

ILLINOIS STATE TOLL HIGHWAY AUTHORITY



2700 Ogden Ave., Downers Grove, IL 60515

VOLUME 1 OF 2 CONCEPT DRAINAGE REPORT FOR TRI-STATE TOLLWAY (I-294) BRIDGE REHABILITATION AND RECONSTRUCTION

MILE LONG BRIDGE

M.P. 20.7 TO M.P. 22.3

CONTRACT RR-14-4221

DATE: OCTOBER 11, 2017

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Concept Drainage Report Submittal Checklist

- DISPOSITION OF COMMENTS
- GENERAL LOCATION DRAINAGE MAP
- EXISTING DRAINAGE PLANS
- IDENTIFIED DRAINAGE CONCERNS
- IDENTIFIED BASE FLOODPLAINS
- BRIDGES AND CULVERTS
- DESIGN CRITERIA
- OUTLET EVALUATION
- STORMWATER DETENTION ANALYSIS
- RIGHT-OF-WAY EVALUATION
- DRAINAGE ALTERNATIVES
- LOCAL AND OTHER AGENCY COORDINATION
- PROPOSED DRAINAGE PLAN
- FLOODPLAIN ENCROACHMENT EVALUATION
- PERMIT REQUIREMENTS
- CONCEPT REPORT ASSEMBLY

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Table of Contents

VOLUME 1 OF 2

1	EXECUTIVE SUMMARY	1
2	EXISTING DRAINAGE CONDITIONS	3
2.1	GENERAL LOCATION DRAINAGE MAP	3
2.2	EXISTING DRAINAGE PLANS	3
2.3	IDENTIFIED DRAINAGE CONCERNS	5
2.3.1	FLOODING IN RESIDENTIAL SUBDIVISION WEST OF I-294, NORTH OF ARCHER AVENUE ALONG THE CN RAILROAD TRACKS IN THE VILLAGE OF WILLOW SPRINGS NEAR M.P. 21.1	5
2.3.2	STANDING WATER UNDER AND ADJACENT TO THE MILE LONG BRIDGE WITHIN THE MWRD LAWNDALE AVENUE SOLIDS MANAGEMENT AREA (LASMA) NEAR M.P. 21.4	7
2.3.3	FLOODING IN THE COMMERCIAL PROPERTIES AND BNSF RAIL YARD DRAINING TO THE DES PLAINES RIVER, EAST OF I-294, M.P. 21.5 TO M.P. 22.0, VILLAGE OF HODGKINS	7
2.3.4	I-294 MEDIAN DRAINAGE PROBLEM AREA, NORTH SIDE OF THE NORTHBOUND MILE-LONG BRIDGE, M.P. 22.0	8
2.3.5	STORM SEWER TELEVISIONING RECOMMENDATIONS	9
2.4	IDENTIFIED BASE FLOODPLAINS	9
2.5	OUTLET EVALUATION	12
2.6	BRIDGES AND CULVERTS	15
2.6.1	BRIDGE SPANS OVER WATERWAYS	15
2.6.2	WATERS OF THE US CULVERTS (WOUS)	19
2.6.3	MAJOR NON-WOUS CULVERTS	19
3	DRAINAGE DESIGN CRITERIA	22
4	PROPOSED DRAINAGE CONDITIONS	28
4.1	PROPOSED DRAINAGE CONDITIONS	28
4.2	PROPOSED DRAINAGE PLANS	29
4.3	PROPOSED DRAINAGE ALTERNATIVE FOR IDENTIFIED DRAINAGE CONCERNS	29
4.4	STORMWATER DETENTION ANALYSIS	30
4.5	RIGHT-OF-WAY ANALYSIS	34
4.6	DRAINAGE ALTERNATIVES	36
4.7	FLOODPLAIN ENCROACHMENT EVALUATION	36
4.8	BRIDGES AND CULVERTS	37
4.8.1	BRIDGE SPANS OVER WATERWAYS	37
4.8.2	WATERS OF THE US CULVERTS (WOUS)	39
4.8.3	MAJOR NON-WOUS CULVERTS	40
4.9	PERMITS	42

APPENDIX A – EXHIBITS

A-1.1	GENERAL LOCATION DRAINAGE MAP
A-1.2 TO A-1.3	EXISTING DRAINAGE PLAN OUTLET SUMMARY
A-2.1 TO A-2.12	EXISTING DRAINAGE PLAN
A-3.1	IDENTIFIED BASE FLOODPLAIN MAPS (FEMA FIRM)
A-3.2	MWRD INUNDATION MAP
A-3.3	COMPARISON OF DWP 100-YR INUNDATION MAPPING AND FEMA EFFECTIVE FIRM LOWER DES PLAINES RIVER WATERSHED
A-4.1	CHICAGO SANITARY AND SHIP CANAL WATER INFORMATION TABLE
A-4.2	DES PLAINES RIVER WATER INFORMATION TABLE (FIS MODEL)
A-4.3	DES PLAINES RIVER WATER INFORMATION TABLE (MWRD DWP MODEL)
A-5.1 TO A-5.12	PROPOSED DRAINAGE PLAN
A-5.13 TO A-5.16	PROPOSED DRAINAGE PROFILE
A-5.17 TO A-5.21	WILLOW SPRINGS/CN DRAINAGE EXISTING AND PROPOSED CONDITIONS AND ALTERNATIVES
A-6.1 TO A-6.5	EXISTING TYPICAL CROSS SECTIONS
A-6.6 TO A-6.13	PROPOSED TYPICAL CROSS SECTIONS
A-7	VILLAGE OF HODGKINS SANTA FE DRIVE DRAINAGE STUDY SUMMARY (MANHARD CONSULTING, LTD.)
A-8	SITE PHOTOS

Volume 2 of 2**APPENDIX B – CALCULATIONS**

STORM WATER DETENTION CALCULATIONS
HYDROLOGIC AND HYDRAULIC CALCULATIONS FOR BRIDGES
HYDROLOGIC AND HYDRAULIC CALCULATIONS FOR CULVERTS
SCUPPER AND INLET SPACING CALCULATIONS
HYDROLOGIC AND HYDRAULIC CALCULATIONS FOR SEWERS
OUTLET EVALUATION – CALCULATIONS AND SUPPORTING INFORMATION

APPENDIX C – SOURCE DATA REVIEWED**APPENDIX D – CORRESPONDENCE**

DISPOSITION OF COMMENTS

GEC COMMENTS (JUNE 1, 2016)

DCM/DSE COMMENTS (JUNE 1, 2016)

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1 EXECUTIVE SUMMARY

The Illinois State Toll Highway Authority (ISTHA) is conducting a Master Planning Study for the bridge rehabilitation and bridge reconstruction and widening of the Mile-Long Bridge (M.P. 20.7 to M.P. 22.3) in Cook County, Illinois, as part of the Tri-State Tollway (Interstate 294/I-294) infrastructure investments from 95th Street to Balmoral Avenue (M.P. 17.7 to M.P. 40.0) under the Move Illinois Program.

The project consists of replacing the Mile-Long Bridge (dual structures) and the proposed plan consists of adding an additional lane in each direction with a widened inside shoulder to serve as a flex lane. The existing dual structure bridge is comprised of sixteen units made up of 54 spans with a total length of 4,933.83 feet from centerline of bearing to centerline of bearing at abutments. The bridge carries I-294 over a Canadian National rail line with Amtrak and Metra use, the Illinois and Michigan (I&M) Canal, the Chicago Sanitary and Ship Canal, the Des Plaines River, the John Husar I&M canal trail, the Forest Preserve District of Cook County and Metropolitan Water Reclamation District of Greater Chicago properties, BNSF rail yard, Santa Fe Drive, and a portion of the 75th Street interchange ramps.

This Concept Drainage Report was prepared as part of the Concept Report and is submitted under separate cover. This study evaluates the drainage within the limits of Contract RR-14-4221, M.P. 20.7 (north of Archer Avenue) to M.P. 22.3 (south of 5th Avenue Cutoff Bridge over I-294). Note that for discussion purposes, the Mile Long Bridge/RR-14-4221 section will generally be referred to as a north-south roadway, and offsets to the right of the alignments are considered east, and offsets to the left of the alignments are considered west.

Existing deck drainage is accomplished by multiple deck scuppers installed in the median and outside shoulders of the bridge deck. Runoff is collected by drainage piping and carried down the piers by vertical downspout piping to splash blocks at the ground level. Some downspouts carry drainage directly into storm sewers or small, open detention areas located under the bridge. Drainage on the ground surface and in storm sewers is conveyed in open ditches and culverts to the Des Plaines River, the Chicago Sanitary & Ship Canal, and the I&M Canal.

The existing roadway drainage system consists of drainage structures along the center of the median that collect runoff from the median shoulders and inside lane (Lane 1) that outlet to roadside ditches and ramp infields, while the outside lanes (Lanes 2 through 4) and shoulders in both directions sheet flow to the roadside ditches or are collected by a storm sewer system. There is one known drainage concern on the mainline I-294 pavement section within the RR-14-4221 improvement limits.

Tollway maintenance staff noted a median drainage problem area at a sag curve on the north side of the northbound Mile Long Bridge. The median drainage system and sewer will be replaced as part of the proposed improvements which will address this concern. Refer to Section 2.3 for additional information on Identified Drainage Concerns.

In general, the proposed drainage design will follow the existing drainage patterns and maintain the existing outlets. Improvements are recommended at some of the existing outlets. The entire existing drainage system will be upgraded. The proposed drainage system will include a new bridge deck drainage system, storm sewers, detention basins, improved detention facilities in the ramp infields, ditches, bioswales, and cross-road culverts.

The limits of this contract are located in the Lower Des Plaines River watershed. Runoff within the projects limits is eventually discharged into the Des Plaines River, the Chicago Sanitary and Ship Canal, or the I&M canal. There are 11 existing outlets located within the project reconstruction limits.

The required stormwater detention was calculated based on the additional pavement area using Tollway design criteria (See Appendix B). The proposed additional bridge and roadway pavement will require approximately 5.7 acre-feet of stormwater detention. An estimated 0.7 acre-feet of existing stormwater detention volume will also need to be replaced that is currently within existing oversized sewers and in small, open detention areas under the bridge. An estimated 7.2 acre-feet of existing storage is located within the existing ramp infields and within the site of the UPS maintenance building property to be acquired that will need to be maintained. Detention will be provided by a combination of additional detention graded within improved interchange infields, proposed detention basins, oversized sewer (minimal), and ditch detention at individual outlets (See Appendix B). The overall required 100-year detention volume for the increase in impervious area, replacement of lost detention and maintenance of existing detention is estimated to be 13.6 acre-feet. An estimated 26.3 acre-feet of proposed 100-year detention volume is provided. Note that a detention basin is proposed to address both additional Tollway pavement area and an identified flooding concern in a residential area in Willow Springs along the CN Railroad right-of-way. This basin is estimated to provide 3.5 acre-feet of storage for the 100-year event.

2 EXISTING DRAINAGE CONDITIONS

2.1 GENERAL LOCATION DRAINAGE MAP

Please see Exhibit A-1.1 for the General Drainage Location Map and Exhibits A-1.2 and A-1.3 for the Existing Drainage Plan Outlet Summary drawings.

2.2 EXISTING DRAINAGE PLANS

The existing I-294 Mile Long Bridge deck drainage system consists of scuppers (7.5" wide x 37" long) installed in the median and outside shoulders of the bridge deck. The median scuppers collect runoff from the median shoulders and inside lane (Lane 1). The outside shoulder scuppers collect runoff from Lanes 2 through 4 and the outside shoulder.

The vertical alignment of the Tri-State Tollway in the area of the bridge starting from the south consists of a 0.5% tangent grade rising to the north to meet an 800' vertical curve cresting near the south side of the Des Plaines River (at Pier 23). The grade north of the vertical curve slopes downward at a rate of 0.5% toward the north end of the bridge.

The scuppers are typically spaced at approximately 350 foot centers in the outside shoulders, and infrequently spaced on the inside shoulders. The approximately 800 foot south limits of the bridge is superelevated with more frequently spaced scuppers located in the northbound outside shoulder and southbound inside shoulder. The scuppers discharge into horizontal or vertical piping and runoff is carried down the piers by vertical downspout piping typically to splash blocks at the ground level. Some downspouts carry drainage directly into storm sewers or small, open detention areas located under the bridge. Drainage on the ground surface and storm sewer is conveyed in open ditches and culverts to the Des Plaines River, the Chicago Sanitary & Ship Canal, and the I&M Canal.

The existing I-294 roadway drainage system consists of both open and closed drainage systems that convey roadway drainage runoff. There is a system of drainage structures along the center of the median that collect runoff from the median shoulder and inside lane (Lane 1). This median drainage system outlets to a system of roadside ditches, ramp infields, and closed drainage on the outside of the interstate. The outside lanes (Lanes 2 through 4) and shoulder sheet flow to the roadside ditches or ramp infields in open drainage areas and to drainage structures and pipe in sections where gutter is present. Open ditch locations along I-294 are summarized in Table 1 below.

Within the proposed reconstruction improvement limits, there are 11 existing outlets. Runoff within the northern section of the project limits is tributary to the Des Plaines River. Runoff from the middle section of the Mile Long Bridge deck (Spans 7 to 23) is tributary to the Chicago Sanitary and Ship Canal (CS&SC). Runoff from the southern section of the project limits is tributary to the I&M canal. The existing drainage patterns and existing outlets will be maintained. Improvements at various outlets are recommended.

There are two (2) major culverts and two (2) major combination culvert/sewers that cross under I-294 within the project reconstruction limits. There are also four (4) major culverts crossing under the ramps within the limits of proposed ramp improvements or in the immediate vicinity of the ramp improvements that were reviewed and analyzed.

There is existing stormwater detention in the Ramp B and Ramp C infields at the 75th Street interchange and in the lower infield of the Archer Avenue entrance Ramp C to southbound I-294. There is a small amount of detention in the upper infield for Archer Avenue entrance Ramp C to southbound I-294 and within the 42 inch diameter median sewer (Sta. 1086+87 to Sta. 1091+44) which are both located in the RR-14-4223 project limits (within the Outlet 20C system). There is a small amount of detention in the open, excavated areas that collect bridge deck drainage located between piers for five of the spans north of Santa Fe Drive. There is also a small amount of detention within the site of the UPS maintenance building property to be acquired.

The major tributary areas within the project limits, were delineated based on the contours generated from Lidar survey performed for this project and provided by the Tollway, site survey as well as available Cook County contours provided by the Tollway, and contours from USGS topographic maps.

The existing sub-divide tributary areas are identified with a dash and number suffix following the outlet name (21A-01, 21A-02, etc.). These areas are combined in the outlets. The outlets are named by the milepost of the outlet location (e.g., 21A).

Table 1: Existing Ditch Locations

Start STA	End STA	Offset	Description
1096+70	1100+76	LT	Ramp B to NB LaGrange Road/SB I-294 Infield
1106+18	1115+16	LT	Roadway Ditch, SB I-294 Along Retaining Wall
1108+66	1113+79	RT	Roadway Ditch, NB I-294
201+00	211+07	RT	Ramp B Ditch & Infield Detention Area
203+00	207+43	LT	Ramp B Ditch
112+08	117+01	LT	Ramp A Ditch
1175+04	1177+18	LT	Roadway Ditch, SB I-294
1169+74	1176+62	RT	Roadway Ditch, NB I-294
310+00	317+02	RT	Ramp C Infield & Detention Area, conveyance ditch for detention area
317+02	324+22	RT	Ramp C Infield (Ditch Upstream of Detention Area)
310+02	322+00	LT	Ramp C Ditch
409+37	418+51	RT	Ramp D Ditch
403+61	407+60	RT	Ramp D Ditch along access drive

Please see Exhibit A-2.1 through A-2.12 for the Existing Drainage Plans.

2.3 IDENTIFIED DRAINAGE CONCERNS

Note that there is an identified drainage concern, Drainage Issues Near Archer Avenue (SI 1104), which is located south of the project reconstruction limits. This identified drainage concern was evaluated by contract RR-14-4223. Also there is an identified drainage concern, Flooding Issues along the Tollway Row in the Village of Justice, which was evaluated by contract RR-14-4223. Based on coordination with the RR-14-4223 design team, the concerns are primarily at Outlets 19A, 19D, 19E & 19F. These outlets were evaluated by RR-14-4223 and they are also currently evaluating Outlet 20C which is located within the Village of Justice.

The identified drainage concerns being evaluated under this contract RR-14-4221 are described below.

2.3.1 Flooding in residential subdivision west of I-294, north of Archer Avenue along the CN railroad tracks in the Village of Willow Springs near M.P. 21.1

The Tollway conducted an outreach meeting with the Village of Willow Springs on January 11, 2016. Willow Springs stated at his meeting that the subdivision immediately south of I-294, west of LaGrange Rd and North of Archer Ave experiences severe flooding. The Tollway also received a copy of a letter addressed to numerous agencies from a resident at 412 N. Rust Trail that experiences significant flooding issues. This area of concern was initially reviewed in coordination with the Tollway GEC. There was an additional meeting with the Tollway, LHQ, Willow Springs and CN to discuss this issue and proposed drainage improvement alternatives on September 14, 2017.

Flooding is centralized behind the homes on N. Rust Trail adjacent to the CN railroad tracks. The residential property at 412 N. Rust Trail (Mr. Russo's property) experiences the most significant flooding in this area. Refer to Exhibits A-5.17 and A-5.18 for information regarding the existing conditions. The land at 412 N. Rust Trail is the lowest property adjacent to the CN drainage ditch. Recent field survey has verified that the local CN railroad ditch has its low point directly behind Mr. Russo's property. It was originally understood that the ditch flowed from west to east (high point near Poston Road) with a very mild slope and drained into the 24 inch storm sewer/culvert located along the south abutment of the Mile Long Bridge (MLB). As noted on Exhibit A-5.18, the actual low point of the ditch has an elevation of 586.0 and the upstream invert of the 24 inch sewer is 587.18. The survey noted a small ridge point immediately upstream of the 24 inch sewer at 588.28. This is likely due to silt and debris build up at the upstream end of the culvert that will ultimately be cleaned out. Therefore, for modeling purposes it was assumed that the ditch has to fill up to a depth of 1.18 feet (586.0 to 587.18) before flow from the ditch will be conveyed through the 24 inch sewer. It was observed that the CN ditch is very flat and poorly maintained with a lot of debris and vegetation (including large chunks of concrete, railroad ties, heavy vegetation in the ditch bottom) that limits the conveyance capability of the ditch

This 24 inch sewer/culvert conveys the runoff from the CN ditch to the east side of the Mile Long Bridge. There is approximately 49.9 acres of residential area tributary to the CN ditch. There is also an 18 inch storm sewer that connects into the 24 inch/sewer culvert. This 18 inch sewer conveys flow from approximately 3.4 acres of I-294 and 10.9 acres of the residential area via a concrete ditch along the west side of I-294. The 24 inch sewer/culvert that runs along the south abutment drains to another CN ditch east of I-294. The CN ditch then continues to drain east until it terminates at a 27 inch storm sewer that connects directly into a 54 inch storm sewer along the west side of LaGrange Road. The 54 inch storm sewer outlets into the I&M canal. The 24 inch sewer/culvert is undersized and restricts the conveyance, causing backwater and exacerbating upstream flooding in the upstream tributary areas described above.

The flood elevations resulting from the dynamic modeling of the existing conditions for the 2-year through 50-year recurrence intervals are shown on Exhibit A-5.18. The 2-year flood elevation was estimated to be 590.5 which causes flooding of the rear yard and garage of 412 N Rust Trail property. The survey indicated that a localized high point in the rear yard near the back door at approximately elevation 590.6. When flooding exceeds this elevation, runoff will drain directly towards the rear door which is sunken relative to the yard. The 50-year flood elevation was estimated at 593.1, which overtops the high point of the CN ditch near Poston Road.

The recommended proposed drainage improvement (referred to as Alternative 1) consists of the addition of a new culvert outfall into the I&M canal on the west side of I-294 and the acquisition of the 412 N Rust Trail property and the three adjacent residential properties to the east for the construction of a stormwater detention basin within the vacated properties and along the CN ditch. Refer to Exhibit A-5.19 for the proposed plan exhibit. The new outfall into the I&M canal would consist of a 48 inch diameter steel culvert under the CN railroad tracks, a short run of channel, and an approximately 6' x 2.5' box culvert under a gravel access path (cover constraints limit height) that would drain into the I&M canal. The detention basin would outfall into the 48 inch culvert under the CN tracks. The 100-year overflow from the basin would be graded at approximately elevation 590 (elevation 590 is approximate elevation along the CN right-of-way) and the overflow would be directed to an overflow ditch/or combination shallow ditch with small overflow culvert along the proposed south abutment wall of the MLB. Proposed runoff from portions of the I-294 improvements would be directed into the proposed basin. As noted on Exhibit A-5.19, the flood elevations are reduced significantly with this alternative.

The basin would provide many benefits including: reduction in flooding, attenuation of peak flow rate from this tributary area for the new outfall into the I&M canal, detention storage for a portion of the detention requirements related to the additional impervious area of the I-294 improvements, elimination of flood prone properties, and water quality benefits. This alternative is currently being coordinated with the Village of Willow Springs and the CN Railroad.

See the existing and proposed culverts (Sections 2.6.3 and 4.8.3), stormwater detention analysis (Section 4.4) and proposed drainage alternatives for identified drainage concern (Section 4.3) of the report for additional information.

2.3.2 Standing water under and adjacent to the Mile Long Bridge within the MWRD Lawndale Avenue Solids Management Area (LASMA) near M.P. 21.4

There is an extensive area of ponded water under and to the west of the Mile Long Bridge within the MWRD LASMA property. This area of standing water limits maintenance and inspection access to the bridge. Tollway and MWRD staff have stated that the ponding has gotten worse over time. MWRD staff stated that the ponding is likely due to a combination of a clogged drainage structure(s) and possible damming of flow toward the Chicago Sanitary and Ship Canal due to the access road along the canal. Record plans and field survey show two 15" to 18" outlet pipes (inlets/upstream ends not shown on records) draining into the north bank of the canal, however the upstream end of the pipes or any related inlets could not be located during field survey (with assistance from MWRD staff). A section of this ponded area was delineated as a wetland by LHQ wetland staff and is currently considered to be USACE jurisdictional wetland.

The proposed bridge will be located east of the existing bridge. The majority of the proposed detention basin will be within the limits of the existing standing water/wetland. The surface area west of the new bridge will be graded to drain to the proposed detention basin. The downspout discharges will be directed into the proposed basin. The proposed detention basin will utilize a new culvert outlet that will discharge into the Chicago Sanitary and Ship Canal. There will be space available between the east edge of the basin and the new bridge to allow for maintenance access to the bridge. These improvements will address this identified drainage concern. Wetland mitigation will be addressed in coordination with the USACE.

See the stormwater detention analysis (Section 4.4) for additional information on the detention basin.

