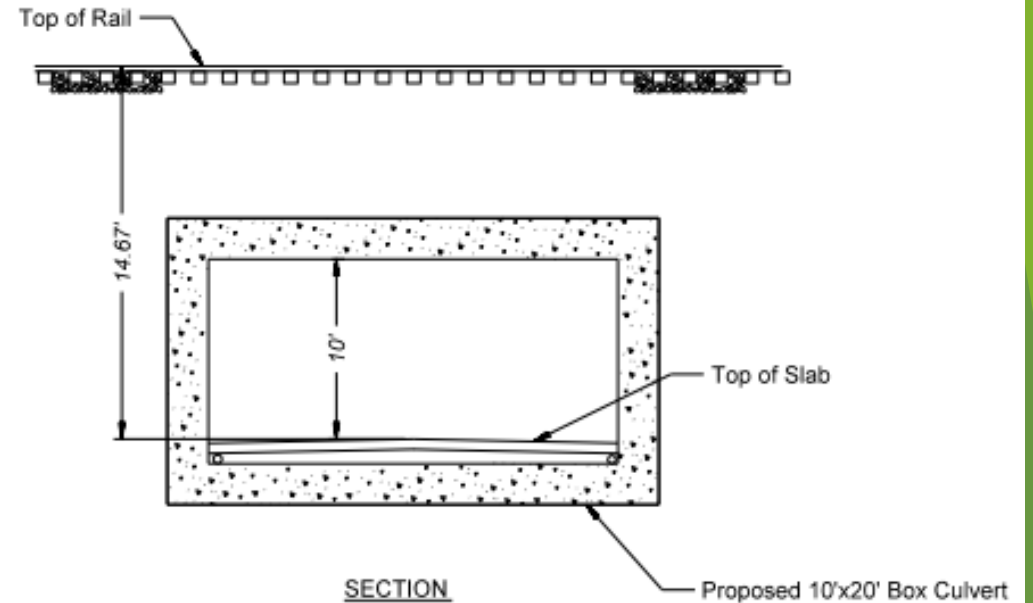
Town of Normal ranks this option as second preference (assuming staged construction not permitted)



# Option 4 - Box Culvert Construction

- ▶ Shortest ramp lengths - most desirable for users
- ▶ Conventional Construction
- ▶ Quickest Overall Method
- ▶ Joints will need appropriate waterproofing
- ▶ Similar to Dixon, CA
- ▶ Moderate Construction Cost
- ▶ Work windows if STAGED
  - ▶ Sheet piles: 2 to 3 5-hour windows
  - ▶ Box culvert: 48 to 60-hour window (such as weekend closure)

Town of Normal ranks this option as first preference (assuming staged construction is permitted)