2.3.3 Flooding in the commercial properties and BNSF rail yard draining to the Des Plaines River, east of I-294, M.P. 21.5 to M.P. 22.0, Village of Hodgkins

Tollway and LHQ staff have participated in community outreach meetings with the Village of Hodgkins and stakeholder meetings with BNSF and commercial properties adjacent to the bridge. All of these parties have stated concerns with flooding and drainage problems in the commercial area and BNSF yard located northeast of the Mile Long Bridge. This area is downstream of the northeast 75th Street interchange.

There are a series of culverts and channels that convey runoff from the commercial properties and BNSF yard to a dual 60 inch CMP culvert that drains into the Des Plaines River. It was observed during site visits that many of these culverts and channels are in poor condition with significant silting in of the conveyance system. The Village stated that if the river is high the water does not drain, which is frequently, and causes flooding.

The Village had a drainage study performed that provided recommendations for culvert, channel and maintenance improvements in this area. Excerpts from this study were provided to the Tollway and this information is included as Exhibit A-7.

There was a project coordination meeting with the Tollway, DCM, LHQ, and the Village of Hodgkins on March 21, 2017. The Village stated that they were not able to obtain approval for funding of the drainage and maintenance improvements recommended in the drainage study. It was also stated that the ditches located between the buildings are on private property and are maintained by the property owners. The property owners pump out these ditches when the water level gets high. The Village would be open to partnering opportunities with the Tollway for improvements to the drainage system within Village's jurisdiction. Improvements to the private ditches and any related temporary easements would have to be coordinated with property owners.

The proposed detention improvements in the Ramp C infield at the 75th street interchange will significantly reduce the peak flow rates and will also reduce the volume of flow into the Village of Hodgkins drainage system. It was discussed with the Village to replace approximately 640' of the 24" sewer storm along the south side of Santa Fe Drive with a larger diameter sewer with adequate capacity to accommodate the proposed bridge improvements from approximately the existing centerline of I-294 to the sewer outlet into the open ditch located between the east side of Superior Mechanical Systems and west side of Menasha Packing. Improvements to this storm sewer would allow for a reduction or possible elimination of stormwater detention upstream of the direct connection into the Santa Fe sewer. There is limited space available underneath the bridge to provide proposed detention. The additional detention volume in the Ramp C infield would mitigate for the increase in flow rate from the proposed storm sewer at the sewer outlet.

The potential improvements to the Village's drainage system will continue to be coordinated with the Village during the design process. Temporary easements are identified on the plans to address potential improvements within the private ditches. The proposed detention in the Ramp C infield was increased significantly from existing conditions with an existing 100-year detention volume of 3.7 acre-feet and a 100-year release rate of 174.5 cfs to a proposed detention volume of 11.5 acre-feet and a 100-year release rate of 156.5 cfs. The proposed basin will reduce the flow rate and volume into the Village's drainage system. An expanded detention basin area is also proposed in the area of the UPS maintenance building to be removed that will provide additional reduction in flow rate into the Village's drainage system.

See the stormwater detention analysis (Section 4.4) for additional information on the detention basins.

2.3.4 I-294 median drainage problem area, north side of the northbound Mile-Long Bridge, M.P. 22.0

On March 31, 2016, LHQ participated in a meeting with Tollway Maintenance and Design Staff and the other I-294 Design Section Engineers (DSEs) to discuss maintenance of traffic and maintenance issues with the Tollway Maintenance Department. Tollway

maintenance staff noted a median drainage problem area on the north side of the northbound Mile Long Bridge.

This area was reviewed for potential drainage issues. There is a low point in the sag curve approximately 360 feet north of the bridge. There are three median drainage structures at the sag point in the northbound and southbound median. Sag inlets are prone to clogging so the problem area is likely a maintenance issue. The median and median drainage structures will be replaced with the proposed improvements and the proposed bridge deck drainage system will be designed to minimize bypass flow coming off of the bridge deck. Refer to the Proposed Drainage Plan Exhibit A-5.7, Proposed Drainage Profile Exhibit A-5.15 and the Inlet Spacing and Storm Sewer Calculations in Appendix B for additional information on the proposed drainage system in this area.

2.3.5 Storm Sewer Televising Recommendations

There are no sewer televising recommendations for the identified drainage concerns described above. The mainline sewer within the project reconstruction limits will all be removed and replaced so there are no sewer televising recommendations for the mainline I-294 storm sewer.

It is recommended that the approximately 120 foot length of 42 inch storm sewer crossing under the southbound lanes of LaGrange Road (from approximately Sta. 1103+60 to 1104+80) be televised. This sewer will be located between the proposed drilled shafts for the new center pier of the proposed I-294 bridge over LaGrange Road.

Additional coordination is required with the BNSF railroad to determine if the existing CMP storm sewers that are proposed to be lined will require sewer televising prior to lining. Refer to Proposed Drainage Plan Exhibits A-5.5 and A-5.10 for the CMP sewer locations to be lined.

2.4 IDENTIFIED BASE FLOODPLAINS

There are a total of three waterway crossings within the study area with regulatory FEMA floodplains. The Mile Long Bridge has a transverse crossing of the following three waterways with mapped floodplains:

1. Illinois and Michigan (I&M) Canal
2. Chicago Sanitary and Ship Canal (CS&SC)
3. Des Plaines River (DPR)

A detailed description of each of the Mile Long Bridge spans over the waterways is included in Section 2.6 of this report. A brief description of each floodplain with the project limits is provided below:

1. Mile Long Bridge over the I&M Canal

The Mile Long Bridge over the I&M Canal is located within a Zone A floodplain. The I&M Canal is a manmade canal that has been blocked at two locations. The canal functions as a level-pool reservoir gradually flowing from northeast to southwest within the project area. There is a small earth dam located in the canal approximately 600 feet upstream of the Mile Long Bridge (immediately downstream of LaGrange Road Bridge) and another small dam located approximately 150 feet downstream of the Mile Long Bridge. There are pipe culverts that pass through the bottom of the dams that allow for restricted flow through the dams.

The Zone A floodplain boundary from the Flood Insurance Rate Map (FIRM) was superimposed on the existing topography (contours generated from survey, LiDAR and County) without any further adjustments for a very approximate estimate of the 100-year base flood elevation (approximately Elevation 585 at the bridge crossing).

The MWRD Detailed Watershed Plan (DWP) for the Calumet-Sag Channel Watershed (August 2009) was reviewed for additional information on the I&M canal in the project area. It is noted in the DWP that the I&M canal was not modeled in the project area due to reasons described above. The I&M canal south of the Cal-Sag Channel was modeled in detail in the DWP. The DWP contains information of sub-watersheds that are tributary to the I&M Canal in the project area.

The I&M Canal is listed as a Public Water (primarily artificial navigable water open to public use) and is available for recreational use.

2. Mile Long Bridge over the Chicago Sanitary and Ship Canal (CS&SC)

The Mile Long Bridge over the Chicago Sanitary and Ship Canal (CS&SC) is located within a Zone A floodplain. The CS&SC is part of the Chicago Area Waterway System (CAWS), which is a 76 mile network of man-made canals that is controlled by the MWRD and primarily serves to drain the Chicago metropolitan area and provide water based commercial transportation (*MWRD Detailed Watershed Plan, February 2009*). The CS&SC discharges into the Des Plaines River downstream at Lockport. The canal flows gradually from northeast to southwest in the project area.

The DWP for the Lower Des Plaines Watershed (February 2009) was reviewed for additional information on the CS&SC within the project area. A detailed hydrologic and hydraulic analysis was prepared as part of the DWP. The DWP utilized USACE hydrologic models and an unsteady HEC-RAS hydraulic model was developed as part of the DWP to determine detailed hydraulic profiles for the CS&SC. A floodway determination was not included in the DWP.

The Zone A floodplain boundary from the FIRM maps was superimposed directly onto the existing topography without any further adjustments. The 100-year flood elevations for

the DWP were also superimposed on the existing topography and the DWP boundaries were adjusted to best fit the existing contours.

As coordinated with IDNR-OWR, the hydrologic and hydraulic flood elevations information and related modeling included in the DWP will be utilized as the basis of design for this project.

The CS&SC is listed as a Public Water and is open to commercial and recreational navigation. The United States Coast Guard (USCG) has jurisdictional authority over the CS&SC. There has been initial coordination with the USCG related to horizontal and vertical clearance issues and permitting. The USACE maintains vertical and horizontal clearance charts with low operating water surface elevation information.

3. Mile Long Bridge over the Des Plaines River

The Mile Long Bridge over the Des Plaines River is located within a Zone AE floodplain with a regulatory floodway and is therefore included in the Cook County Flood Insurance Study (FIS). The DPR flows from northeast to southwest in the project area and is parallel to the CS&SC.

The MWRD DWP for the Lower Des Plaines Watershed (February 2009) was reviewed for additional information on the DPR within the project area. A detailed hydrologic and hydraulic analysis was prepared as part of the DWP. The DWP utilized USACE hydrologic models that were updated and an unsteady HEC-RAS hydraulic model was developed as part of the DWP to determine detailed hydraulic profiles for the DPR. A revised floodway determination was not included in the DWP.

The water surface elevations for various recurrence intervals included in the DWP within the project limits are at a higher elevations than the flood profiles included in the FIS and FEMA FIRM. The 100-year base flood elevation from the DWP is approximately 2.4 feet higher at the Mile Long Bridge crossing than the 100-year base flood elevation on the regulatory FEMA FIRM/FIS (599.8 DWP vs 597.4 FIS). The difference in base flood elevation is due to the higher flows in the DWP model. The flow rates in the DWP model were calculated by utilizing an unsteady state HEC-RAS model with HEC-HMS hydrologic modeling. The FIS used a HEC-2 hydraulic model with HEC-1 hydrologic modeling. The flow rates at the bridge in the DWP model are higher than the FIS model with a peak 100-year flow rate of 9642 cfs in the DWP model verses 8400 cfs in the FIS model. The cross sections in the vicinity of the bridge compare favorably with what is show in the DWP and FIS models with similar approximate elevation of 583 near the bridge. See Exhibit A-3.3 for a comparison of the FEMA floodplain and DWP inundation areas.

The Zone AE floodplain and floodway boundaries from the FIRM were superimposed directly onto the existing topography and were adjusted to best fit the existing contours. The 100-year flood elevations for the DWP were also superimposed on the existing topography and the DWP boundaries were adjusted to match the best fit the existing

contours. The floodplain boundaries on the DWP include inundation of flood prone areas in the Village of Hodgkins located on the north side of the river, east of I-294. These flood prone areas are hydraulically connected to the river by a series of channels and culverts (no flap gates observed during field inspections).

As coordinated with IDNR-OWR, both the regulatory FEMA model and the DWP model will be used for design and permitting purposes.

The DPR is listed as a Public Water within the project location (primarily artificial navigable water open to public use) and is available for recreational use. The USCG does not have jurisdictional authority of the DPR since the river is not open to commercial navigation.

Please see the following Exhibits A-3.1 to A-3.3 for floodplain mapping. Flood elevations stated in the FEMA FIS and Floodplain Maps and in the MWRD Detailed Watershed Plan Study and Inundation Maps are based on North American Vertical Datum (NAVD) 88. The project datum is NAVD 88 so no adjustments are needed to the elevations provided in the FEMA or MWRD studies.

2.5 OUTLET EVALUATION

Eleven (11) drainage outlets were identified within the project reconstruction limits. Outlets 20A and 20B are located south of the proposed RR-14-4221 pavement reconstruction limits and drainage improvements. As coordinated with the RR-14-4223 design team, these outlets are being evaluated in Contract RR-14-4223. Existing and proposed drainage information at the project tie-in location was provided to the RR-14-4223 design team. These two outlets are shown in Table 2 below for reference only and are not included in the total of 11 drainage outlets within the project reconstruction limits.

Outlet 20C is also being evaluated in Contract RR-14-4223. Existing and proposed drainage information draining into this outlet from the RR-14-4221 project was provided to the RR-14-4223 design team.

The existing outlet summary table below (Table 2) provides the outlet number corresponding to the existing drainage plans, outlet description, outlet location, outlet description and information on whether the outlet is sensitive and suitable for continued use. A more detailed existing outlet summary table which also summarizes existing and proposed tributary areas, existing, and proposed peak runoff and maximum allowable release rates at each outlet is included in Appendix B. See Appendix B (Outlet Evaluation-Calculations and Supporting Information) for outlet calculations.

See the General Location Drainage Map (Exhibit A-1.1) and the Existing Drainage Plan Outlet Summary drawings (Exhibits A-1.2 and A-1.3) for plan view summary of the drainage outlets.

Table 2: Existing Outlet Summary

OUTLET ID	OUTLET DESCRIPTION	STATION		LT/RT	MAJOR OUTFALL	WATERSHED	SENSITIVE OUTLET (Y/N)/ SUITABLE FOR CONTINUED USE (Y/N)
*20A	48" RCP STORM SEWER LEAVING TOLLWAY ROW AT 79TH STREET	1088+80	I-294	117' RT	Justice, Sewer System	I & M CANAL	Evaluation by RR-14-4223
*20B	21" RCP STORM SEWER CONNECTED INTO 54" RCP	1093+49		109' RT	IDOT Sewer System (West of LaGrange Road)		Evaluation by RR-14-4223
*20C	DRAINS INTO 6' X 5.5' RCBC	1103+21		113' RT	Open Channel (East of LaGrange Road)		Y/Y-Evaluation by RR-14-4223
**20D	54" RCP STORM SEWER @ LAGRANGE ROAD	1108+20		162' RT	IDOT Sewer System (West of LaGrange Road)		Y/Y-No increase in flow rate, partial relocation of sewer required
***21A	CN RAILROAD DITCH	1113+79		215' RT	IDOT Sewer System (West of LaGrange Road)		Y/Y - Ditch to be cleaned and proposed new outfall west of I-294 will reduce flow rate and volume to this outlet (see 21B below)
21B	I & M CANAL (BRIDGE SCUPPER DOWNSPOUTS)	1117+20		95' RT	IDOT Sewer System (West of LaGrange Road)		N/Y- A new outfall into the I&M Canal (Prop Culverts 21B-1 and 21B-2) with a detention basin is proposed west of I-294.
21C	CHICAGO SANITARY AND SHIP CANAL (BRIDGE SCUPPER DOWNSPOUTS)	1122+50		75' LT & RT	Chicago Sanitary & Ship Canal	CHICAGO SANITARY AND SHIP CANAL	N/N - New minor culvert required due to proposed bridge footprint

OUTLET ID	OUTLET DESCRIPTION	STATION		LT/RT	MAJOR OUTFALL	WATERSHED	SENSITIVE OUTLET (Y/N)/ SUITABLE FOR CONTINUED USE (Y/N)
***21D	12" CMP	1126+25	I-294	121' LT	Chicago Sanitary & Ship Canal	CHICAGO SANITARY AND SHIP CANAL	N/N - Proposed detention basin with new culvert outlet into the Canal
21E	24" RCP	1140+61		83' LT	BNSF Sewer System	DES PLAINES RIVER	N/Y- 24" RCP to remain, proposed discharge reduced
***21F	12" CMP	1140+32		161' RT	Des Plaines River		N/N - New minor culvert required due to proposed bridge footprint
21G	24" RCP @ SANTA FE DRIVE	1150+77		15' RT	Hodgkins/ BNSF Drainage System		Y/N- Proposed 36" sewer replacement to address undersized sewer and to accommodate increase in flow rates
****21H - BNSF	BNSF SEWER SYSTEM - 21" CMP	1143+42		572' RT	BNSF Drainage System		Y/Y - CMP sewers will be lined to increase capacity due to increase in flow rates
***21H	24" CMP	409+26	RAMP D	96' RT	Hodgkins /BNSF Drainage System		Y/Y-additional detention in Ramp C infield to be provided
***22A	18" RCP	212+43	RAMP B	127' RT	UPS Detention Basin	DES PLAINES RIVER (FIRST DRAINS INTO UPS DETENTION POND LOCATED SW CORNER OF 75TH STREET & UPS ENTRANCE 1)	Y/Y- additional detention in Ramp B infield to be provided

* FINAL ANALYSIS BY CONTRACT RR-14-4223
** NO DIRECT TOLLWAY RUNOFF
*** EXISTING RUNOFF IS BASED ON RESTRICTED CONDITION AT THE
OUTLET
**** NO DIRECT TOLLWAY RUNOFF IN EXISTING CONDITION

2.6 BRIDGES AND CULVERTS

The dual structure Mile Long Bridge spans over the three (3) waterways as described in Section 2.4. There are two (2) major culverts and two (2) major combination culvert/sewers that cross under I-294 within the project reconstruction limits. There are also four (4) major culverts crossing under the ramps within the limits of proposed ramp improvements or in the immediate vicinity of the ramp improvements that were reviewed and analyzed. There are a select number of other ramp culverts that were reviewed as part of the study due to the location of the culverts within the infield drainage system.

This section applies to any single barrel crossroad culvert with a cross-sectional opening area greater than 7.5 square feet, any multi-barrel crossroad culvert, any crossroad culvert located within an identified floodplain or within an area of identified drainage concern, and any crossings draining 20 or more acres in urban area.

Please see the Existing Drainage Plans, Exhibit A-2.1 to A-2.12 for the existing culvert and bridge crossings. For the proposed culvert and bridge crossings, see Section 4.8

2.6.1 Bridge Spans over Waterways

The dual structure Mile Long Bridge spans over three (3) waterways. The original bridge was constructed in 1957, widened to the inside in 1969, and then widened again to the outside in 1993. The out to out deck width is typically 76'-7" for each structure. See Sections below for a detailed description of the bridge spans over the three waterways.

2.6.1.1 Bridge Spans over the I&M Canal

The Mile Long Bridge crosses over the I&M Canal on a high-level bridge at MP 21.1 (Station 1118+02). The dual structure has one-span at the canal with a cast-in-place concrete deck and is located on W36 steel I-beams. The span length is 105'-0". The existing piers are located on the overbanks, outside the surveyed water surface. The out to out deck width is 76'-7" for each structure. The bridge is aligned with the canal and is on a skew of 21° 28' 55" (LT Ahead) with respect to the roadway centerline.

As described in Section 2.4 above, there are earth dams located upstream and downstream of the bridge. The canal functions as a level-pool reservoir within the project area. The canal flows gradually from northeast to southwest in the project area.

As coordinated with IDNR-OWR, a hydraulic evaluation of the existing and proposed crossing will not be required at the I&M canal since it is basically a level pool within the project limits.

2.6.1.2 Bridge Spans over the Chicago Sanitary and Ship Canal (CS&SC)

The Mile Long Bridge crosses over the Chicago Sanitary and Ship Canal (CS&SC) on a high-level bridge at MP 21.2 (Station 1123+96). The dual structure has three-spans at the canal with a cast-in-place concrete deck and is located on 90 inch to 150 inch steel plate girders. The southern span (Span 9) length is 196'-0", the main span (Span 10) over the canal is 260'-0" and the northern span (Span 11) length is 196'-0" for a continuous unit length of 652'-0". The existing piers for the main span are located near the edge of channel. The out to out deck width is 76'-7" for each structure. The bridge is aligned with the canal and is on a skew of 14° 00' 00" (LT Ahead) with respect to the roadway centerline.

The CS&SC crossing is located in a Zone A floodplain so a regulatory FEMA model does not exist. The MWRD DWP for the Lower Des Plaines River includes hydraulic profiles (20-year through 500-year) and inundation mapping for the CS&SC based on initial models developed by the USACE that were updated for the DWP. The DWP includes an unsteady HEC-RAS model for the CS&SC. A floodway determination is not included in these models. As coordinated with IDNR-OWR, a truncated, steady-state version of the DWP model will be used as a basis for the water surface elevations and modeling of the existing and proposed conditions and for permitting. The unsteady HEC-RAS model was obtained from the MWRD and truncated and converted to a steady state model within a distance of approximately 1,000 feet downstream and 2,000 feet upstream of the existing Mile Long Bridge. The LaGrange Road Bridge over the CS&SC is located approximately 800 feet upstream of the Mile Long Bridge so the limits of the truncated model extend approximately 1,200 feet upstream of the LaGrange Road Bridge. The truncated steady model was checked versus the unsteady model and only negligible differences of no more than 0.01 feet were observed. The cross sections in the truncated model were then updated with the project hydraulic survey and project LiDAR survey within the limits of available project survey and LiDAR data. The Manning's n values used in the DWP model were compared to the CS&SC channel photos and aerial images. The physical properties of the channel were accurately represented with n values in the DWP model. The existing Mile Long and LaGrange Road bridges were not included in the DWP model but were added to the model based on project survey.

The natural conditions model was created by removing the existing bridges from the model.

IDNR has confirmed that permitting for the CS&SC will be based on Part 3700 (non-designated floodway) and Part 3704 (Public Water) rules.

The preliminary hydraulic calculations and HEC-RAS output for the natural and existing conditions are included in Appendix B. A Waterway Information Table is included as Exhibit A-4.1. The created head for the existing bridge is minimal with a maximum created head of 0.02 feet (highest created head corresponds for the 50-year frequency).

2.6.1.3 Bridge Spans over the Des Plaines River

The Mile Long Bridge crosses over the Des Plaines River (DPR) on a high-level bridge at MP 21.5 (Station 1137+65). The dual structure has three-spans at the river with a cast-in-place concrete deck and is located on W36 steel I-beams. The southern span (Span 23) length is 100'-0", the main span (Span 24) over the river is 100'-0" and the northern span (Span 25) length is 75'-9" for a length of 275'-9" over the river. The existing piers for the main span are approximately 50' from the center of channel. The out to out deck width is 76'-7" for each structure. The bridge is aligned with the canal and is on a skew of 6° 34' 30" (LT Ahead) with respect to the roadway centerline.

The DPR crossing is located within a Zone AE floodplain with a regulatory floodway and is therefore included in the Cook County Flood Insurance Study (FIS). The regulatory FEMA model is based on a HEC-1 hydrologic model and HEC-2 hydraulic model. The MWRD Detailed Watershed Plan (DWP) for the Lower Des Plaines River includes hydraulic (2-year through 100-year) and inundation mapping for the DPR based on an updated HEC-HMS hydrologic model and an unsteady HEC-RAS model. An updated floodway determination is not included in DWP model. As coordinated with IDNR-OWR both the truncated, steady-state version of the DWP model and the regulatory FEMA model will be used as a basis for the water surface elevations and modeling of the existing and proposed conditions and for permitting

The unsteady HEC-RAS model was obtained from the MWRD and truncated and converted to a steady state model within a distance of approximately 2,200 feet downstream and 2,800 feet upstream of the existing Mile Long Bridge. The truncated steady model was checked versus the unsteady model and only negligible differences of no more than 0.01 feet were observed. The cross sections in the truncated model were then updated with the project hydraulic survey and project LiDAR survey within the limits of available project survey and LiDAR data. The Manning's n values used in the DWP model were compared to the Des Plaines River photos and aerial images. The physical properties of the channel were accurately represented with n values in the DWP model. The existing Mile Long Bridge and LaGrange Road were not included in the DWP model but the Mile Long Bridge was added to the model based on project survey. The model will be further truncated south of LaGrange Road Bridge since this bridge is located approximately 1,250 feet upstream of the Mile Long Bridge

There was no 500-year flow in the DWP model but the model included flows for the 2, 5, 10, 25, 50, and 100-year events. These flows were used to interpolate the 500-yr by performing a log-log analysis. The flows were plotted and then a trend line was formed to interpolate the 500-year flow. The 500-year interpolated flow used was 11,430 cfs.