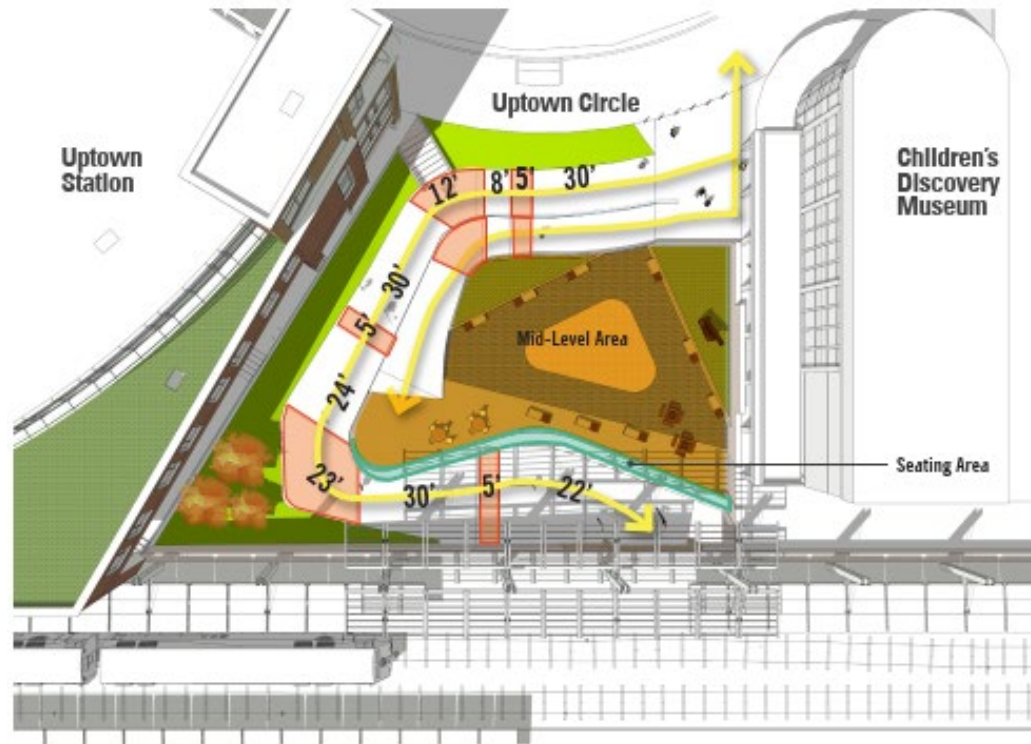


# Ramp Lengths - North Plaza

Preferred length = 194-198 ft.

## Option Comparisons - North Plaza

**Option 1 Open Cut Bridge, Option 3a Jacked Box (9' height), and Option 4 Box Culvert**



Aerial View - North Plaza

- Ramp Length (including landings):
  - ~194' for Options 1 and 4
  - ~198' for Option 3
- Mid-Level Area: ~4,157 SF
- Tunnel Height:
  - 10' for Options 1 and 4
  - 9' for Option 3a
- Elevation (top of rail to top of tunnel slab):
  - 14.67' for Options 1 and 4
  - 15.43' for Option 3a

*Note:*

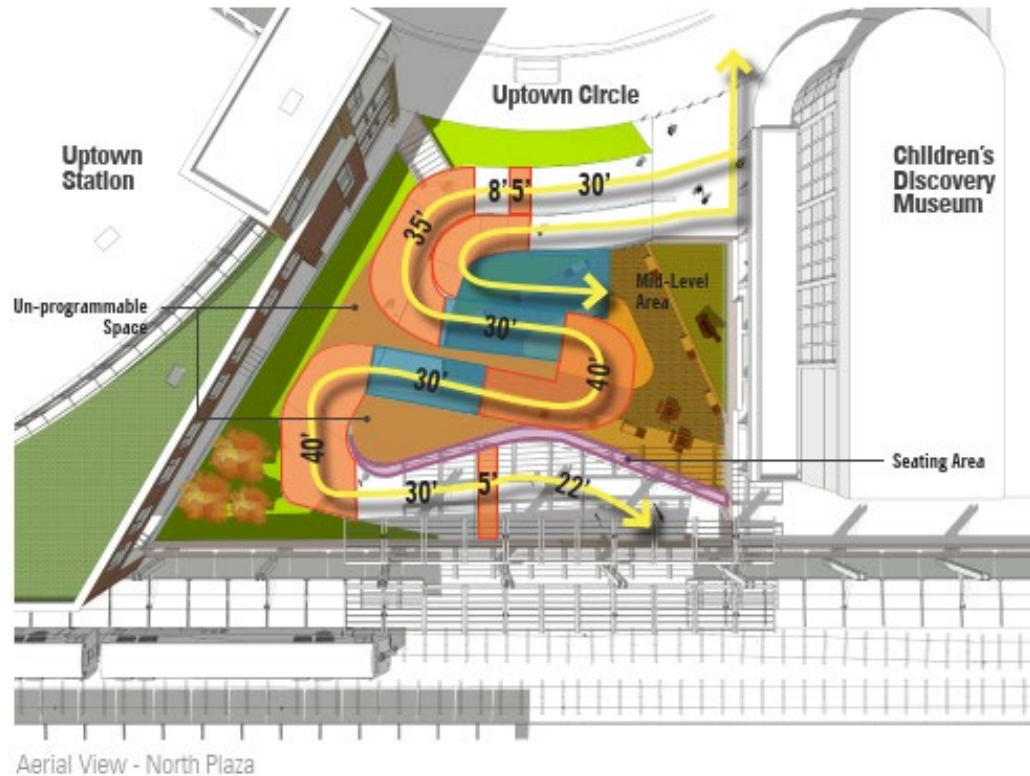
*Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.*

*Figure conceptually represents ramp length for Options 1 and 4. Dimensions shown in figure are estimates.*

# Ramp Lengths - North Plaza

Lengths excessive  
Not recommended

## Option Comparisons - North Plaza Option 2 Pipe Roof and Option 3b Jacked Box (10' height)



- Ramp Length (including landings):  
~280' for Option 2  
~222' for Option 3b
- Mid-Level Area: ~1,553 SF
- Tunnel Height:  
10' for Options 2 and 3b
- Elevation (top of rail to top of tunnel slab):  
-18.58' for Option 2  
-16.43' for Option 3b

*Note:*  
Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

*Figure conceptually represents ramp length for Option 2. Dimensions shown in figure are estimates.*

# Ramp Lengths - South Plaza

Preferred length = 284-296 ft.

## Option Comparisons - South Plaza

**Option 1 Open Cut Bridge, Option 3a Jacked Box (9' height), and Option 4 Box Culvert**



Aerial View - South Plaza

- Ramp Length (including landings):
  - ~284' for Options 1 and 4
  - ~296' for Option 3a
- Plaza: ~2,981SF
- Tunnel Height:
  - 10' for Options 1 and 4
  - 9' for Option 3a
- Elevation (top of rail to top of tunnel slab):
  - 14.67' for Options 1 and 4
  - 15.43' for Option 3a

*Note:*

*Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.*

*Figure conceptually represents ramp length for Options 1 and 4. Dimensions shown in figure are estimates.*

# Ramp Lengths - South Plaza

Lengths excessive  
Not recommended

## Option Comparisons - South Plaza Option 2 Pipe Roof and Option 3b Jacked Box (10' height)



Aerial View - South Plaza

- Ramp Length (including landings):  
~360' for Option 2  
~340' for Option 3b
- Plaza: ~1,268SF
- Tunnel Height:  
10' for Options 2 and 3b
- Elevation (top of rail to top of tunnel slab):  
-18.58' for Option 2  
-16.43' for Option 3b

*Note:*  
Ramp lengths are estimates based on conceptual grading plans. Ramp configurations and lengths will be updated as designs are advanced.

*Figure conceptually represents ramp length for Option 2. Dimensions shown in figure are estimates.*

# Next Steps

- ▶ Select alternative to advance to preliminary engineering
- ▶ Illinois Commerce Commission Status Hearing
- ▶ PE completion + concurrence from project stakeholders
- ▶ NEPA completion + FRA signature
- ▶ FRA BUILD grant obligation for final design and construction phases

Phase I	
NEPA	Completion Dec. 2020
Preliminary Engineering	Completion Dec. 2020
BUILD Grant Obligation <sup>A</sup>	
Completion of grant documentation	Dec. 2020 to Jan 2021
Phase II	
Final Design Plans, Specifications, & Estimates	Jan. 2021 to Dec. 2021
Contractor Procurement	Dec. 2021 to Mar. 2022
Phase III	
Construction	Mar. 2022 to Dec. 2023



## TRANSMITTAL

---

To: Chris Keckeisen, Union Pacific Railroad

From: Wayne Aldrich, Town of Normal

RE: Conceptual Design – Stage Construction Alternatives  
Grade Separated Pedestrian Crossing, Normal, IL  
MP 124.10 Joliet Subdivision  
(Near closed Crossing No. 290811W, 40.50869800/-88.98398600)

Date: September 9, 2020

cc: Jason Comfort, Town of Normal, Ryan Otto, Town of Normal  
Rick Friesen, Union Pacific Railroad, Mark Bristol, Union Pacific Railroad  
Jordon Albers, Union Pacific Contractor, Matt Lemmerman, Union Pacific Contractor  
Rick Powell, WSP, Courtney McCormick, WSP

---

Conceptual alternatives for four methods of construction were submitted to Union Pacific Railroad on June 16, 2020 for the Grade Separated Pedestrian Crossing underpass project in Normal, IL. The options in the submittal included both staged and non-staged construction alternatives. A design review meeting was held on August 27, 2020 and attended by representatives from the Town of Normal, Union Pacific Railroad, Illinois Commerce Commission, and Illinois Department of Transportation. During the meeting, Union Pacific noted that the Town of Normal would need to formally request that Union Pacific review staged construction alternatives.

With this submittal, the Town of Normal is requesting that Union Pacific Railroad review and approve the option for staged construction for the Normal underpass project.

Staged construction is referring to construction at one track location at a time. During that construction, the second track would remain in service. Sheet piles would be driven between the tracks for track support and to minimize track disturbance during the construction stages.

The Town of Normal understands that staging construction on double track corridors has been successful used on Union Pacific right-of-way in locations such as California as well as locally within Illinois. Normal would build on successes and lessons learned from those past projects to further develop the staged alternatives for the Normal underpass project.

Minutes from the August 27, 2020 meeting and the Method of Construction Alternatives Report dated June 16, 2020 are attached with this request. The report provides details for two conceptual alternatives that would use staged construction:

- Option 1 – Open Cut Bridge Construction
- Option 4 – Box Culvert Construction

If staged construction is permitted, the Town of Normal recommends the box culvert method of construction as a preferred alternative.