The original FEMA model was a hard copy printout of a HEC 2 model of the Des Plaines River from 1979. The hard copy was manually typed into a text document following the HEC 2 input format to produce a ".dat" file that could be imported into HEC-RAS. The hard copy also contained multiple different runs of the model. Two (2) versions used the same cross section geometry but different boundary conditions. One boundary condition was the downstream normal depth was 0.00120, and the other used a known water surface

elevation of 595.50 feet that also contained a run of a 0.1 feet increase in water surface scenario. For the duplicate effective model, the run that was replicated contained the original geometry of the cross sections and a boundary condition with a normal depth of 0.00120.

The HEC-RAS water surface elevations at every cross section for all four (4) flows only varied between 0.0-0.05 feet of the HEC-2 results. The small difference in water surface elevation are to be expected when comparing results from a model ran in HEC-2 and the same model being ran in HEC-RAS. These differences are due to the changes in the programs and how they compute the results.

The duplicate effective model was then imported into GeoHECRAS. The map coordinate reference system used was the NAD83(NSRS2007)/Illinois East (ftUS). Three (3) cross-sections of the Duplicate Effective Model, cross-section 4, 6, 8, were extended using Cook County topography and USGS topography.

For the Corrected Effective Model – Existing, current survey data was added to the GeoHECRAS model. The Mile-Long Bridge along with five (5) cross section upstream and five (5) cross sections downstream of the Mile-Long Bridge were added to the model. The water surface elevations were compared to the Duplicate Effective Model. The water surface elevations at all cross sections were within the FEMA 0.5 feet tie-in requirement. The difference in water surface elevations are due to the addition of new survey data and the addition on the bridge that was not present in the HEC 2 model.

For the Corrected Effective Model – Natural, the bridge was removed from the Corrected Effective Model – Existing. The water surface elevations differences were due to the bridge being removed from the model. The Corrected Effective Model – Natural were closer to the Duplicate Effective model and were within 0.5 foot on all cross sections.

The natural condition models was created by removing the existing bridges from the truncated DWP model as well. .

IDNR-OWR has confirmed that permitting for the DPR will be based on Part 3708 (designated floodway) and Part 3704 (Public Water) rules.

The preliminary hydraulic calculations and HEC-RAS output for the natural and existing conditions are included in Appendix B. Waterway Information Tables are included as Exhibits A-4.2 (FIS) and 4.3 (DWP). The created head for the existing bridge is minimal with a maximum created head of 0.03 feet (for the 10-year through 500-year frequencies) in the FEMA model. The created head for the existing bridge in the DWP model is slightly increased for the 500-year at 0.05 feet. The DWP model created head to the existing bridge is 0.02 feet for both the 50-year and 100-year event. The increase in created head for the 500-year event could be due to the larger flow used in the DWP model.

A existing pier scour analysis was done for both the DWP model and the FEMA model using HEC-RAS, which uses the FHWA HEC-18 method to model scour. The existing

pier scour in the DWP model is 5.84 feet for the 100-year event and 5.93 feet for the 500-year event. The existing pier scour in the FEMA model is 5.78 feet for the 100-year event and 6.04 feet for the 500-year event. The DWP model and FEMA model had very similar results with the existing pier scour.

2.6.2 Waters of the US Culverts (WOUS)

There are no major WOUS culverts with Tollway ROW.

2.6.3 Major Non-WOUS Culverts

As stated above, there are two (2) major culverts and two (2) major combination culvert/sewers that cross under I-294 within the project reconstruction limits. There are also four (4) major culverts crossing under the ramps within the limits of proposed ramp improvements or in the immediate vicinity of the ramp improvements that were reviewed and analyzed. There are a select number of other ramp culverts that were reviewed as part of the study due to the location of the culverts within the infield drainage system.

Culverts 20C-3, 20C-4, and 20C-5 will be analyzed by Contract RR-14-4223. Existing and proposed drainage information draining into this outlet from the RR-14-4221 project was provided to the RR-14-4223 design team.

The major crossing culverts were modeled with Bentley Civilstorm. The culverts were modeled as part of the existing and proposed detention analysis. Bentley Civilstorm is the design and analysis software included with the Bentley Subsurface Utility Design and Analysis (SUDA) package. The 500-year event checks for the mainline and ramp culverts were estimated using a log-log interpolation to estimate flow rate and FHWA HY-8 software was used to estimate the 500-year headwater elevations.

SCS method hydrology (Bulletin 70, Huff distributions) was used to generate peak flows to the major culverts.

The following culvert table provides the culvert number (corresponding to the culvert summary on the General Location Drainage Map), location, size and a note stating if the culvert was analyzed. Culvert located within the existing right-of-way and permanent easements are included in the table. The culverts in bold text indicate the two culverts and one sewer/culvert crossing under I-294. Note that culverts 22A-1, 22A-2, 22A-3 and 22H-12 are not considered major culverts but an initial analysis was performed as part of the review of the ramp infield detention system. A number of the minor culverts were analyzed as part of the outlet evaluation (flow rates computed, headwater not computed) and are not noted as analyzed/modeled in Table 3 below.

Table 3: Existing Culvert Summary

MILE LONG BRIDGE - EXISTING CULVERT SUMMARY									
CUL #	CULVERT SIZE	LOCATION			> 7.5 SQ. FT.	TRIBUTARY AREA > 20 AC	FLOODPLAIN	ID CONCERN	ANALYZED/ MODELED
		ALIGN.	STA.	LT/RT					
20C-5	42" RCP	I-294	1096+58	202' LT	X			Analysis by Contract RR-14- 4223	
20C-4	95" x 67" CMP Arch Culvert (70" x 48" HDPE Liner)		1102+09	0' LT	X	X			
20C-3	6' X 5.5' RC Box Culvert		1103+41	185' RT	X	X			X
20D-1	54" RCP/42" Lined CMP & RCP		1106+60	0' LT	X	X			TBD- Further coordinate with IDOT
21A-2	24" / 18" RCP Sewer		1115+06	0' LT		X		X	X
21A-1	27" RCP DIRECT CONNECTION TO 54" RCP		1112+16	441' RT		X		X	X
21D-2	15" CMP		1125+54	141' RT			X		
21D-1	12" CMP		1126+25	121' LT			X	X	
21E-1	24" / 18" / 15" RCP Sewer		1144+74	80' LT			X		
21F-1	12" CMP		1140+56	155' RT			X		
21 G-7	18" CMP		1157+77	5' LT					
21 G-6	18" CMP		1157+06	5' LT					
21 G-5	18" CMP		1155+79	6' LT					
21 G-4	18" CMP		1154+41	6' LT					
21 G-3	18" CMP		1153+55	6' LT					
21 G-2	18" CMP		1152+44	4' LT					
21 G-1	18" CMP	1151+61	6' LT						
21H-16	2-27" RCP	RAMP A	110+83	0' LT				Analysis by Contract RR-14- 4223	
			110+89	0' LT					
21H-15	42" /36" RCP	I-294	1173+58	0' LT	X			X	
21H-14	2-48" RCP		418+47	0' LT	X	X		X	

MILE LONG BRIDGE - EXISTING CULVERT SUMMARY									
CUL #	CULVERT SIZE	LOCATION			> 7.5 SQ. FT.	TRIBUTARY AREA > 20 AC	FLOODPLAIN	ID CONCERN	ANALYZED/ MODELED
		ALIGN.	STA.	LT/RT					
		RAMP D	418+53	0' LT					
21H-13	2-48" RCP	RAMP C	309+97	0' LT	X	X		X	
21H-12	24" RCP		310+03	0' LT				X	
21H-11	72" RCP	RAMP D	318+92	85' RT				X	
21H-10	24" CMP		409+32	0' LT	X	X		X	
22A-3	24" RCP	RAMP B	408+89	126' RT		X	X	X	
22A-2	30" X 19" RCP	RAMP A	203+00	0' LT				X	
22A-1	24" RCP	RAMP B	117+00	0' LT				X	
			211+48	128' RT				X	

The existing culvert calculations and culvert evaluation summary tables are included in Appendix B. The justification for replacement of existing culverts and a description of the proposed culverts is included in Section 4.8.

3 DRAINAGE DESIGN CRITERIA

The Drainage Criteria is based upon the criteria established in the Tollway Drainage Design Manual dated March 2017. Within the Tollway's right-of-way, the Tollway criteria will govern over the MWRD criteria per coordination with the Tollway and MWRD. The Drainage Design Criteria for the Central Tri-State Corridor, provided by the Design Corridor Manager (Task B-9 Bridge Deck Drainage was added for additional clarification for RR-14-4221), is included below.

Table 4: Drainage Design Criteria

	Task	Description
A - HYDROLOGY		
A-1	Rainfall Intensity and Distribution	ISWS Bulletin 70 (Isohyetal Values) with Huff Distributions will be used for bridges, culverts, channels, and detention basin design. ISWS Bulletin 70 (Sectional Values) will be used for storm sewers and roadway ditch design. If a hydrograph method is used, rainfall should be distributed using the appropriate ISWS Circular 173 Huff rainfall distribution (Huff, 1990) and a critical duration analysis must be utilized.
A-2	Peak Discharge for Major Waterway Crossings	FIS and MWRD discharge will be used for major waterway structures when available. If storm gage data are available, they may be used for design purposes. Otherwise, a hydrograph method shall be used to calculate peak flows. Regression equations may be used for watersheds ≥ 450 -ac in urban area.
A-3	Peak Discharge for Storm Sewers, Ditches, and Minor Culverts	Rational Method for watersheds less than 200-ac. However, a hydrograph method is preferred for complex facilities and larger watersheds.
A-4	Runoff coefficients C	C = 0.95 (impervious), C = 0.30 (pervious)
A-5	Runoff curve numbers CN	CN = 74 (open spaces with grass cover on 75% - lawns, parks, golf courses, cemeteries, for hydrologic soil group C)
B - HYDRAULICS		
B-1	Bridge	Design frequency is 50-yr storm; the calculated design headwater elevation (HW) shall be minimum 3 ft. below the low edge of pavement. The low chord shall be at least 2 ft. above the 50-yr natural highwater surface elevation and also above recorded high water at site. Check for the 500-yr storm, HW shall not encroach onto the roadway edge of pavement on the low side of the roadway. If the structure is located in designated floodway or floodplain, see item B-2 below for additional design criteria.
B-2	Major Waterway Crossings Located in	Required for all designated floodways and floodplains with greater than 1 sq.mile (640-ac) watershed area. For structures in designated floodways, the structure shall meet the 17 ILL. ADM. CODE-Part 3708

	Task	Description
	Designated Floodway or Floodplains	<p>rules for Bridge and Culvert Reconstruction or Modification, which may involve determining the feasibility of reducing the created head to 0.1 ft. over natural for events up to and including the 100-yr storm, if the structure is a source of flood damage. If the structure is not a source of flood damage, minimum design criteria is to not increase the flood profile by more than 0.1 ft. over existing, for flood profiles up to and including the 100-yr storm.</p> <p>When no designated floodway exists, the proposed structure shall meet the Part 3700 rules for Bridge and Culvert Reconstruction. In general, replacement structures should reduce created head to 0.5 ft. for floods up to and including the 100-yr event.</p> <p>See also App. K to the Tollway’s Drainage Manual Dated March 2017.</p>
B-3	Storm Sewers	<p>Design frequency is 50-yr storm; the maximum highwater elevation shall be kept at least 2 ft. below the manhole/inlet rim elevation.</p> <p>Zero encroachment on traveled way and no closer than 3 ft. from the edge of the traveled way. Maximum water depth on pavement of 0.35 ft.</p> <p>Minimum size shall be 15” dia. RCP under traveled way, or 12” dia. RCP outside of traveled way. Minimum 6-in cover between bottom of subbase and crest of the pipe.</p> <p>Maximum structure spacing is 350 ft. (15” to 24” dia.), 400 ft. (27” to 36” dia.), 500 ft. (42” to 54” dia.) and 1,000 ft. (over 60” dia.).</p> <p>Maximum inlet spacing is 1,000 ft. The first inlet spacing may be as great as 1,200 ft. from crest vertical curve. Minimum three structures at sag locations.</p>
B-4	Cross Road Culvert	<p>Design frequency is 50-yr storm; the calculated design headwater shall be minimum 3 ft. below the low edge of pavement, $HW/D \leq 1$ ratio or maximum 0.5 ft. of created head.</p> <p>Check for 100-yr storm, no encroachment on any adjacent properties. Check for 500-yr storm, no overtopping of roadway.</p> <p>Minimum size for roadway or ramp crossings is 24” dia. RCP for lengths less than 200 ft. and 30” dia. RCP for longer than 200 ft.</p> <p>Minimum size for ditch culverts is 18” dia. RCP.</p> <p>No CMP will be allowed.</p> <p>Use HY-8 for non floodplain areas and HECRAS for floodplain areas.</p>
B-5	Ditch Design Requirements	<p>Design frequency is 50-yr storm. The ditch depth shall be a minimum of 3 ft., or the water surface elevation (WSEL) in the ditch shall be 2 ft. below the edge of pavement, or 1 ft. below the adjacent right-of-way, whichever is controlling.</p> <p>The minimal longitudinal slope shall be 0.3% (with 0.5% preferred by IDOT District One). Longitudinal slope less than 0.3% is allowable with the approval of the Tollway, if special consideration is provided.</p>

	Task	Description
		The velocities shall be generally between 3 to 5 fps. Ditches with more than 5-fps will need to be lined. Ditch lining recommendations will consider velocity and soil types. Check for 100-yr storm, the WSEL shall not encroach onto the roadway.
B-6	Ditch Cross Section Requirements	For new ditches, 6:1 foreslopes, 4-ft. bottom and 4:1 backslopes are desirable, but 4:1 foreslopes, 2-ft bottom and 3:1 backslopes are acceptable. When existing ditches are to remain or to be re-established, use 4:1 foreslopes, 2-ft bottom, and 3:1 backslopes. The ditch check crest must be a minimum of 1 ft. above grated inlets and 2 ft. below the edge of pavement.
B-7	Pump Station	Design frequency is 50-yr storm; the design hydraulic gradeline shall have a 2 ft. freeboard below the top of the inlet. Check for 100-yr, the hydraulic gradeline shall not be above the top of the inlet.
B-8	Interchange and Expressway	The proposed interchange and expressway in the floodplain shall have a minimum of 3 ft. of freeboard against the 50-yr storm WSEL, or 2 ft. of freeboard against the 100-yr WSEL, whichever is higher.
B-9	Bridge Deck Drainage	Bridge scupper spacing on the outside shoulder for Tollway bridges shall be designed for the 10-year event. Bridge scupper spacing for the flex lane (inside shoulder) shall be designed to meet the corridor flex lane criteria (see note below this Table). Bypass runoff from the bridge deck shall be designed for the 50-year event to be intercepted by the roadway drainage system. Zero maximum encroachment on the traveled way with minimum of 3 inlets at any sag vertical curve.
C - FLOODPLAIN		
C-1	Compensatory Storage	For fill in the regulatory floodplain, 17 ILL. ADM. CODE-Part 3708 rules will need to be followed. The Compensatory Storage Volume, for any fill due to roadway widening and structures in the regulatory floodplain, shall be provided incrementally between the normal elevation and the 10-yr flood elevation and between the 10-yr flood elevation and the base flood elevation (BFE) (100-yr flood elevation) as follows: (i) at a 1:1.0 ratio for Cook County (ii) at a 1:1.0 or 1:1.5 ratio for DuPage County. For details, see DuPage County Countywide Stormwater and Flood Plain Ordinance, dated April 2013, section 15-81.D
D - DETENTION		
D-1	General Considerations	Detention volume shall be provided to compensate for the effect of increased peak discharges resulting from the additional impervious areas. The proposed construction shall not increase the existing peak runoff from Tollway property and shall comply with the maximum

	Task	Description
		<p>allowable release rate criteria (see section D3). Offsite drainage shall be bypassed rather than detained.</p> <p>Detention in ditches can be provided if it does not cause a hazard to traffic. Detention in pipes is acceptable only if no other alternate is feasible. A 2-fps cleansing velocity must be provided for upsized pipes used for conveyance and storage purpose.</p> <p>Detention facilities and floodplain compensatory storage site shall be provided separately.</p>
D-2	Design Storm	<p>100-yr storm event for the critical storm duration (Cook County facilities) and for the 24-hr storm duration (DuPage County facilities), using the ISWS Bulletin 70 rainfall depth.</p>
D-3	Maximum Allowable Release Rates	<p>The maximum allowable release rates are estimated, for the added impervious area only, as follows:</p> <ul style="list-style-type: none"> (i) 0.04-cfs/acre, for the 2-yr storm and for the critical storm duration (Cook County facilities) and for the 24-hr storm duration (DuPage County facilities). (ii) 0.10-cfs/acre, for the 100-yr storm and 24-hr storm duration (DuPage County facilities). (iii) 0.15-cfs/acre, for the 100-yr storm and for the critical storm duration (Cook County facilities). <p>The offsite post-development release rates shall be less than or equal to the pre-developed condition release rates, for the 2-yr and 100-yr storm events, for the critical storm duration (Cook County facilities) and for the 24-hr storm duration (DuPage County facilities). The above release rates should be estimated using an appropriate hydrograph routing method such as HEC-HMS, xpSWMM, Win TR-20, or Pond-Pack.</p>
D-4	Required Volume	<p>The volume of required detention storage (acre-feet) can be initially estimated using the maximum allowable release rates (see section D-3) and as shown in Appendix G1 (for Cook County facilities) and Appendix G2 (for DuPage County facilities).</p> <p>The final detention volumes and the outlet control structure (restrictor) will be designed according to section D-5 and section D-6.</p>
D-5	Water Quality Volume	<p>The required volume control shall include the capture of the first flush, a runoff volume equal to 1.00” (Cook County), or 1.25” (DuPage County) of rainfall times the added impervious area.</p> <p>The runoff from the first flush rainfall shall be stored below the elevation of the primary gravity outlet of detention facility, or within roadside ditches located upstream of the proposed detention facility. A control structure or underdrain may be used, provided that the draw down time is between 48 and 96 hours.</p> <p>According to USACOE (Oct 2016), the applicants for Regional Permit 3 shall be required to make a reasonable attempt to retain the runoff from the 1.00” rainfall event. Where project constraints make it impracticable</p>

	Task	Description
		to fully met the stormwater performance standard, applicants shall be allowed to implement practices according with the following hierarchy: (i) retention facilities, (ii) use of bioswales, (iii) detention facilities, (iv) use of catch basins with sumps or other inlet controls, and (v) runoff design practices for bridge deck runoff crossing waters to minimize stormwater impacts.
D-6	Methodology	<p>Detention shall be designed using an appropriate hydrograph routing method such as HEC-HMS, xpSWMM, Win TR-20, or Pond-Pack.</p> <p>Proposed condition release rates, at the main outfall (outlet), must be less than or equal to existing condition release rates, for the 2-yr and 100-yr storm events for the critical storm duration.</p> <p>Within the same watershed, some shifting of required detention between outfalls (outlets) is allowable (regional detention). The proposed release rates, at the main outfalls (outlets) included in the regional detention analysis, must be less than or equal to existing release rates, for the 2-yr and 100-yr storm events for the critical storm durations.</p>
D-7	Detention Basin	<p>Dry detention basins are preferred. Wet basins are allowed for water quality, if they are not a hazard or are shielded by guardrail, and only with the Tollway approval.</p> <p>A minimum of 2 ft. freeboard above the maximum water surface elevation (100-yr) to the top of berm and a minimum of 3 inches above the maximum water surface elevation (100-yr) over emergency spillway to the top of berm shall be provided.</p> <p>The control structure in and out pipes should have the same size. The minimum restrictor plate orifice size is 4" dia.</p>
D-8	Detention in Ditches	<p>Maximum water surface elevation (100-yr) shall be at least 2 ft. below the edge of pavement.</p> <p>A maximum detention depth of 4 ft. is recommended.</p> <p>Minimum ditch check outlet pipe shall be 12" dia. and a minimum 4" dia. restrictor plate orifice.</p> <p>A minimum of 1 ft. freeboard shall be provided between the maximum water surface elevation (100-yr) and the existing right-of-way ground elevation.</p>
D-9	Detention in Infield Areas	<p>Maximum water surface elevation (100-yr) shall be at least 2 ft. below the edge of pavement.</p>

For flex lane drainage requirements (previously referred to as Lane 0), the criteria for allowable storm water spread within a newly constructed full width flex lane is defined in the Technical memorandum submitted to the Tollway. Areas where existing shoulder width remains, or a flex lane has a width of less than 16', special consideration will have to be provided on a case by case basis to determine the most viable allowable criteria for storm water spread.

For reference, please see Lane 0 (Flex Lane) Memorandum (Updated November 1, 2016) prepared by the DCM (included in Appendix D).

4 PROPOSED DRAINAGE CONDITIONS

4.1 PROPOSED DRAINAGE CONDITIONS

4 The proposed drainage improvements will maintain the existing outlets and replicate the existing drainage patterns as closely as possible. The proposed roadway drainage system will be a combination of a closed and open system. The proposed drainage system will generally consist of drainage structures along the center of the median that will collect runoff from the median shoulders (Lane 0) into a storm sewer system that will outlet to roadside ditches. The proposed center median for the proposed improvements is typically located east of the existing median due to the proposed alignment shift so all of the median storm sewer will need to be replaced within the improvement limits. Lanes 1 through 5 and the outside shoulder will typically drain to the roadside ditches. For areas with proposed retaining walls, noise walls, cut sections with backslopes, or in some areas with steep front slopes, the proposed roadway typical cross section will utilize a barrier wall or gutter along the outside edge of shoulder to collect runoff from the roadway. The proposed ditch slopes will typically follow the similar grades and flow in the same direction as the existing. The roadside ditches in many areas will need to be regraded due to the proposed additional outside lane and to provide additional conveyance, detention and water quality benefits. Bioswales will be utilized at select locations. Paved ditches will be replaced within the improvement limits with open cell vegetated articulated block, bioswales or with other stabilized, vegetated systems. The roadside ditches will convey flow to the improved culverts, ramp infields and waterways.

4 The bridge deck drainage system will consist of scuppers placed in the outside and median shoulders (flex lane) to collect runoff from the lane and shoulder configuration described above. The bridge deck drainage system will be designed to convey runoff into detention facilities (where feasible) and/or storm water best management practices (BMPs) for filtering of pollutants prior to release into the waterways. The bridge drainage systems in some cases will consist of sections of horizontal piping supported below the deck to convey the runoff to the BMPs and detention facilities. For the spans located over the BNSF rail yard, the scuppers for the southbound bridge will discharge into an existing 18 inch/24inch storm sewer which is proposed to remain with existing Tollway permanent easement. This sewer will be retrofitted with a manhole with a sump or stormwater quality treatment structure at its outfall for treatment of runoff prior to its discharge into wetlands on the banks of the Des Plaines River. The scuppers for the spans for the northbound bridge over the rail yard are proposed to drain into existing CMP storm sewers within the yard that will be lined to improve the conveyance capacity of the sewers.

4 The proposed bridge spans allow for additional opening area in the waterways and the hydraulic performance of the crossings will be improved.

4 Stormwater detention facilities and BMPs will be utilized throughout the project limits to meet Tollway requirements for newly added impervious area and to replace existing volumes impacted by the proposed improvements. The Ramp B and C infields at the 75th Street interchange will be enhanced with additional detention and water quality volume.

The lower infield area for the Archer Avenue entrance Ramp C onto southbound I-294 will be enhanced for additional detention and water quality volume, in coordination with RR-14-4223 design team. Other identified detention/BMP locations include, but are not limited to, an oversized bioswale with a permanent ditch check for detention in the Tollway's existing triangular right-of-way area located on the east side of I-294 between LaGrange Road and the CN tracks, a new detention basin in Willow Springs on the west side of I-294 along the CN tracks, a proposed detention basin within proposed right-of-way on the MWRD LASMA site on the west side of the Mile Long Bridge and an expanded existing detention basin in the area of the UPS Maintenance Building to be removed along the east side of the Mile Long Bridge, south of Santa Fe Drive in the Village of Hodgkins.

4.2 PROPOSED DRAINAGE PLANS

The proposed drainage plans are included in Appendix A as Exhibits A-5.1 through A-5.12. The proposed drainage profiles are included in Appendix A as Exhibits A-5.13 through A-5.16.

4.3 PROPOSED DRAINAGE ALTERNATIVE FOR IDENTIFIED DRAINAGE CONCERNS

There are three alternatives that are being considered for the identified drainage concern at Outlet 21A (flooding in residential subdivision in Willow Springs – See Section 2.3.1). The recommended Alternative (Alternative 1) is described in Section 2.3.1.

The second alternative (Alternative 2) consists of the addition of the new culvert outfall into the I&M canal on the west side of I-294 as described in Alternative 1 and the acquisition of the 412 N Rust Trail property (no proposed detention basin). Refer to Exhibit A-5.20 for Alternative 2. The proposed culvert would be located west of the Alternative 1 location so that it is in-line with the 412 N. Rust Trail property to facilitate construction of the culvert. The proposed CN ditch would also be regraded to drain to the culvert location with an overflow/high point ditch elevation set at approximately elevation 590 west of I-294. Overflow would be directed to an overflow ditch or combination shallow ditch with small overflow culvert along the proposed south abutment wall of the MLB. This alternative still provides a significant reduction in flooding, however the attenuation of peak flow rate into the I&M canal as compared to Alternative 1 will not be as significant due to the elimination of the proposed detention basin.

The third alternative (Alternative 3) consists of the replacement of the 24 inch sewer/culvert along the Mile Long Bridge south abutment with a larger culvert (72 inch estimated) that would provide adequate capacity and opening area to convey the runoff from the upstream tributary area to the downstream CN ditch on the east side of I-294 and ultimately to the IDOT sewer outfall into the I&M canal. Refer to Exhibit A-5.21 for Alternative 3. The ditch along the CN would be regraded to flow from west to east to the new culvert and the low point in the CN ditch at the 412 N. Rust Trail property would be eliminated with the regrading. There are numerous concerns/issues related to the improvements needed at the IDOT sewer outfall into the I&M canal to accommodate this alternative. This alternative would result in a significant increase in the flow rate to the

IDOT system due to the removal of the restrictive 24 inch sewer and the larger conveyance system along the south abutment. The restrictive existing 27 inch stub pipe that conveys the CN ditch into the existing 54 inch sewer would need to be replaced to eliminate the backwater and upstream flooding (including flooding along the CN ditch upstream of south abutment) that would result due to the increase in flow rate tributary to the 27 inch sewer.

It is currently understood that this 54 inch sewer is overtaxed based on our conceptual analysis and information contained in the MWRD Detailed Watershed Plan for the Calumet-Sag Channel Watershed and the drainage study prepared by CBBEL in August 2011 for I-294 Drainage at US 12/20/45 (LaGrange Road) and IL 171 (Archer Avenue). These studies note that a 54 inch storm sewer along 79th Street that crosses under LaGrange Road and connects into the 54 inch outfall sewer has an estimated tributary area of 2.1 square miles. There is limited cover available at the downstream end of the 54 inch sewer so the preliminary modeling assumed that a 60 inch sewer improvement would be utilized downstream of a new 60 inch sewer connection from the CN ditch. Additional analysis and coordination with IDOT would be necessary to determine if additional upstream sections of the existing 54 inch sewer would need to be improved to accommodate this alternative.

This alternative still provides a significant reduction in flooding, however the attenuation of peak flow rate into the I&M canal as compared to Alternatives 1 and 2 will not be as significant due to the elimination of the proposed detention basin and the downstream tailwater constraints at the IDOT sewer outfall.

The drainage modeling for Alternatives 2 and 3 is not included with this report but can be submitted upon request.

No addition alternatives are included in this report for the identified drainage concerns. As described in Section 2.3.3, it is recommended that there be further coordination with the Village of Hodgkins for improvements to their drainage system to reduce flooding in the Village and for the proposed improvements to the existing 24 inch storm sewer along the south side of Santa Fe Drive.

4.4 STORMWATER DETENTION ANALYSIS

The required 2-year and 100-year detention volumes, based on for the additional bridge and roadway impervious areas, was determined using the graphic method shown in the Tollway Drainage Design Manual Appendix G. Additionally, runoff hydrographs have been appropriately routed through the proposed conditions to ensure that, at the major outfalls, the 2-year and 100-year release rates do not exceed the maximum allowable release rates. The maximum allowable release rates were typically based on not exceeding the existing flow rates/release rates from the existing infield detention facilities that are proposed to be enhanced since the infields will be used to overdetermine runoff (using allowable release rates less than existing conditions) to allow for an increase in flow rate at

some other outlets within the watershed. A detailed summary of detention volume and water quality treatment volumes are included in Appendix B.

All the existing detention volume will be maintained where feasible within the corridor. The lost existing detention volume is added to the required detention volume for additional impervious area to calculate the total required detention volume. Additional right-of-way acquisition will be required, as discussed in Section 4.5 of this report to accommodate several new detention and water quality facilities.

The required 100-year detention volume due to the increase in impervious area of approximately 10.8 acres for the proposed improvements is 5.7 acre-feet. This includes approximately 3.1 acres of increase in impervious area from the RR-14-4223 improvements that is tributary to Outlets 20C and 21H.

An estimated 0.7 acre-feet of existing stormwater detention volume will also need to be replaced that is currently within the oversized 42 inch diameter median sewer (Sta. 1086+87 to Sta. 1091+44) which are both located in the RR-14-4223 project limits (within the Outlet 20C system). There is also a small amount of detention in the open, excavated areas that collect bridge deck drainage located between piers for five of the spans north of Santa Fe Drive. The detention in the 42 inch sewer and the open excavated areas under the bridge is considered as lost detention that will need to be replaced since the sewer will be replaced and the open areas will be filled.

An estimated 7.2 acre-feet of existing storage is located within the existing ramp infields and within the site of the UPS maintenance building property to be acquired that will need to be maintained. The overall required 100-year detention volume for the increase in impervious area, replacement of lost detention and maintenance of existing detention is estimated to be 13.6 acre-feet. An estimated 26.3 acre-feet of proposed 100-year detention volume is provided. Note that a detention basin is proposed to address both additional Tollway pavement area and an identified flooding concern in a residential area in Willow Springs along the CN Railroad right-of-way. This basin is estimated to provide 3.5 acre-feet of storage for the 100-year event.

Required detention calculations, summaries and an estimate of the required water quality treatment volume are included in Appendix B.

Note that development of control structure schematics are not included in this Concept submittal.

A geotechnical investigation was prepared and is included in Appendix D to provide a detailed assessment of the soil conditions, infiltration rates and groundwater elevations at the proposed detention sites.

A detention requirement summary table (see below) provides the outlet number corresponding to the drainage plans, location, the required detention for the outlet, the provided detention and a description of the detention.

A brief description of the primary proposed detention sites within each watershed is also provided below.

Table 5: Stormwater Detention Summary

OUTLET NO.	STATION	LT/RT	WATERSHED	EXISTING / LOST DETENTION VOLUME (ACRE- FEET)	REQUIRED DETENTION VOLUME (100 YEAR) (ACRE- FEET)	DETENTION VOLUME PROVIDED (100 YEAR) (ACRE- FEET)	PROPOSED DETENTION DESCRIPTION
20A	1088+80	RT	I & M Canal	Contact RR-14-4223			
20B	1093+49	RT		0.00	0.14	TBD by RR-14-4223	TBD By Contract RR-14-4223
*20C	1103+21	RT		2.13	3.54	3.58	Infield detention Ramp C to SB Tri-State Tollway, Partial Detention Basin constructed in RR-14-4221. Basin to be expanded in RR-14-4223
20D	1108+20	RT		0.00	0.00	0.00	None. No Tollway runoff contributes to this outlet.
21A	1113+79	RT		0.00	0.68	3.57	Regional detention basin in Willow Springs along the CN tracks with a new outlet into the I&M canal. Large bioswale on Tollway property (East of I-294 between CN Railroad and LaGrange Road)
21B	1117+20	RT		0.00	0.00	0.00	None. Overdetain at Outlet 21A.
WATERSHED TOTAL				2.13	4.36	7.15	
21C	1122+50	LT & RT	Chicago Sanitary and Ship Canal	0.00	-0.12	0.00	None. Overdetain at Outlet 21D.
21D	1126+25	LT		0.00	1.49	2.40	Detention Pond - MWRD property (West of Mile Long Bridge between Sanitary and Ship Canal & Des Plaines River)
WATERSHED TOTAL				0.00	1.37	2.40	
21E	1140+61	LT	Des Plaines River	0.00	-0.68	0.00	Over detain in Ramp C infield at Outlet 21H
21F	1140+32	RT		0.00	0.16	0.00	
*21G	1150+77	RT		1.28	1.88	1.70	Detention Basin on UPS Maintenance Facility building to be removed and over detain in Ramp C infield at Outlet 21H
21H - BNSF	1143+42	RT		0.00	0.32	0.00	Over detain in Ramp C infield at Outlet 21H

OUTLET NO.	STATION	LT/RT	WATERSHED	EXISTING / LOST DETENTION VOLUME (ACRE- FEET)	REQUIRED DETENTION VOLUME (100 YEAR) (ACRE- FEET)	DETENTION VOLUME PROVIDED (100 YEAR) (ACRE- FEET)	PROPOSED DETENTION DESCRIPTION
*21H	409+26	RT		3.58	5.10	11.53	Infield detention at Ramp C - Tollway property
WATERSHED TOTAL 1				4.86	6.77	13.23	
*22A	0212+43	LT	Des Plaines River (First drains into UPS detention pond located at the SW corner of 75th Street & UPS Entrance 1)	0.86	1.06	3.52	Infield detention at Ramp B - Tollway property
WATERSHED TOTAL 2				0.86	1.06	3.52	
OVERALL TOTAL				7.85	13.56	26.30	

* - Outlets with existing detention

Proposed Detention Description – I&M Canal Watershed

The infield area between the Archer Avenue entrance Ramp C onto southbound I-294 and Ramp B to northbound LaGrange Road provides detention in the existing condition. There is a berm in the infield parallel to LaGrange Road that controls the maximum water surface elevation in the infield basin. The proposed infield will be regraded and the cross road culvert 20C-4 will be replaced to maximize available detention and to not increase the peak flow rate. The detention and culvert improvements are being analyzed in Contract RR-14-4223. A partial detention basin is proposed to be constructed in this contract. The proposed detention basin will be expanded to the south (east) with reconstruction/realignment of Archer Avenue Ramp C to SB I-294 in Contract RR-14-4223.

As described in Section 2.3.1, a recommended proposed drainage improvement consists of the addition of a new culvert outfall into the I&M canal on the west side of I-294 and the acquisition of the 412 N Rust Trail property and the three adjacent residential properties to the east for the construction of a stormwater detention basin within the vacated properties and along the CN ditch. See Section 2.3.1 for additional information regarding the proposed detention basin.

Detention will be provided in an oversized bioswale in the Tollway’s existing triangular right-of-way area located on the east side of I-294 between LaGrange Road and the CN tracks. Check dams with a culvert outlet including a manhole and restrictor plate will be utilized to control the rate of runoff and to promote additional infiltration.

Proposed Detention Description – Chicago Sanitary and Ship Canal (CS&SC) Watershed

A dry bottom detention basin is proposed on the west side of the Mile Long Bridge within proposed right-of-way on the MWRD LASMA island property. The initial geotechnical information indicates a potential for high groundwater in this area so the basin depth will be limited. The bridge deck drainage system is proposed to discharge at grade on the west side of the proposed bridge and the surface area will be graded to drain into the proposed basin. The construction of the basin will be staged so that the eastern portion of the basin can be constructed after the removal of the existing bridge substructure. The use of native and wetland plantings will be investigated to provide bio-filtration prior to release of stormwater into the CS&SC.

Proposed Detention Description – Des Plaines River Watershed

Stormwater detention and water quality treatment volume will be provided in the Ramp B and Ramp C infields at the 75th Street interchange. Additional grading in these infields is proposed to meet and exceed the detention requirements for the watershed. There are wetland areas and significant floodplain areas on the west side of the river that limit the feasibility of providing detention near the river's edge. The area under the Mile Long Bridge north of the river is developed, including the BNSF rail yard, and space is not available for detention so the ramp infield are proposed to provide additional detention (overdetain) so that detention does not need to be provided within the BNSF railyard.

There is an existing detention basin located on the east side of the UPS maintenance building to be removed. This detention basin is proposed to be expanded to the west within the former building site to provide detention to reduce the peak runoff into the storm sewer system along the south side of Santa Fe Drive.

As discussed in Section 2.3.3, the proposed detention improvements in the Ramp C infield at the 75th street interchange will significantly reduce the peak flow rates and volume of flow into the Village of Hodgkins drainage system. This should allow for the improvement of the Santa Fe storm sewer to accommodate the increase in flow rate from the Mile Long Bridge improvements and eliminate or minimize the need for stormwater detention in the confined area between Santa Fe Drive and the 75th Street interchange.

4.5 RIGHT-OF- WAY ANALYSIS

The additional right-of-way, permanent and temporary easements are shown on the proposed drainage plan sheet Exhibits A-5.1 to A-5.12. Detailed right-of-way exhibits are include in the Concept Report.

The primary proposed right-of-way, permanent easement and temporary easement requirements for drainage systems are located at the following ten (10) locations:

1. An Intergovernmental Agreement (IGA) with IDOT will be required for proposed detention basin and culvert construction within IDOT right-of-way in the ramp infield

- between the Archer Avenue entrance Ramp C onto southbound I-294 and Ramp B to northbound LaGrange Road (approximately Sta. 5096+50 to Sta. 5102+00 LT).
2. Additional right-of-way for ditch grading and culvert construction at the front (south) face of proposed Retaining Wall No. 4 in Willow Springs (approximately Sta. 5105+00 to Sta. 5108+50 LT).
 3. Additional right-of-way in Willow Springs for the proposed detention basin and culvert construction along the CN Railroad. This includes the acquisition of four residential parcels. Proposed permanent easements are required for the proposed culvert construction under the CN Railroad and the access path along the I&M canal.
 4. Proposed right-of-way for the proposed detention basin and culvert outlet into the CS&SC on the MWRD LASMA property (approximately Sta. 5125+00 to Sta. 5136+00 LT).
 5. Maintain the Tollway's existing permanent easement to allow for the continued use of a Tollway 18"/24" storm sewer within the BNSF rail yard (approximately Sta. 5141+00 to Sta. 5150+00 LT).
 6. Proposed temporary easement or construction access agreements with BNSF for the lining of existing CMP storm sewers within the BNSF rail yard (approximately Sta. 5142+50 to Sta. 5145+00 RT).
 7. Proposed right-of-way to maintain and expand the detention basin on the site of the UPS maintenance building to be demolished approximately (approximately Sta. 5146+00 to Sta. 5150+00 RT).
 8. Temporary easement for sewer construction along the south side of Santa Fe Drive. The existing sewer to be replaced is located within an existing Village of Hodgkin's utility/sewer easement.
 9. Proposed permanent easement along proposed Noise Abatement Wall 3A for minor swale grading and installation of a pipe underdrain behind the wall (approximately Ramp D Station 418+00 to Station 422+25).
 10. Proposed permanent right-of-way along proposed Noise Abatement Wall 3A for minor grading and installation of a pipe underdrain behind the wall (approximately Station 5174+00 to Station 5181+00).

4.6 DRAINAGE ALTERNATIVES

See Section 4.3 for Proposed Drainage Alternatives for Identified Drainage Concerns.

A proposed drainage alternative was previously developed during the Master Planning process for the drainage along outside shoulder of northbound I-294 (approximately Sta. 1174+00 to Sta. 1181+00 RT). An option for 900 foot long, 6 ft. span x 2.5 ft. rise box culvert could be utilized in lieu of a standard ditch if right-of-way acquisition is not desired in this residential location and if the proposed noise wall would be located at the back of shoulder. During the Concept Plan development it was determined in coordination with RR-14-4223 that the proposed Noise Wall 3A would be set back away from the roadway and right-of-way acquisition would be pursued. Therefore this drainage alternative is no longer being investigated.

Other drainage alternatives have been considered during the study process but are currently not being further investigated. These include, but are not limited to the following:

- The use of precast underground detention chambers under the proposed bridge north of Santa Fe Drive. The chambers would be used to limit the peak flow rate to existing conditions from the bridge deck to allow for the existing Santa Fe storm sewer to remain.
- The use of a new storm sewer system in the BNSF rail yard to accommodate the bridge deck drainage. A new sewer would require an additional outfall into the Des Plaines River and would require challenging jacking operations for long lengths of shallow storm sewers under the rail lines.

4.7 FLOODPLAIN ENCROACHMENT EVALUATION

The existing and proposed Mile Long Bridge spans over the floodplains for the three waterways with only minor encroachments due to the existing and proposed bridge piers. The embankment for the roadway approaches to the bridge are located well outside of the regulatory floodplain and also outside of the limits of floodplain inundation mapping as shown in the MWRD Detailed Watershed Plan.

The proposed piers at the I&M canal are located at the top of the bank and are located outside the limits of the Zone A floodplain. No compensatory storage will be required for the I&M canal.

Piers are proposed in the floodplain associated with the Des Plaines River and CS&SC. There are currently two existing piers within the FEMA Zone A and MWRD floodplain limits for the CS&SC. The proposed piers at the CS&SC are located outside of the channel outside and outside of the FEMA Zone A floodplain limits and the MWRD floodplain limits. This will result in the elimination of pier volume within the floodplain and no compensatory storage will be required for the CS&SC.

The proposed piers for the main spans at the Des Plaines River are located near the edge of channel and are located within the floodway. In the proposed condition there are two sets of piers (two northbound and two southbound which are equivalent to approximately two full length piers) within the FEMA designated floodway as compared to the existing condition in which there are three full length piers. There will be a reduction in pier volume within the regulatory floodway in the proposed condition due to the elimination of one full length pier from the floodway. In the proposed condition there are three sets of piers (three northbound and three southbound which are equivalent to approximately three full length piers) within the MWRD floodplain boundaries as compared to the existing condition in which there are six full length piers. There will be a reduction in pier volume within the MWRD floodplain boundaries in the proposed condition due to the elimination of three piers from the floodway. This will result in the elimination of pier volume within the floodway and floodplain and no compensatory storage will be required for the Des Plaines River.

Compensatory storage will not be required for this project. Additional information will be provided regarding pier locations and volumes within the floodplain as the substructure design progresses in the detailed design phase.

4.8 BRIDGES AND CULVERTS

4.8.1 Bridge Spans over Waterways

The proposed Mile Long Bridge cross section for the proposed improvements carries five lanes of traffic in each direction as well as both a northbound and southbound auxiliary Lane 0. With the exception of units with flared decks for sight distance, the proposed out-to-out width of the northbound and southbound bridge cross sections is 93'-2". The Recommended Plan provides a 10-foot gap between northbound and southbound structures. As described in the Bridge Type Study, constructing dual structures with a 10-foot gap will improve future inspection and maintenance access also allows more of the structure to be built outside of the existing structure's footprint and provides the necessary room to accommodate a rubber tire gantry.

See Sections below for a detailed description of the bridge spans over the three waterways.

4.8.1.1 Bridge Spans over I&M Canal

The Mile Long Bridge crosses over the I&M Canal on a high-level bridge near MP 21.1 (Station 1118+02). The proposed dual structure has one-span at the canal with a cast-in-place concrete deck and will be located on 84 inch steel plate girders. The proposed span length is 187'-10". The proposed piers are located on the overbanks, well outside the surveyed water surface. The out to out deck width is 93'-2" for each structure. The bridge is aligned with the canal and is on a similar skew to the existing condition of 21° 28' 55" (LT Ahead) with respect to the roadway centerline.

As described in Section 2.4, there are earth dams located upstream and downstream of the bridge. The canal functions as a level-pool reservoir within the project area. The canal flows gradually from northeast to southwest in the project area.

As coordinated with IDNR-OWR, a hydraulic evaluation of the existing and proposed crossing will not be required at the I&M canal since it is basically a level pool within the project limits.

4.8.1.2 Bridge Spans over Chicago Sanitary and Ship Canal (CS&SC)

The Mile Long Bridge crosses over the Chicago Sanitary and Ship Canal (CS&SC) on a high-level bridge at MP 21.2 (Station 5114+15). The recommended dual structure has three-spans at the canal with a cast-in-place concrete deck and will be located on 120 inch to 142 inch steel plate girders. The proposed southern span length is 310'-0" (Span 3), the proposed main span over the canal is 410'-0" (Span 4) and the proposed northern span (Span 5) length is 310'-0" for a continuous unit length of 1030'-0". The proposed piers for the main span are located near the top of bank. The out to out deck width is 95'-2" for each structure. The bridge is aligned with the canal and is on a similar skew to the existing condition of 14° 00' 00" (LT Ahead) with respect to the roadway centerline. .

The description of the hydraulic modeling approach for the existing and natural conditions is included in Section 2.6.1.2.

The preliminary proposed conditions model was created by updating the bridge opening and pier locations to the Recommended Plan geometry and pier locations. The proposed bridges were modeled as two separate structures because of the wide space between structures. The worst case condition in the modeling is always at the upstream face of the northbound bridge. The proposed condition model represents final conditions with the existing bridge demolished.

IDNR-OWR has confirmed that permitting for the CS&SC will be based on Part 3700 (non-designated floodway) and Part 3704 (Public Water) rules.

The preliminary hydraulic calculations and HEC-RAS output for the proposed conditions are included in Appendix B. A Waterway Information Table is included as Exhibit A-4.1.

The created head for the proposed bridge is minimal with a maximum created head of 0.02 feet (for the 50-year event).

A scour analysis was not performed on the CS&SC because the proposed bridge piers are outside the 500-year water surface elevation. Therefore, a scour analysis is not necessary.

4.8.1.3 Bridge Spans over the Des Plaines River

The Mile Long Bridge crosses over the Des Plaines River (DPR) on a high-level bridge at MP 21.5 (Station 5114+15). The recommended dual structure has three-spans at the river

with a cast-in-place concrete deck and will be located on 90 inch PPC bulb tee beams. The proposed southern span (Span 10) length is 161'-4", the proposed main span (Span 11) over the river is 170'-0" and the proposed northern span (Span 13) length is 153'-6" for a length of 484'-10" over the river and its overbanks. The proposed piers for the main span are approximately 85' from the center of channel. The out to out deck width is 95'-2" for each structure. The bridge is aligned with the river and is on a similar skew to the existing condition of 6° 34' 30" (LT Ahead) with respect to the roadway centerline.

The description of the hydraulic modeling approach for the existing and natural conditions is included in Section 2.6.1.3.

The preliminary proposed conditions model was created by updating the bridge opening and pier locations to the Recommended Plan geometry and pier locations. The proposed dual structure was modeled as two separate bridges due to the wide space between bridges. The resulting model created the worst case created head at the upstream face of the northbound bridge for all flow events. The proposed model represents the final conditions after the existing bridge has been completely demolished.

IDNR-OWR has confirmed that permitting for the DPR will be based on Part 3708 (designated floodway) and Part 3704 (Public Water) rules.

The preliminary hydraulic calculations and HEC-RAS output for the proposed conditions are included in Appendix B. Draft Waterway Information Tables are included as Exhibits A-4.2 (FIS) and 4.3 (DWP).

The created head for the proposed bridge in the DWP model is minimal with a maximum created head of 0.07 feet for the 100-yr and 500-year event. The created head for the proposed bridge in the FEMA model is similar with a maximum created head of 0.08 feet for the 10-year through 500-year event.

A scour analysis on the proposed bridges was performed using FHWA HEC-18 modeling in HEC-RAS scour analysis. Both models yield similar scour results for the piers. The FEMA model resulted in 13 feet scour for both the north and southbound bridges for the 100-year event. The DWP model resulted in 12.88 feet scour for the northbound bridge and 12.85 feet scour for the southbound bridge for the 100-year event. The proposed scour depths are higher than existing because of the skew of the piers. The proposed bridge piers are perpendicular to the alignment but the bridge is skewed over the Des Plaines River. This causes about a 6 degree skew in the bridge piers in relation to the flow creating a higher scour.

4.8.2 Waters of the US Culverts (WOUS)

There are no major WOUS culverts with Tollway ROW.

4.8.3 Major Non-WOUS Culverts

As stated in Section 2.6.3, there are two (2) major culverts and two (2) major combination culvert/sewers that cross under I-294 within the project reconstruction limits. There are also four (4) major culverts crossing under the ramps within the limits of proposed ramp improvements or in the immediate vicinity of the ramp improvements that were reviewed and analyzed. There are a select number of other ramp culverts that were reviewed as part of the study due to the location of the culverts within the infield drainage system.

Culverts 20C-3, 20C-4, and 20C-5 will be analyzed by Contract RR-14-4223. Existing and proposed drainage information draining into this outlet from the RR-14-4221 project was provided to the RR-14-4223 design team.

Refer to Section 2.3.1 for additional information on the two new proposed culvert locations in Willow Springs at Outlet 21B. Culvert 21B-1 is the proposed 6' x 2.5' box culvert draining directly in to the I&M canal which is located under a gravel access path. Culvert 21B-2 is the proposed 48" steel pipe to be auger bored under the CN tracks at the outlet from the proposed detention basin in Willow Springs.

The major crossing culverts were modeled with Bentley Civilstorm. The culverts were modeled as part of the existing and proposed detention analysis. Bentley Civilstorm is the design and analysis software included with the Bentley Subsurface Utility Design and Analysis (SUDA) package. The 500-year event checks for the mainline and ramp culverts were estimated using a log-log interpolation to estimate flow rate and FHWA HY-8 software was used to estimate the 500-year headwater elevations.

SCS method hydrology (Bulletin 70, Huff distributions) was used to generate peak flows to the major culverts.

The following culvert table provides the culvert number (corresponding to the culvert summary on the General Location Drainage Map), location of existing culvert, and existing and proposed culvert size. Culverts that are designated to be replaced are included in the table. The proposed culvert calculations and culvert evaluation summary tables are included in Appendix B.

Table 6: Proposed Culvert Summary

MILE LONG BRIDGE - PROPOSED CULVERT SUMMARY					
CUL #	EXISTING LOCATION			EXISTING CULVERT SIZE	PROPOSED CULVERT SIZE
	ALIGN.	STA.	LT/RT		
20C-5	I-294	1096+58	202' LT	42" Reinforced Concrete Pipe	ANALYSIS BY CONTRACT RR-14-4223

MILE LONG BRIDGE - PROPOSED CULVERT SUMMARY					
CUL #	EXISTING LOCATION			EXISTING CULVERT SIZE	PROPOSED CULVERT SIZE
	ALIGN.	STA.	LT/RT		
20C-4		1102+09	0' LT	95" x 67" Corrugated Metal Arch Pipe (63" High Density Polyethylene Liner)	ANALYSIS BY CONTRACT RR-14-4223
20C-3		1103+41	185' RT	6' X 5.5' Reinforced Concrete Box Culvert	EXISTING REMAIN
21A-1		1114+92	0' LT	24" / 18" RCP Sewer	18" RCP IS REPLACED WITH A DETENTION BASIN INFLOW PIPE. 24" RCP IS REPLACED WITH AN OVERFLOW DITCH.
21A-2		1112+16	441' RT	27" RCP DIRECT CONNECTION TO 54" RCP	EXISTING REMAIN. DITCH CLEANOUT PROPOSED UPSTREAM OF EXISTING PIPE.
OUTLET 21B		NONE			A 6' X 2.5' BOX CULVERT (CUL. ID: 21B-1) AND A 48" STEEL PIPE (CUL. ID: 21B-2) ARE PROPOSED.
21D-1		1126+25	121' LT	12" Corrugated Metal Arch Pipe	12" RCP OUTLET PIPE FOR DETENTION POND
21D-2		1125+54	141' RT	15" Corrugated Metal Arch Pipe	15" RCP
21E - 1		1144+74	80' LT	24" / 18" / 15" RCP Sewer	EXISTING REMAIN
21F-1		1140+32	161' RT	12" CMP	12" RCP
21G-7		1157+77	5' LT	18" Corrugated Metal Arch Pipe	ALL CMPs TO BE REMOVED
21G-6		1157+06	5' LT	18" Corrugated Metal Arch Pipe	
21G-5		1155+79	6' LT	18" Corrugated Metal Arch Pipe	
21G-4		1154+41	6' LT	18" Corrugated Metal Arch Pipe	
21G-3		1153+55	6' LT	18" Corrugated Metal Arch Pipe	
21G-2		1152+44	4' LT	18" Corrugated Metal Arch Pipe	
21G-1		1151+61	6' LT	18" Corrugated Metal Arch Pipe	
21H-16		110+83	0' LT		

MILE LONG BRIDGE - PROPOSED CULVERT SUMMARY					
CUL #	EXISTING LOCATION			EXISTING CULVERT SIZE	PROPOSED CULVERT SIZE
	ALIGN.	STA.	LT/RT		
		RAMP A	110+89		
21H-15C	RAMP D	424+70	65' RT	None	PROPOSED 6'x3' RC BOX CULVERT
21H-15	I-294	1173+58	0' LT	36"/42" Reinforced Concrete Pipe	PROPOSED 42" RCP
21H-14	RAMP D	418+47	0' LT	2-48" Reinforced Concrete Pipe	PROPOSED 2-48" RCP
		418+53	0' LT		
21H-13	RAMP C	309+97	0' LT	2-48" Reinforced Concrete Pipe	PROPOSED 2-48" RCP
		310+03	0' LT		
21H-12		318+92	85' RT	24" Reinforced Concrete Pipe	EXISTING TO REMAIN
21H-11	RAMP D	409+32	0' LT	72" Reinforced Concrete Pipe	EXISTING TO REMAIN RESTRICTOR TO BE MODIFIED FOR EXPANDED DETENTION
21H-10	I-294	1161+27	712' RT	24" Corrugated Metal Pipe	PRIVATE CULVERT TO REMAIN
22A-3	RAMP B	203+00	0' LT	24" Reinforced Concrete Pipe	EXISTING REMAIN
22A-2	RAMP A	117+00	0' LT	30" X 19" Reinforced Concrete Pipe	EXISTING REMAIN
22A-1	RAMP B	211+48	128' RT	24" Reinforced Concrete Pipe	EXISTING REMAIN – RESTRICTOR MODIFIED FOR EXPANDED DETENTION

4.9 PERMITS

The following is a summary of anticipated drainage, stormwater, waterway and floodplain related permits required for the project (see the Concept Report for additional permit information):

Permit	Responsible Agency	Anticipated	Reason
Floodway Construction Permit	IDNR, Office of Water Resources	Yes	Construction of widened and new bridge piers within a floodway and temporary construction activities with the floodway/floodplain. Jurisdiction over construction activities in regulatory floodways. IDNR has confirmed the following: Des Plaines River has a regulatory

Permit	Responsible Agency	Anticipated	Reason
			floodway and permit will be based on Part 3708 rules. Since there is no mapped floodway for the I&M Canal and Chicago Sanitary and Ship Canal, the permits for these crossings will be based on Part 3700 rules. Joint application.
Public Water Management	IDNR	Yes	The Des Plaines River, Chicago Sanitary and Ship Canal and I&M Canal are Public Waters. IDNR confirmed that Public Water permits meeting Part 3704 rules will be required for temporary and permanent construction activities in these Public Waters.
Section 401, Clean Water Act, Water Quality Certification	IEPA	Yes	Required in conjunction with Section 404 permit process by Clean Water Act. Programmatic certification usual with regional Section 404 permit. Individual certification and public notice required for individual Section 404 permit. Joint application.
Section 402, Clean Water Act, NPDES ^a	IEPA	Yes	Disturbance and construction impact to an area greater than one acre. Required notification to the IEPA through Illinois Tollway joint agreement with IEPA
Section 404 Permit, Clean Water Act	USACE, Chicago District	Yes	Discharge of dredged or fill material into Waters of the U.S., including jurisdictional wetlands and streams. Determination whether regional or individual permit applies is determined by the USACE. Wetland impact requires mitigation. Joint permit application. ^b

Permit	Responsible Agency	Anticipated	Reason
National Pollution Discharge Elimination System Permit	IEPA	Yes	Because the disturbance area is greater than 1 acre.
Erosion Control Review	Will/ South Cook County Soil and Water Conservation District	Undetermined	SWCD review of erosion control plan required under standing agreement with Chicago District USACE Section 404 permit process.
Section 9, Navigable Waterways Permit	U.S. Coast Guard	Yes	A permit is required for modification of bridges when they cross waterways used for interstate/foreign commerce. The Chicago Sanitary and Ship Canal is a navigable waterway; the Des Plaines River and I&M Canal are not commercially navigable at this location.
Section 10, Rivers and Harbors Act of 1899	USACE, Chicago District	Undetermined	Applies to navigable waterways: Chicago Sanitary and Ship Canal may be concurrent and be issued with Section 404 permit. Joint application.
Watershed Management Ordinance Permit	MWRD	Yes	As coordinated with MWRD, the Tollway improvements/development will be exempt from the stormwater management requirements and related permits from the MWRD Watershed Management Ordinance (WMO) as stated in Article 200.4.G of the WMO. Therefore, the MWRD will not review or regulate stormwater rate and volume control for the improvements, including rate and volume control for new or improved direct outfalls into waterways. MWRD will also not regulate riparian or floodplain areas.

Permit	Responsible Agency	Anticipated	Reason
			However, new or improved direct sewer outfalls into the waterways will be permitted through the WMO. A new outfall permit form (WMO Schedule O form with general WMO permit application) and related direct sewer outfall plans will need to be submitted for MWRD for review and approval of the new or improved direct outfall.

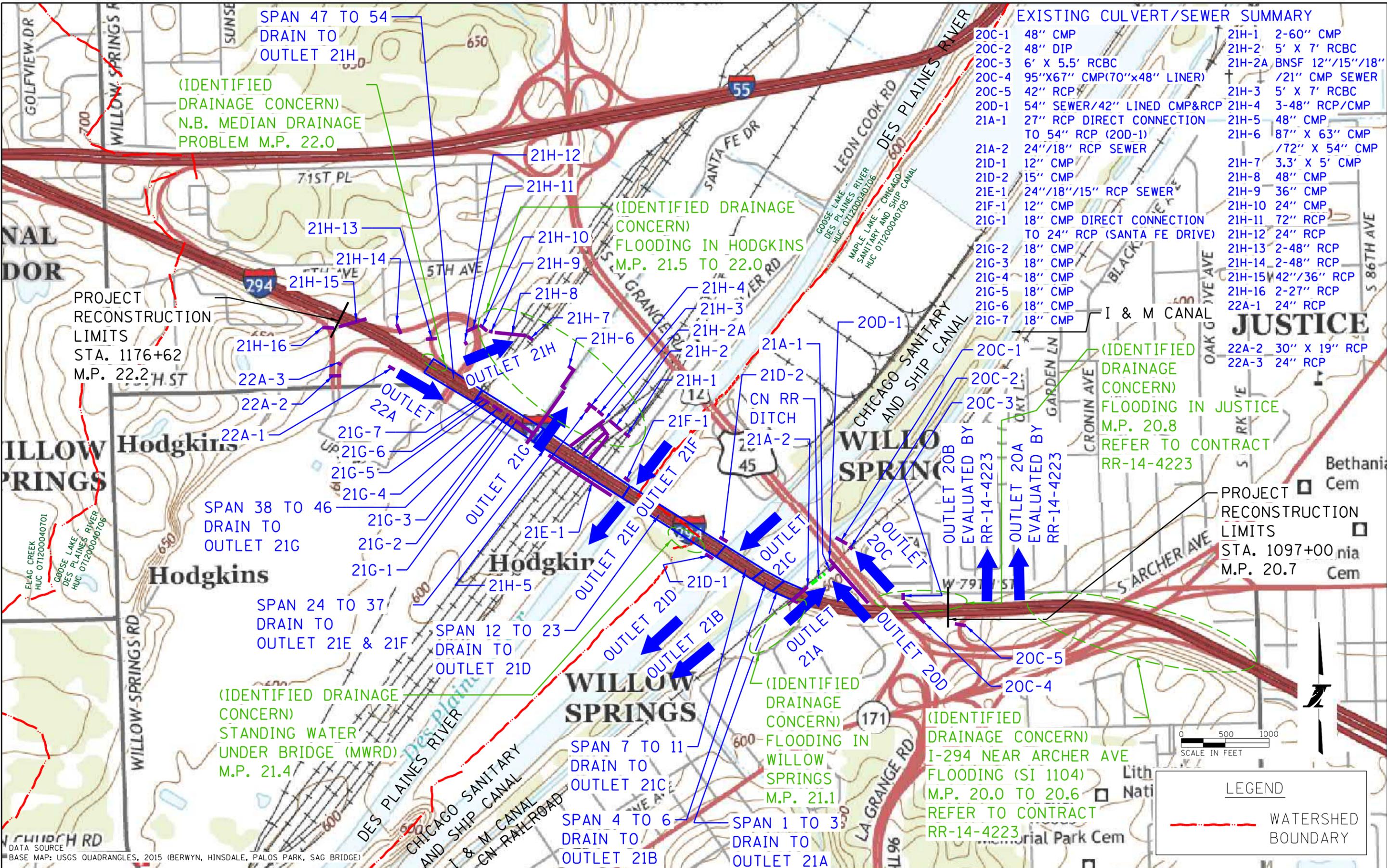
a Requires notification to the IEPA through the Tollway's agreement with IEPA.

b Individual or regional permit based on acreage of wetland impacts, quality of wetland, and presence of T&E species.

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A-1.1 General Location Drainage Map

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PROJECT RECONSTRUCTION LIMITS
 STA. 1176+62
 M.P. 22.2

PROJECT RECONSTRUCTION LIMITS
 STA. 1097+00
 M.P. 20.7

(IDENTIFIED DRAINAGE CONCERN)
 N.B. MEDIAN DRAINAGE PROBLEM M.P. 22.0

(IDENTIFIED DRAINAGE CONCERN)
 FLOODING IN HODGKINS M.P. 21.5 TO 22.0

(IDENTIFIED DRAINAGE CONCERN)
 FLOODING IN JUSTICE M.P. 20.8
 REFER TO CONTRACT RR-14-4223

(IDENTIFIED DRAINAGE CONCERN)
 STANDING WATER UNDER BRIDGE (MWRD) M.P. 21.4

(IDENTIFIED DRAINAGE CONCERN)
 FLOODING IN WILLOW SPRINGS M.P. 21.1

(IDENTIFIED DRAINAGE CONCERN)
 I-294 NEAR ARCHER AVE FLOODING (SI 1104) M.P. 20.0 TO 20.6
 REFER TO CONTRACT RR-14-4223

LEGEND

--- WATERSHED BOUNDARY

DRAWN BY AL DATE 10/03/2017
 CHECKED BY AWM DATE 10/03/2017

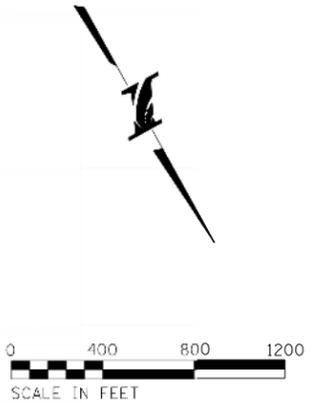
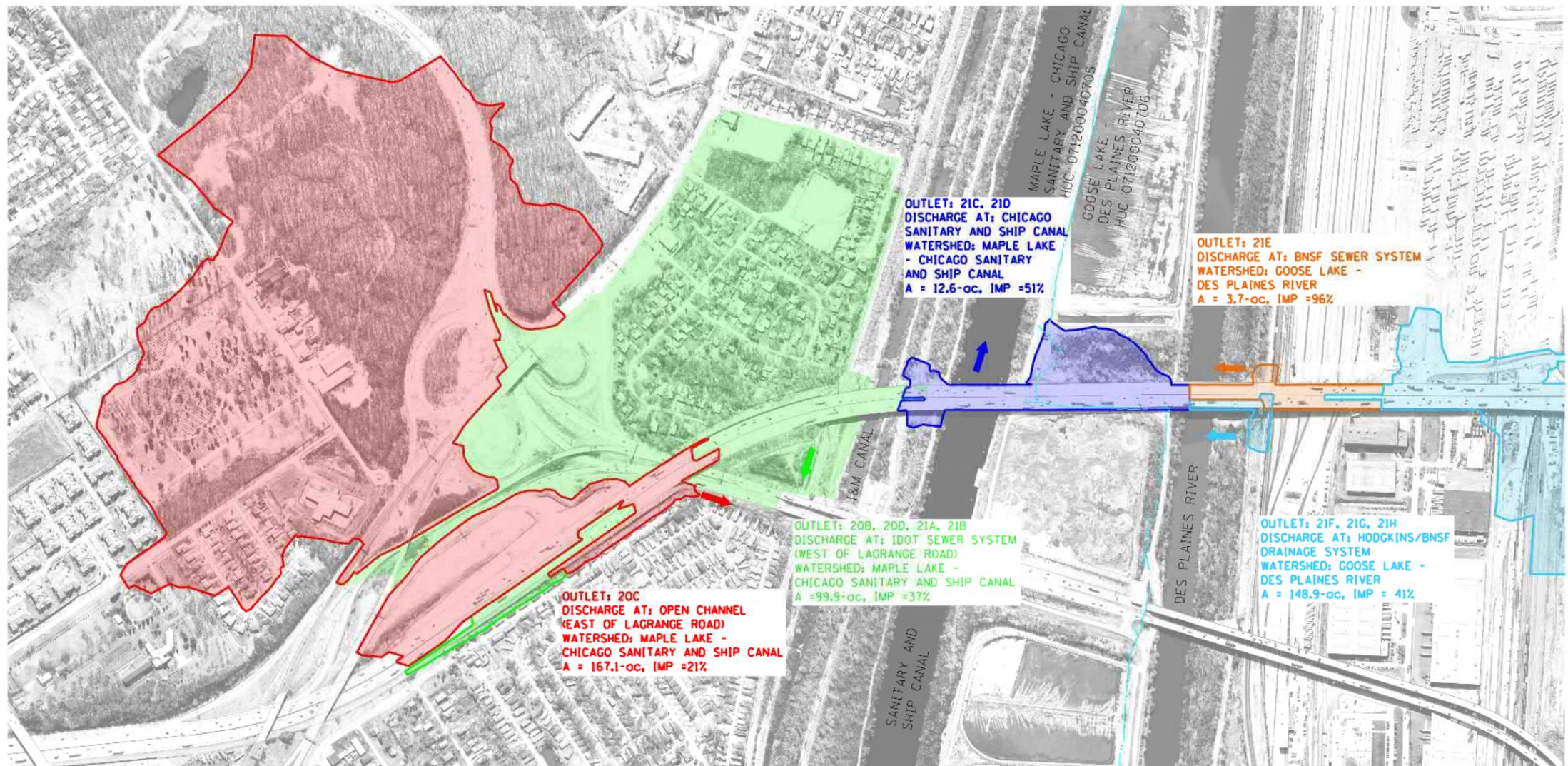


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

REVISIONS	
NO.	DESCRIPTION

CONTRACT NO. RR-14-4221
 GENERAL LOCATION DRAINAGE MAP
 EXHIBIT A-1.1
 DRAWING NO. 1 OF 1

A-1.2 to A-1.3 Existing Drainage Outlet Summary



MAJOR OUTFALLS

OUTLETS	OUTFALL LOCATION	WATERSHED	AREA (AC)
20A	Justice, Sewer System	I & M Canal	Analysis by Contract RR-14-4223
20B, 20D, 21A, 21B	IDOT Sewer System (West of LaGrange Road)	I & M Canal	99.9
20C	Open Channel (East of LaGrange Road)	I & M Canal	167.1
21C, 21D	Chicago Sanitary & Ship Canal	Chicago Sanitary & Ship Canal	12.6
21E	BNSF Sewer System	Des Plaines River	3.7
21F, 21G, 21H	Hodgkins/BNSF Drainage System	Des Plaines River	148.9

MAJOR WATERWAY CROSSINGS

M.P.	WATERWAY	STA.	WOUS	TYPE	LENGTH (FT)	TRIB. AREA (AC)	RUNOFF (CFS)		WSEL	
							50-YR	100-YR	50-YR	100-YR
21.1	I & M Canal	1118+00	YES	3-Span Steel Plate Girders	266'-8"	N/A	N/A	N/A	N/A	N/A
21.25	Chicago Sanitary & Ship Canal	1124+00	YES	3-Span Steel Plate Girders	652'-0"	UNKNOWN	15614.0	15305.0	582.5	585.1
21.5	Des Plaines River	1138+00	YES	3-Span Steel Plate Girders	275'-9"	416,000	FEMA			
							7500.0	8400.0	596.7	597.4
							MWRD			
							8922.0	9638.0	599.4	599.8

OUTLET SUMMARY

ID	M.P.	STATION	OFFSET	DISCHARGE LOCATION	MAJOR OUTFALL	EXISTING		EXISTING RUNOFF (CFS)			
						AREA (AC)	IMPERV. (%)	2-YR	50-YR	100-YR	
20A	20.57	1088+80	117' RT	48" RCP STORM SEWER LEAVING TOLLWAY ROW AT 79TH STREET	Justice, Sewer System	ANALYSIS BY CONTRACT RR-14-4223					
*20B	20.67	1093+49	109' RT	21" RCP STORM SEWER CONNECTED INTO 54" RCP	IDOT Sewer System (West of LaGrange Road)	3.3	58%	8.1	17.2	20.2	
*20C	20.83	1103+21	113' RT	DRAINS INTO 6' X 5.5' RC3C	Open Channel (East of LaGrange Road)	167.1	21%	32.7	169.2	222.8	
**20D	20.92	1108+20	162' RT	54" RCP STORM SEWER @ LAGRANGE ROAD	IDOT Sewer System (West of LaGrange Road)	26.5	37%	NO CONTRIBUTORY TOLLWAY RUNOFF			
***21A	21.07	1113+79	215' RT	CN RAILROAD DITCH	IDOT Sewer System (West of LaGrange Road)	67.2	35%	17.6	30.4	34.0	
21B	21.11	1117+20	95' RT	I & M CANAL (BRIDGE SCUPPER DOWNSPOUTS)	IDOT Sewer System (West of LaGrange Road)	2.9	39%	6.8	14.5	17.0	
21C	21.20	1122+50	75' LT & RT	CHICAGO SANITARY AND SHIP CANAL (BRIDGE SCUPPER DOWNSPOUTS)	Chicago Sanitary & Ship Canal	4.0	72%	13.4	28.4	33.4	
***21D	21.27	1126+25	121' LT	12" CMP	Chicago Sanitary & Ship Canal	8.6	41%	3.0	4.0	4.3	
21E	21.51	1140+61	83' LT	24" RCP	BNSF Sewer System	3.7	96%	9.1	19.4	23.0	
***21F	21.51	1140+32	161' RT	12" CMP	Hodgkins/BNSF Drainage System	1.3	61%	3.8	8.2	9.6	
21G	21.74	1150+77	15' RT	24" RCP @ SANTA FE DRIVE	Hodgkins/BNSF Drainage System	12.4	98%	16.5	52.8	64.7	
***21H	21.94	409+26	@ RAMP D	96' RT	24" CMP	Hodgkins/BNSF Drainage System	135.2	35%	34.3	130.2	174.5

* FINAL ANALYSIS BY CONTRACT RR-14-4223
 ** NO DIRECT TOLLWAY RUNOFF
 *** EXISTING RUNOFF IS BASED ON RESTRICTED CONDITION AT THE OUTLET

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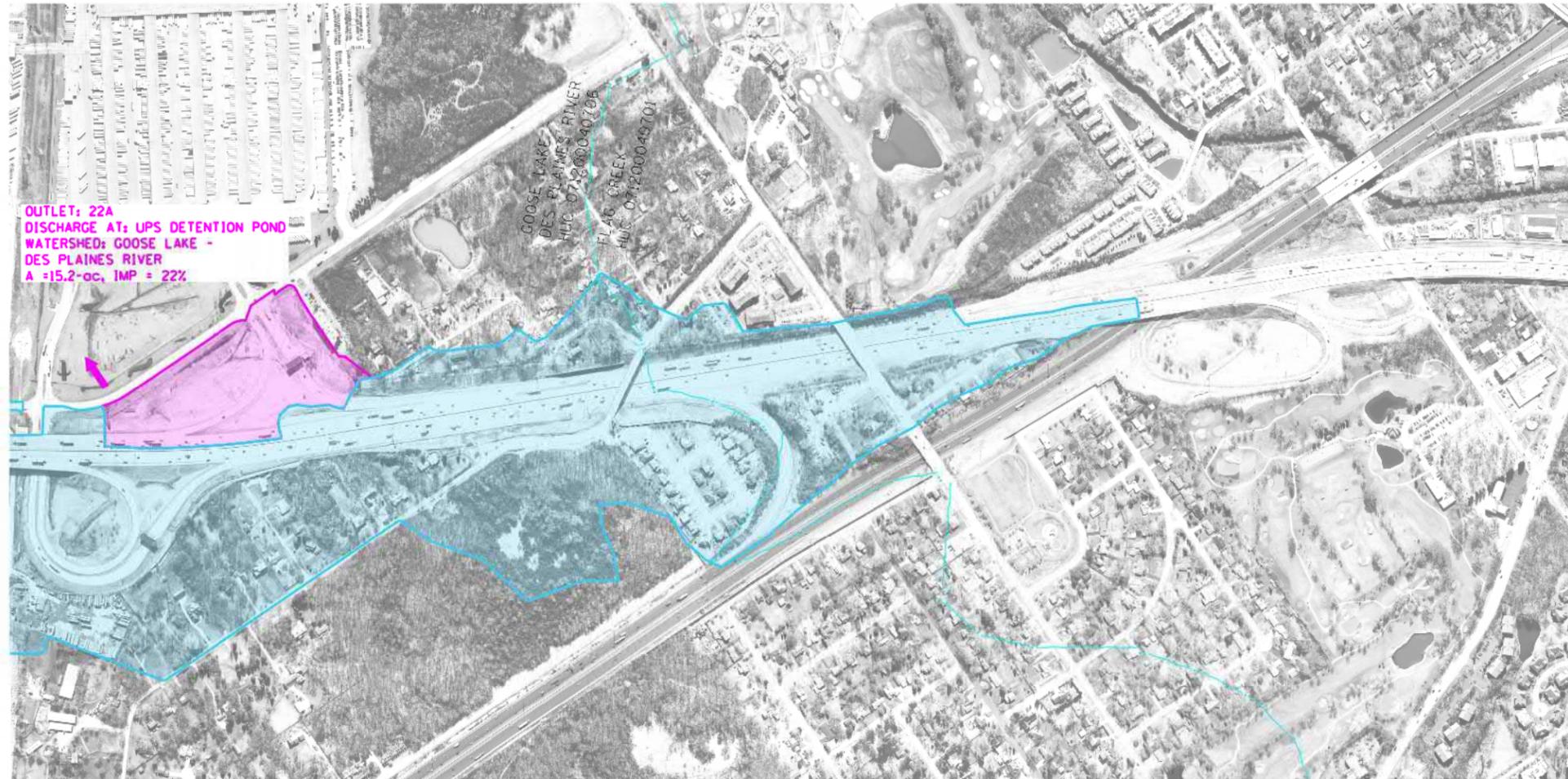
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REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
 EX DRAINAGE PLAN OUTLET SUMMARY

SHEET NO. EXHIBIT A-1.2
 DRAWING NO. 1 OF 2



MAJOR OUTFALLS

OUTLETS	OUTFALL LOCATION	WATERSHED	AREA (AC)
22A	UPS Detention Basin	Des Plaines River	15.2

OUTLET SUMMARY

ID	M.P.	STATION	OFFSET	DISCHARGE LOCATION	MAJOR OUTFALL	EXISTING		EXISTING RUNOFF (CFS)		
						AREA (AC)	IMPERV. (%)	2-YR	50-YR	100-YR
***22A	22.01	212+43	@ RAMP B 127' RT	18" RCP	UPS Detention Basin	15.2	22%	4.3	12.4	14.0

* FINAL ANALYSIS BY CONTRACT RR-14-4223
 ** NO DIRECT TOLLWAY RUNOFF
 *** EXISTING RUNOFF IS BASED ON RESTRICTED CONDITION AT THE OUTFALL

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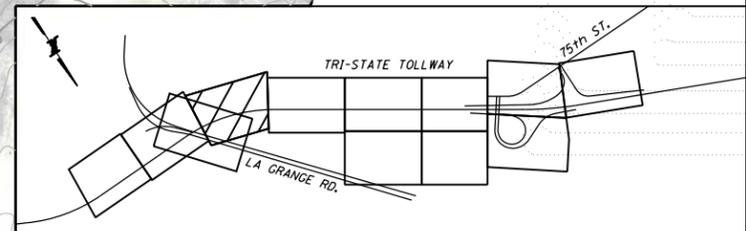
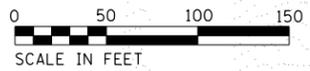
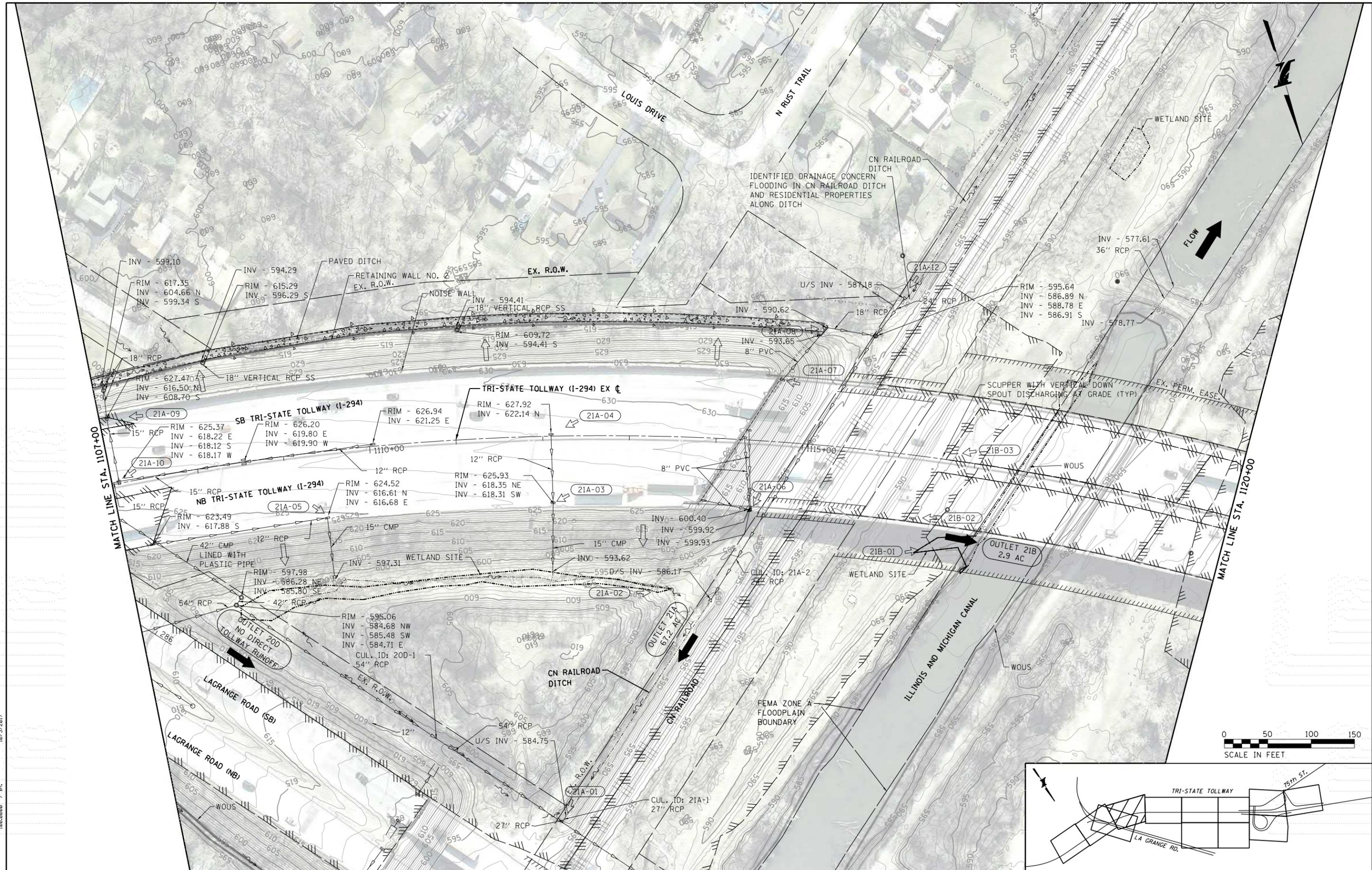
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		DESCRIPTION	

CONTRACT NO.	RR-14-4221
EX DRAINAGE PLAN OUTLET SUMMARY	

SHEET NO.	EXHIBIT A-1.3
DRAWING NO.	2 OF 2

A-2.1 to A-2.12 Existing Drainage Plan

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DRAWN BY DD SCALE 1"=50'
 CHECKED BY MH DATE 9/05/2017

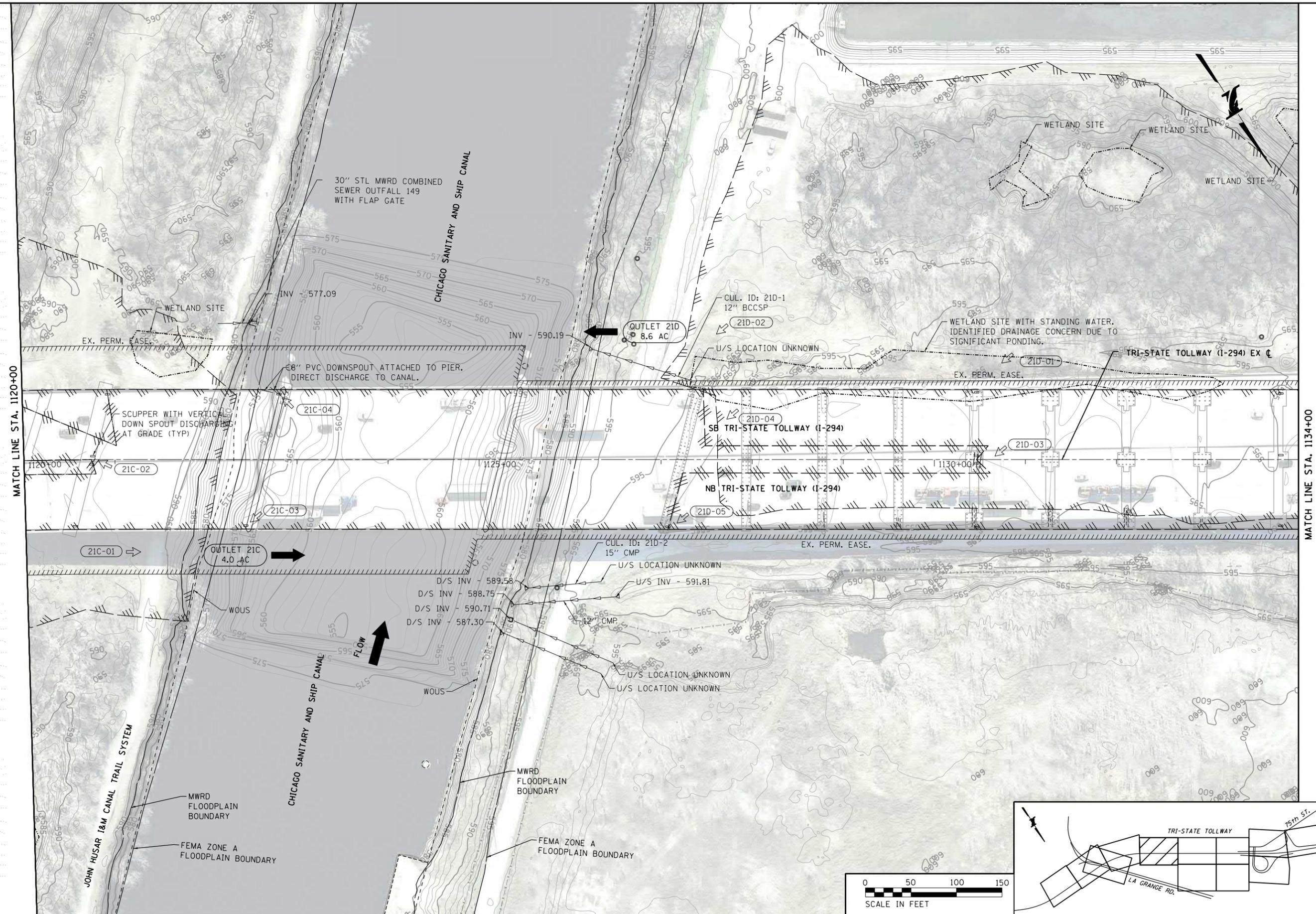


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.	DATE	REVISIONS	DESCRIPTION

CONTRACT NO. RR-14-4221
 EXISTING DRAINAGE PLAN
 STA. 1107+00 TO STA. 1120+00
 SHEET NO. 3 OF 12
 EXHIBIT A-2.3
 DRAWING NO.

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MATCH LINE STA. 1120+00

MATCH LINE STA. 1134+00

JOHN HUSAR I&M CANAL TRAIL SYSTEM
 MWRD FLOODPLAIN BOUNDARY
 FEMA ZONE A FLOODPLAIN BOUNDARY

CHICAGO SANITARY AND SHIP CANAL
 MWRD FLOODPLAIN BOUNDARY
 FEMA ZONE A FLOODPLAIN BOUNDARY

30" STL MWRD COMBINED SEWER OUTFALL 149 WITH FLAP GATE

CHICAGO SANITARY AND SHIP CANAL

OUTLET 21D
8.6 AC

OUTLET 21C
4.0 AC

FLOW

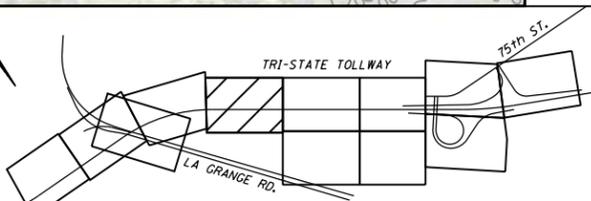
D/S INV - 589.58
 D/S INV - 588.75
 D/S INV - 590.71
 D/S INV - 587.30

CUL. ID: 21D-2
15" CMP

CUL. ID: 21D-1
12" BCCSP

SB TRI-STATE TOLLWAY (I-294)

NB TRI-STATE TOLLWAY (I-294)



DRAWN BY DD SCALE 1"=50'
 CHECKED BY MH DATE 9/05/2017



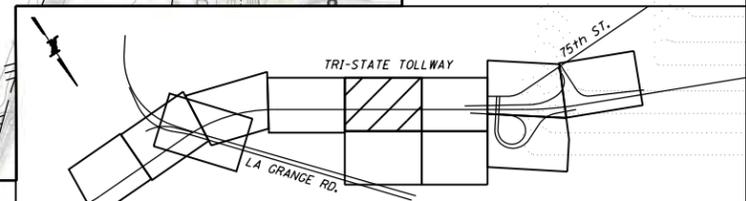
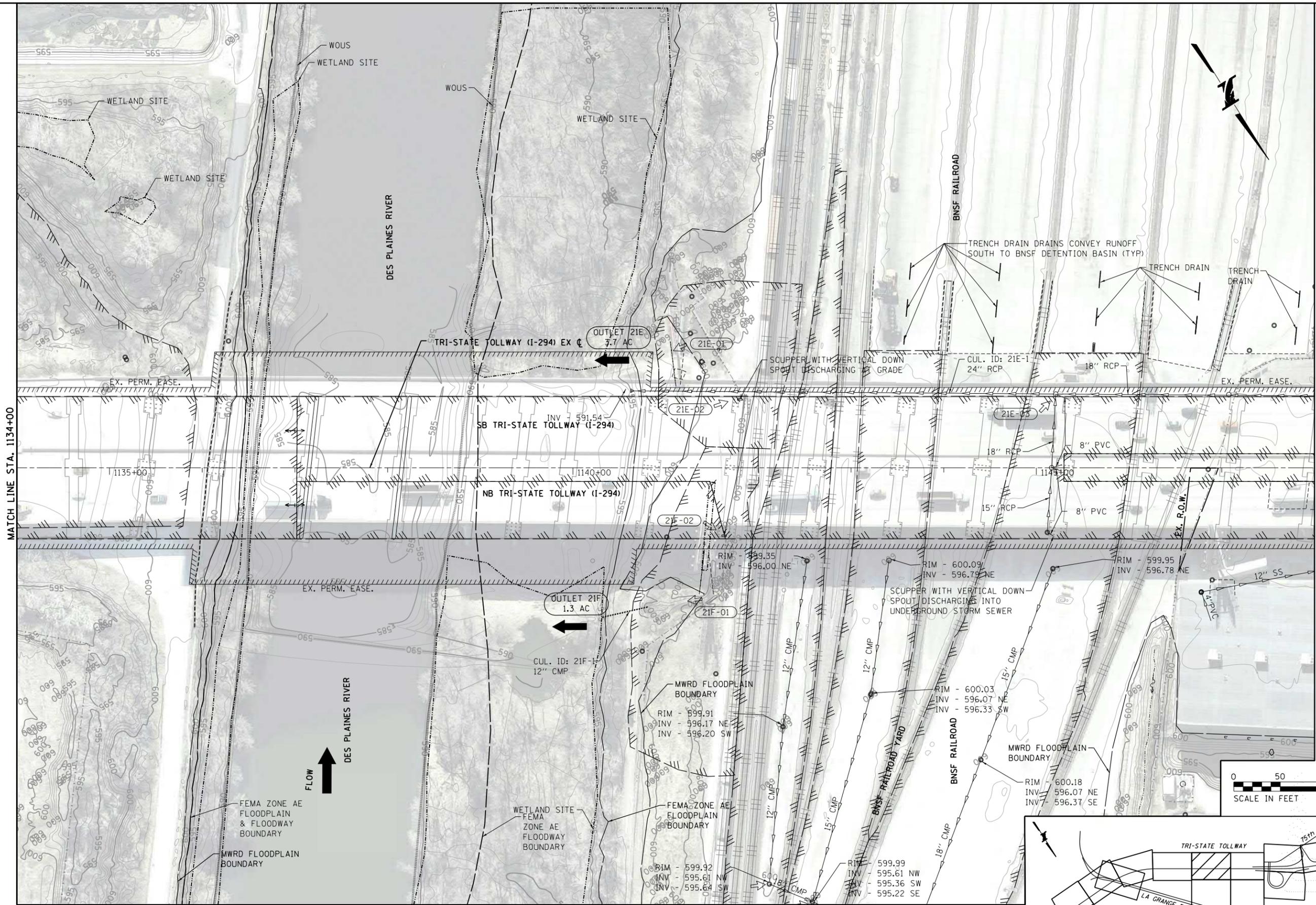
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.	DATE	REVISIONS DESCRIPTION

CONTRACT NO. RR-14-4221
 EXISTING DRAINAGE PLAN
 STA. 1120+00 TO STA. 1134+00

SHEET NO. EXHIBIT A-2.4
 DRAWING NO. 4 OF 12

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MATCH LINE SEE SHEET NO. EXHIBIT A-2.11

DRAWN BY DD SCALE 1"=50'
 CHECKED BY MH DATE 9/05/2017



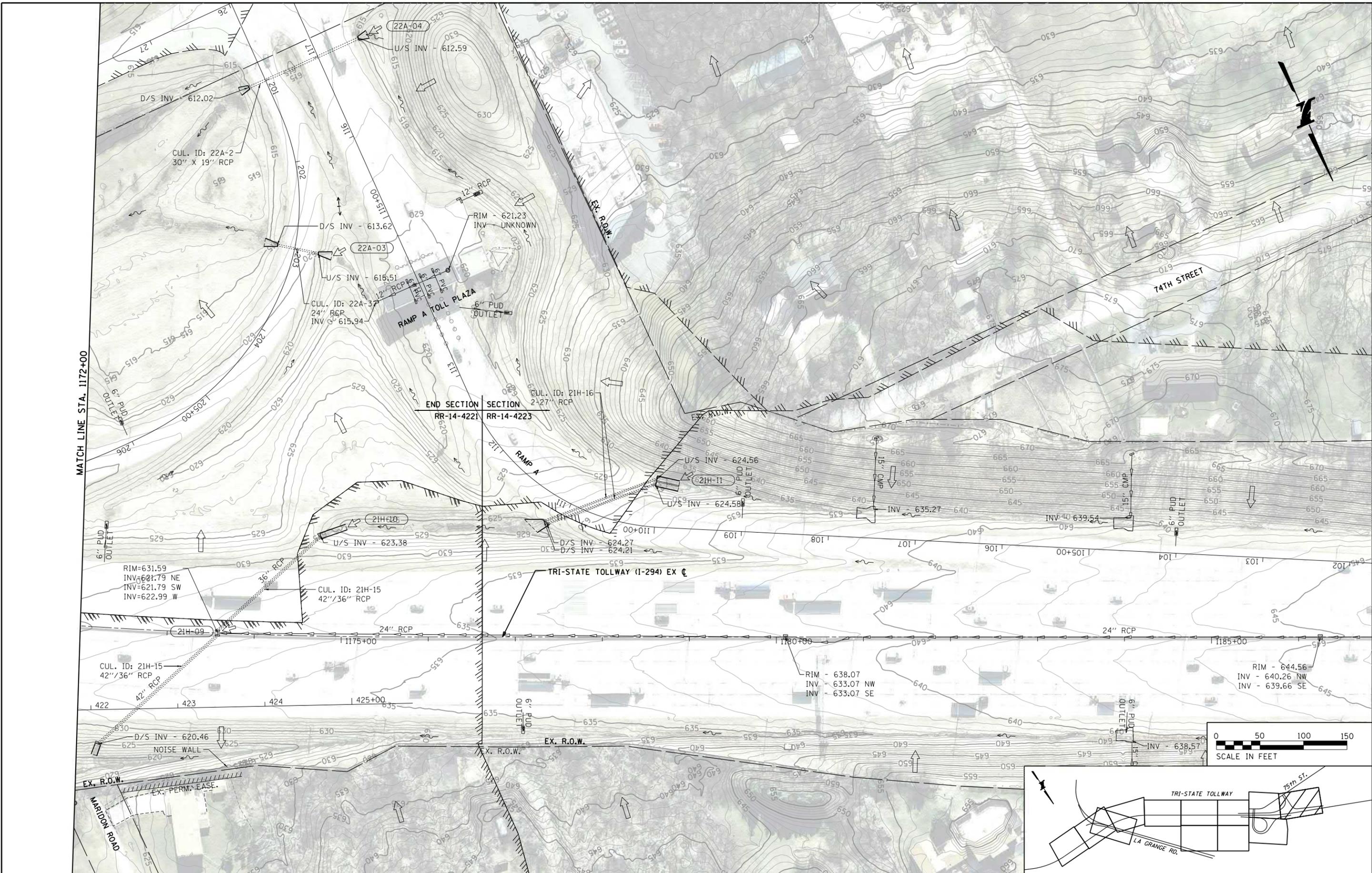
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.		DATE	REVISIONS	DESCRIPTION

CONTRACT NO. RR-14-4221
 EXISTING DRAINAGE PLAN
 STA. 1134+00 TO STA. 1148+00

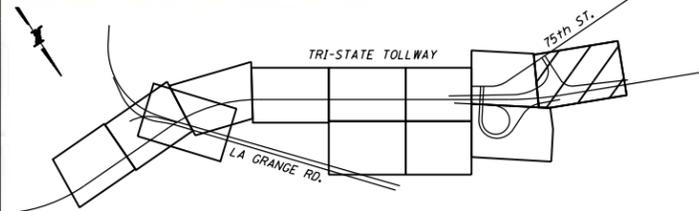
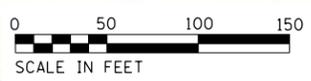
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 DRAWING NO. 5 OF 12

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MATCH LINE STA. 1172+00

END SECTION RR-14-4221 SECTION RR-14-4223



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 CHECKED BY JJM DATE 9/05/2017



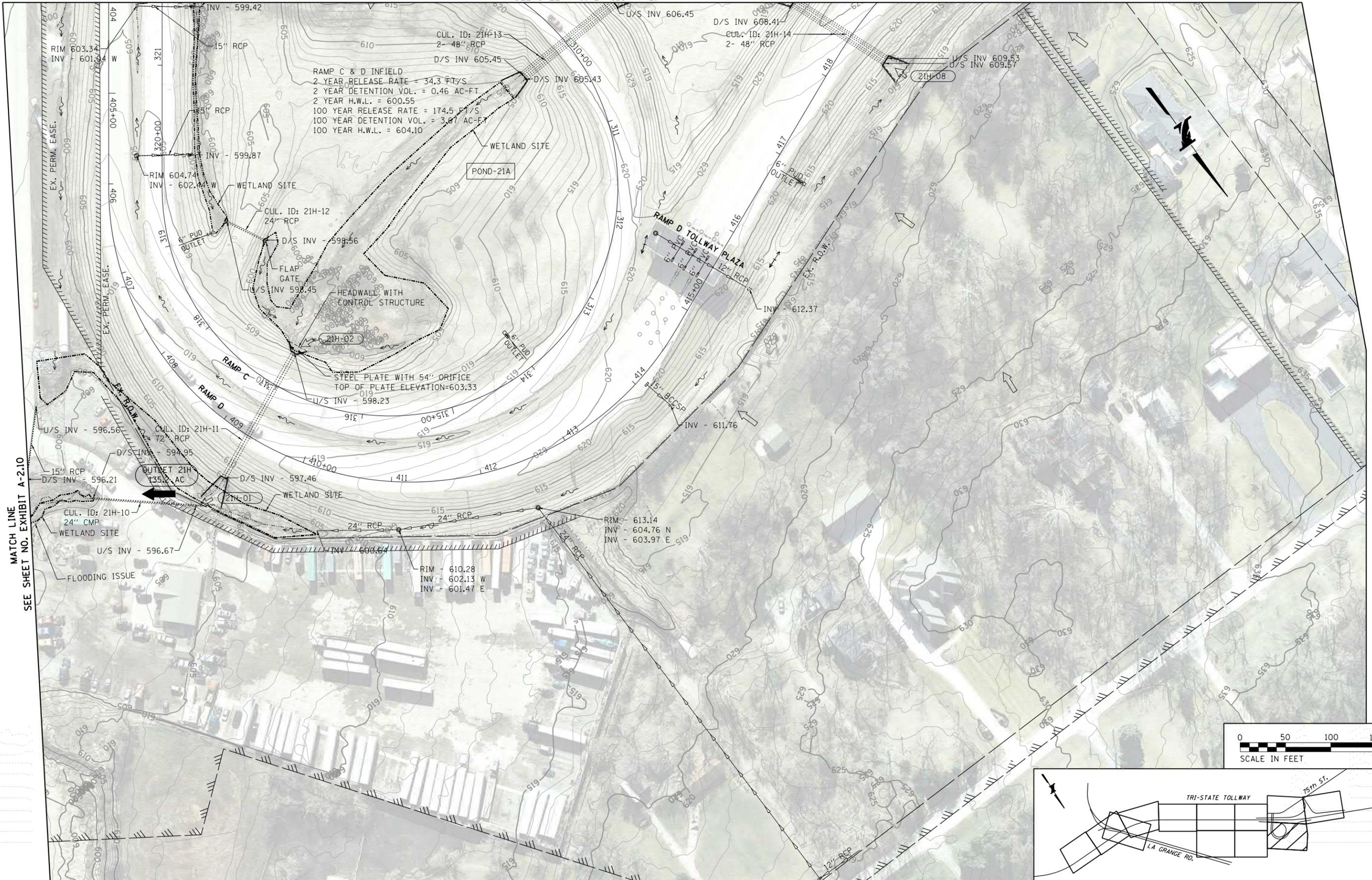
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

REVISIONS		
NO.	DATE	DESCRIPTION

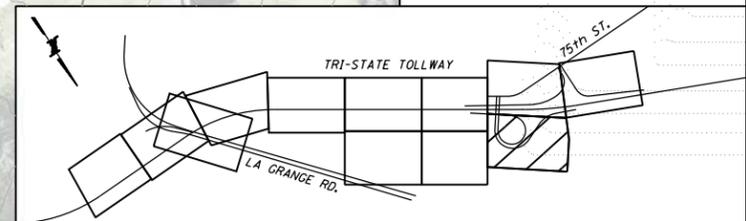
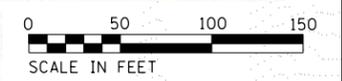
CONTRACT NO. RR-14-4221
 EXISTING DRAINAGE PLAN
 STA. 1174+00 TO STA. 1186+80

SHEET NO.
EXHIBIT A-2.8
 DRAWING NO.
 8 OF 12

MATCH LINE
SEE SHEET NO. EXHIBIT A-2.7



MATCH LINE
SEE SHEET NO. EXHIBIT A-2.10



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 10/3/2017
 dalvarez

DRAWN BY: JTF
SCALE: 1"=50'
CHECKED BY: JJM
DATE: 9/05/2017



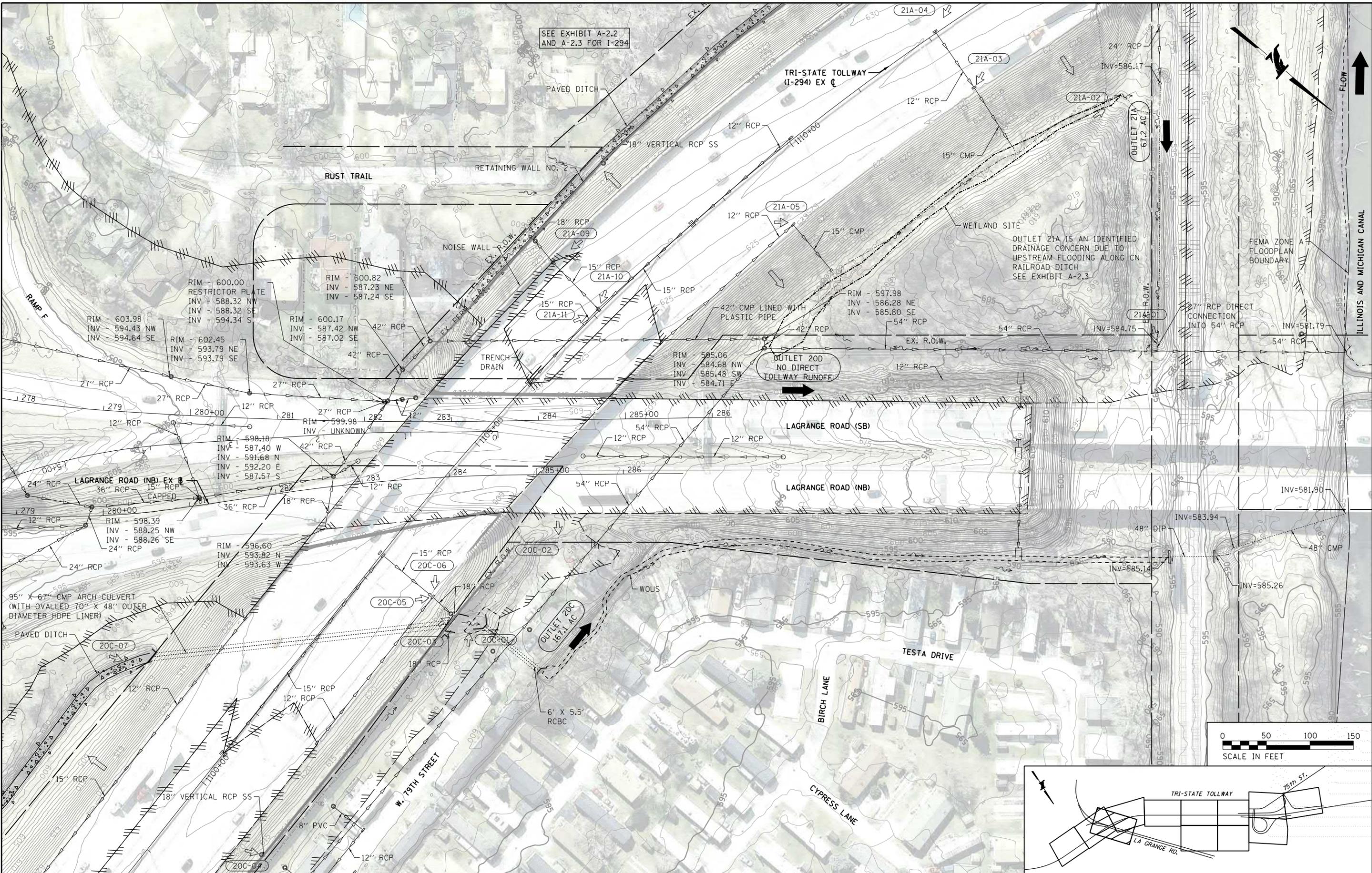
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.	DATE	REVISIONS	DESCRIPTION

CONTRACT NO. RR-14-4221
 EXISTING DRAINAGE PLAN
 STA. 1160+00 TO STA. 1174+00 (RAMP C & D)

SHEET NO. EXHIBIT A-2.9
 DRAWING NO. 9 OF 12

SEE EXHIBIT A-2.2
AND A-2.3 FOR I-294

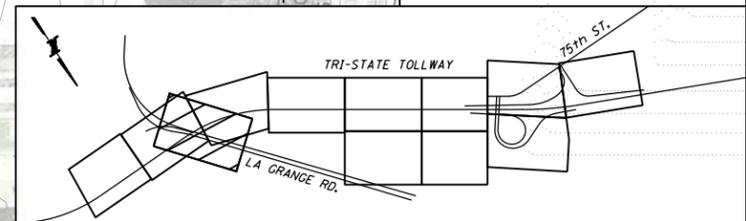
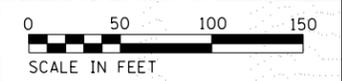


OUTLET 21A IS AN IDENTIFIED DRAINAGE CONCERN DUE TO UPSTREAM FLOODING ALONG CN RAILROAD DITCH SEE EXHIBIT A-2.3

FEMA ZONE A FLOODPLAN BOUNDARY

27" RCP DIRECT CONNECTION INTO 54" RCP

OUTLET 200 NO DIRECT TOLLWAY RUNOFF



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DRAWN BY AL SCALE 1"=50'
 CHECKED BY AWM DATE 9/05/2017



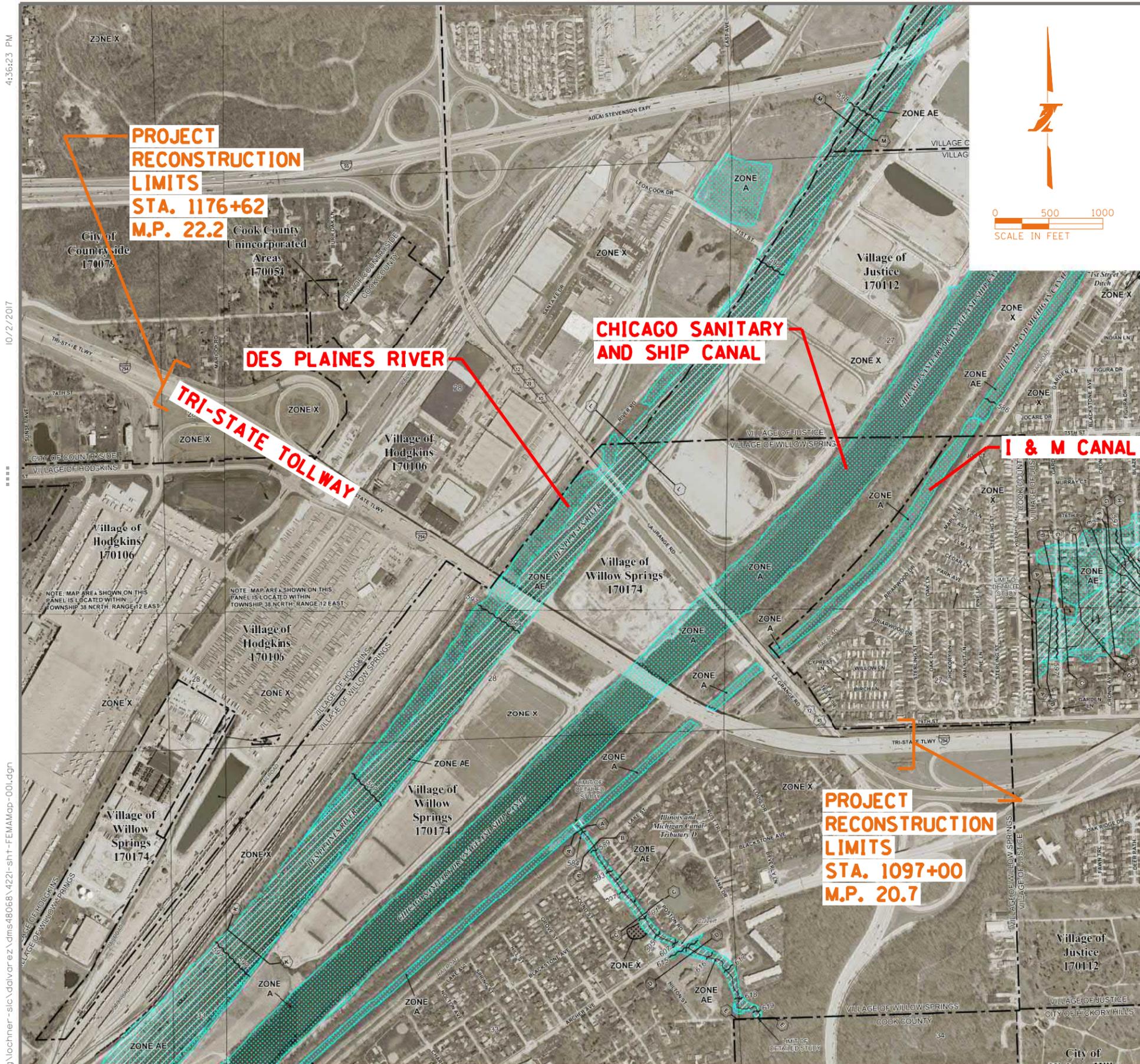
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.	DATE	REVISIONS	DESCRIPTION

CONTRACT NO. RR-14-4221
 EXISTING DRAINAGE PLAN
 LAGRANGE ROAD

SHEET NO.
EXHIBIT A-2.12
 DRAWING NO.
 12 OF 12

A-3.1 Identified Base Floodplain Maps (FEMA FIRM)



PROJECT RECONSTRUCTION LIMITS
STA. 1176+62
M.P. 22.2

CHICAGO SANITARY AND SHIP CANAL

TRI-STATE TOLLWAY

I & M CANAL

PROJECT RECONSTRUCTION LIMITS
STA. 1097+00
M.P. 20.7

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined; for areas of abutment flooding, velocities are determined.
ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently determined to be discontinued.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be left free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
 0.2% annual chance floodplain boundary
 Floodway boundary
 Zone D boundary
 Zone D and OPA boundary
 Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
 Base Flood Elevation line and value; elevation in feet*
 (EL 987)
 Base Flood Elevation value where uniform within zone; elevation in feet*
 *Referenced to the North American Vertical Datum of 1988

Cross section line
 45° 02' 08", 93° 02' 12"
 Transsect line
 Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
 1000-meter Universal Transverse Mercator grid values, zone 16
 5000-foot grid box: Illinois State Plane East Coordinate System, 37% zone (PPSZONE 1201) Transverse Mercator
 DMS10 U
 Bench mark (see explanation in Notes to Users section of this FIRM panel)
 River Mile



FIRM LAYOUT

PANEL 1469J

FIRM FLOOD INSURANCE RATE MAP
COOK COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 469 OF 832
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
BURR RIDGE, VILLAGE OF	170071	0469	J
COOK COUNTY	170084	0469	J
COUNTRY SIDE, CITY OF	170079	0469	J
HENSLEY, VILLAGE OF	170105	0469	J
HODGKINS, VILLAGE OF	170106	0469	J
HICKORY HILLS, VILLAGE OF	170112	0469	J
WESTERN SPRINGS, VILLAGE OF	170174	0469	J
WILLOW SPRINGS, VILLAGE OF	170174	0469	J

MAP NUMBER 17031C0469J
 MAP REVISED AUGUST 19, 2008
 Federal Emergency Management Agency

PANEL 0468J

FIRM FLOOD INSURANCE RATE MAP
COOK COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 488 OF 832
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
BEFORE PARK, VILLAGE OF	170107	0488	J
COOK COUNTY	170084	0488	J
COUNTRY SIDE, CITY OF	170079	0488	J
HODGKINS, VILLAGE OF	170106	0488	J
JUSTICE, VILLAGE OF	170112	0488	J
WILLOW SPRINGS, VILLAGE OF	170174	0488	J

MAP NUMBER 17031C0468J
 MAP REVISED AUGUST 19, 2008
 Federal Emergency Management Agency

PANEL 0582J

FIRM FLOOD INSURANCE RATE MAP
COOK COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 582 OF 832
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
BURR RIDGE, VILLAGE OF	170071	0582	J
COOK COUNTY	170084	0582	J
HODGKINS, VILLAGE OF	170106	0582	J
WILLOW SPRINGS, VILLAGE OF	170174	0582	J

MAP NUMBER 17031C0582J
 MAP REVISED AUGUST 19, 2008
 Federal Emergency Management Agency

PANEL 0601J

FIRM FLOOD INSURANCE RATE MAP
COOK COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 601 OF 832
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
COOK COUNTY	170084	0601	J
HICKORY HILLS, CITY OF	170112	0601	J
HODGKINS, VILLAGE OF	170106	0601	J
JUSTICE, VILLAGE OF	170112	0601	J
WILLOW SPRINGS, VILLAGE OF	170174	0601	J

MAP NUMBER 17031C0601J
 MAP REVISED AUGUST 19, 2008
 Federal Emergency Management Agency

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 CHECKED BY **AWM** DATE **10/02/2017**



THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE,
 ILLINOIS 60515

REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. **RR-14-4221**
FEMA FLOOD INSURANCE RATE MAP
 EXHIBIT **A-3.1**
 DRAWING NO. **1** OF **1**

A-3.2 MWRD Inundation Map

A-3.3 Comparison of DWP 100 - YR Inundation Mapping and FEMA Effective FIRM Lower Des Plaines River Watershed

A-4.1 Chicago Sanitary and Ship Canal
Water Information Table

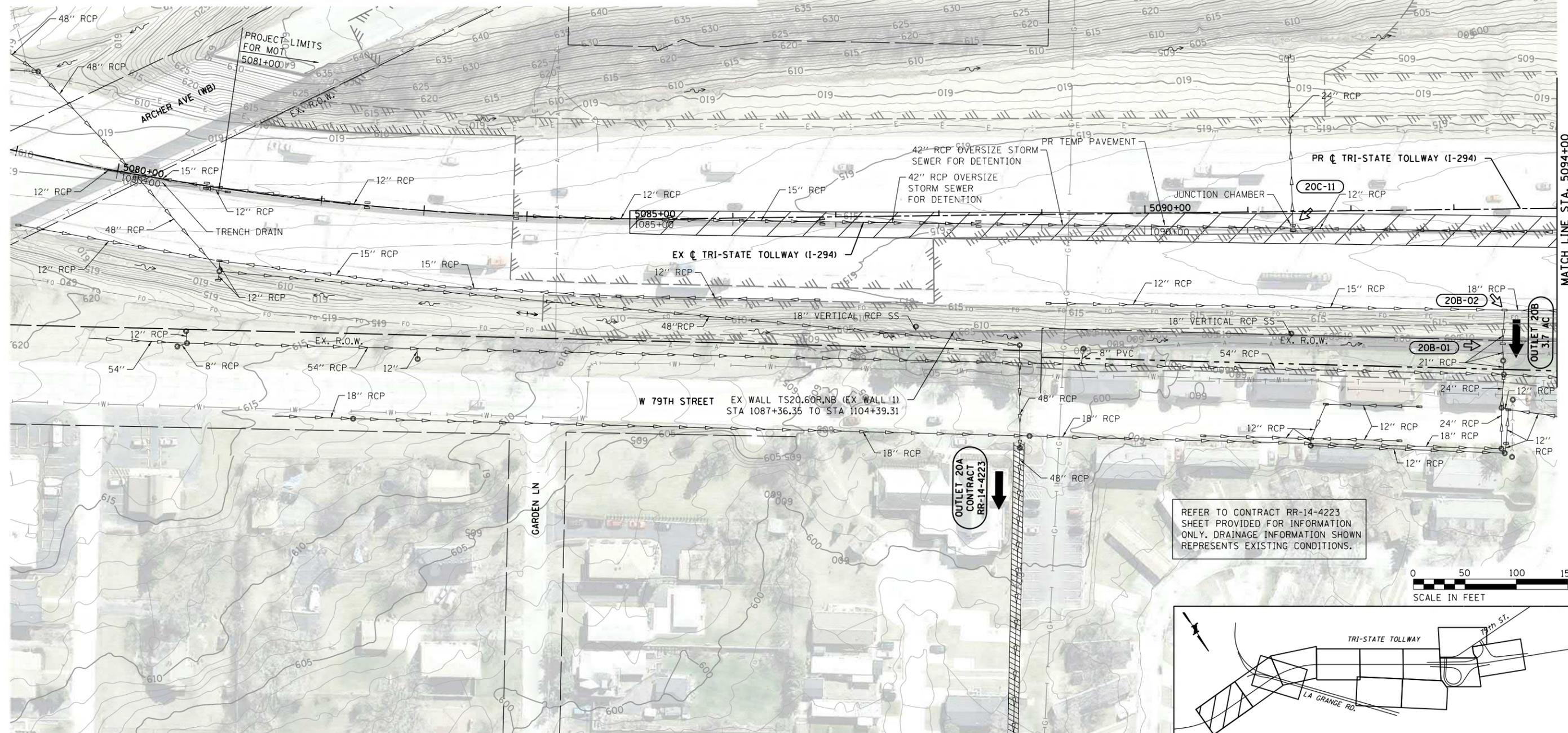
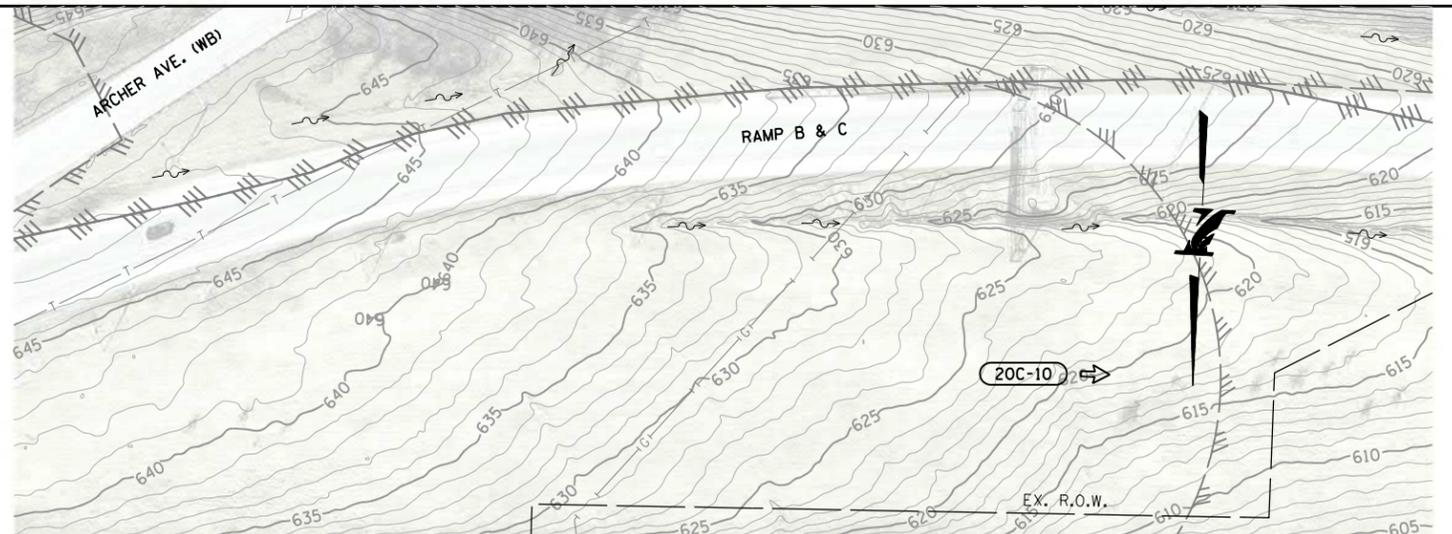
A-4.2 Des Plaines River Water Information Table (FIS Model)

A-4.3 Des Plaines River Water Information Table
(MWRD DWP Model)

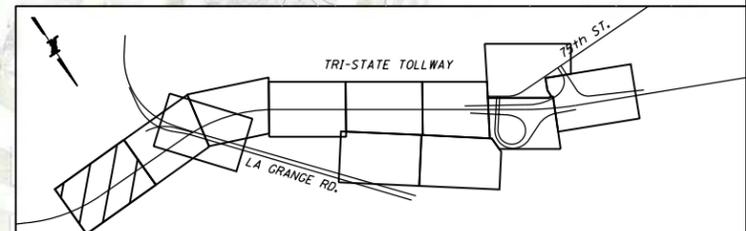
A-5.1 to A-5.12 Proposed Drainage Plan

LEGEND

BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED	BOUNDARY LINES/SYMBOLS	EXISTING	PROPOSED
SWALE			CULVERT END SECTION		
DITCH			HEADWALL/ENDWALL		
DRAINAGE SUMMIT			INLET		
SHEET FLOW			CATCH BASIN		
OUTLET ID			MANHOLE		
OUTLET			BRIDGE SCUPPER WITH AERIAL DRAIN PIPE PROP. ONLY	N/A	
SUB-DIVIDE OUTLET ID			W.O.U.S. LIMITS		
SUB-DIVIDE OUTLET			WETLAND LIMITS		
CULVERT SIZE-TYPE			DRAINAGE BOUNDARY		
BRIDGE LOCATION - BRIDGE NO.			FLOODPLAIN BOUNDARY		N/A
STORM SEWER			FLOODWAY BOUNDARY		N/A
			RIGHT OF WAY		
			PERMANENT EASEMENT		



REFER TO CONTRACT RR-14-4223 SHEET PROVIDED FOR INFORMATION ONLY. DRAINAGE INFORMATION SHOWN REPRESENTS EXISTING CONDITIONS.



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 CHECKED BY **AWM** DATE **09/29/17**



THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

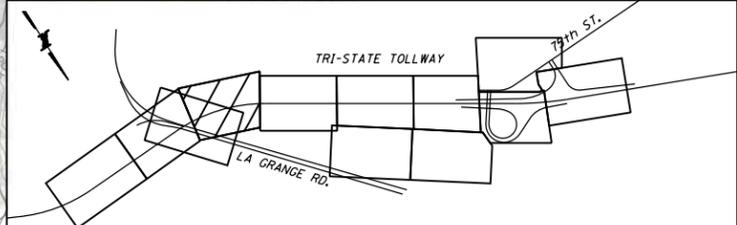
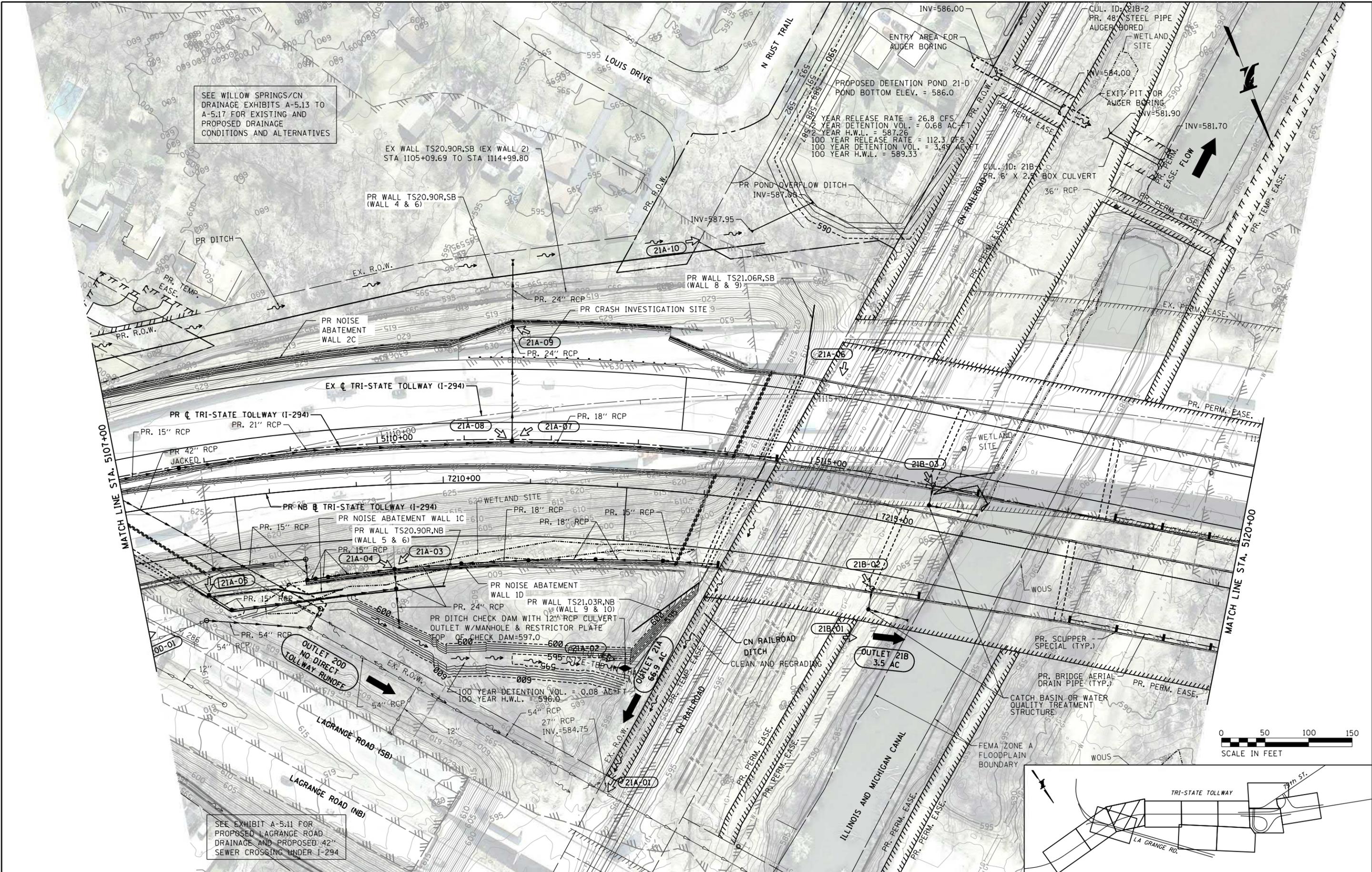
NO.	DATE	DESCRIPTION

CONTRACT NO. **RR-14-4221**
 PROPOSED DRAINAGE PLAN
 STA. 5079+00 TO STA. 5094+00

SHEET NO. **EXHIBIT A-5.1**
 DRAWING NO. **1** OF **12**

SEE WILLOW SPRINGS/CN DRAINAGE EXHIBITS A-5.13 TO A-5.17 FOR EXISTING AND PROPOSED DRAINAGE CONDITIONS AND ALTERNATIVES

SEE EXHIBIT A-5.11 FOR PROPOSED LAGRANGE ROAD DRAINAGE AND PROPOSED 42" SEWER CROSSING UNDER I-294



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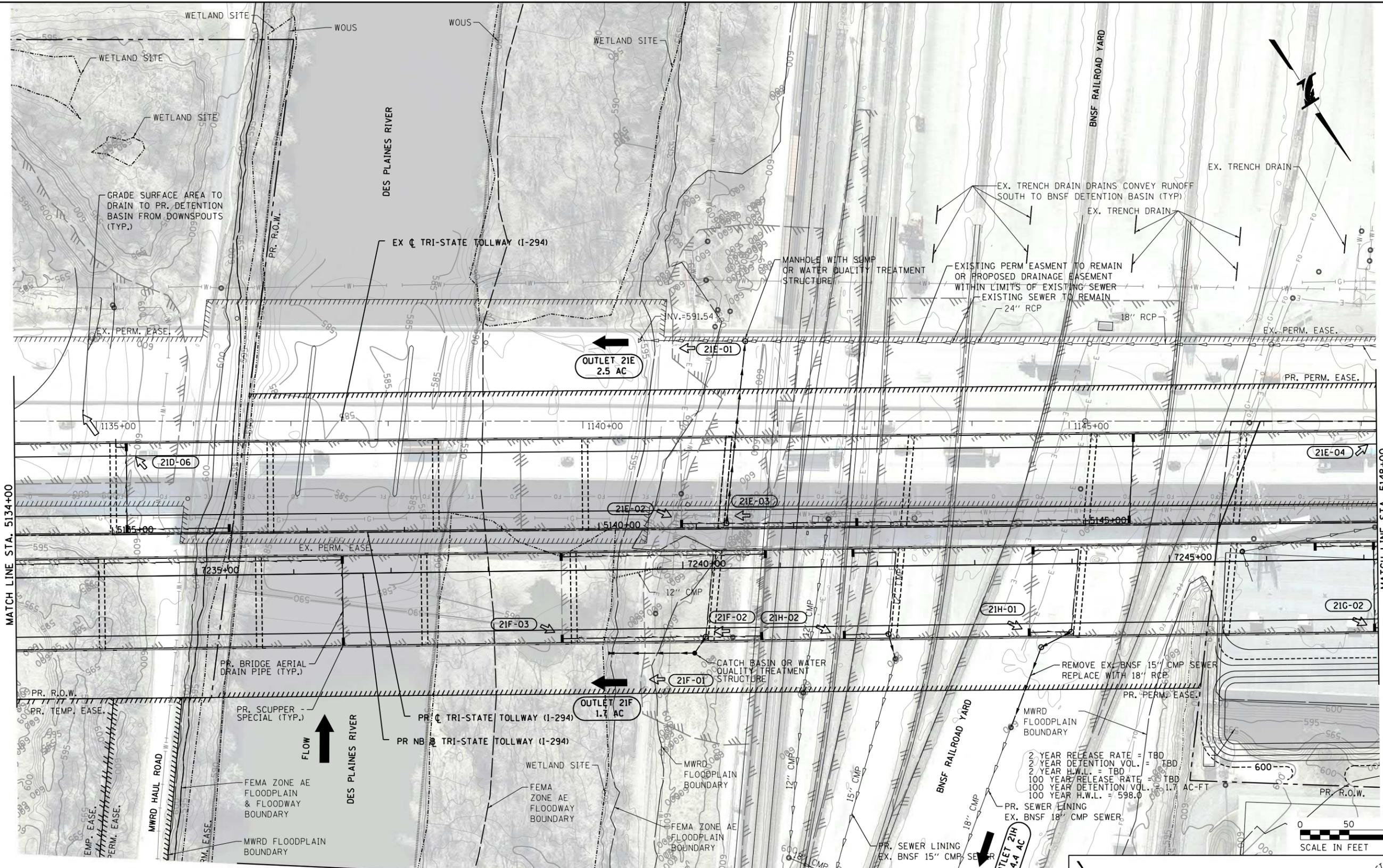


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.	DATE	REVISIONS	DESCRIPTION

CONTRACT NO. RR-14-4221
 PROPOSED DRAINAGE PLAN
 STA. 5107+00 TO STA. 5120+00

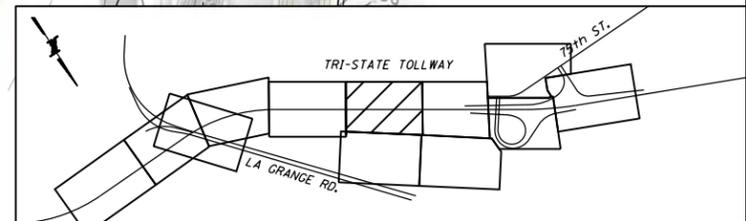
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EXHIBIT A-5.3
 DRAWING NO.
 3 OF 12



MATCH LINE STA. 5134+00

MATCH LINE STA. 5148+00

MATCH LINE
SEE SHEET NO. EXHIBIT A-5.10



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 CHECKED BY AWM DATE 09/29/17



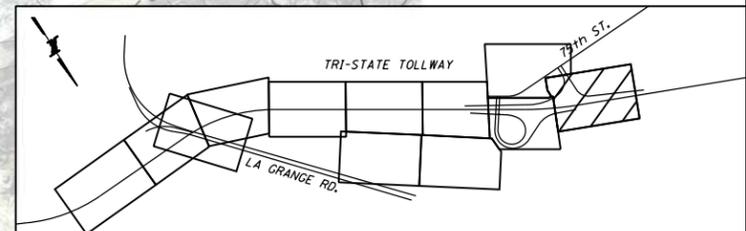
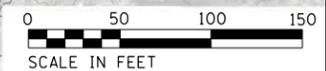
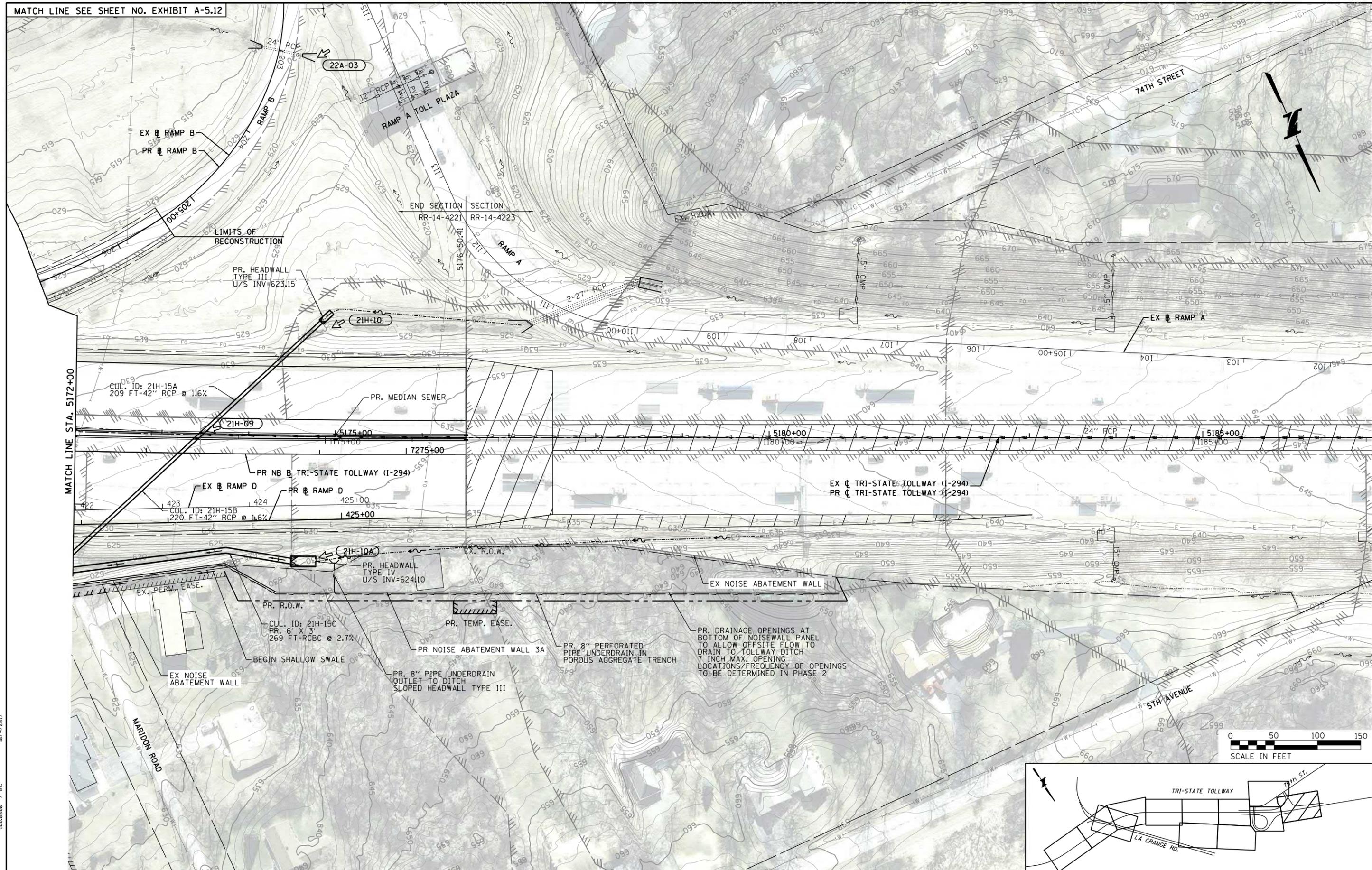
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.		REVISIONS	
NO.	DATE	DESCRIPTION	

CONTRACT NO. RR-14-4221
 PROPOSED DRAINAGE PLAN
 STA. 5134+00 TO STA. 5148+00

SHEET NO.
EXHIBIT A-5.5
 DRAWING NO.
 5 OF 12

MATCH LINE SEE SHEET NO. EXHIBIT A-5.12



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 CHECKED BY AWM DATE 09/29/17

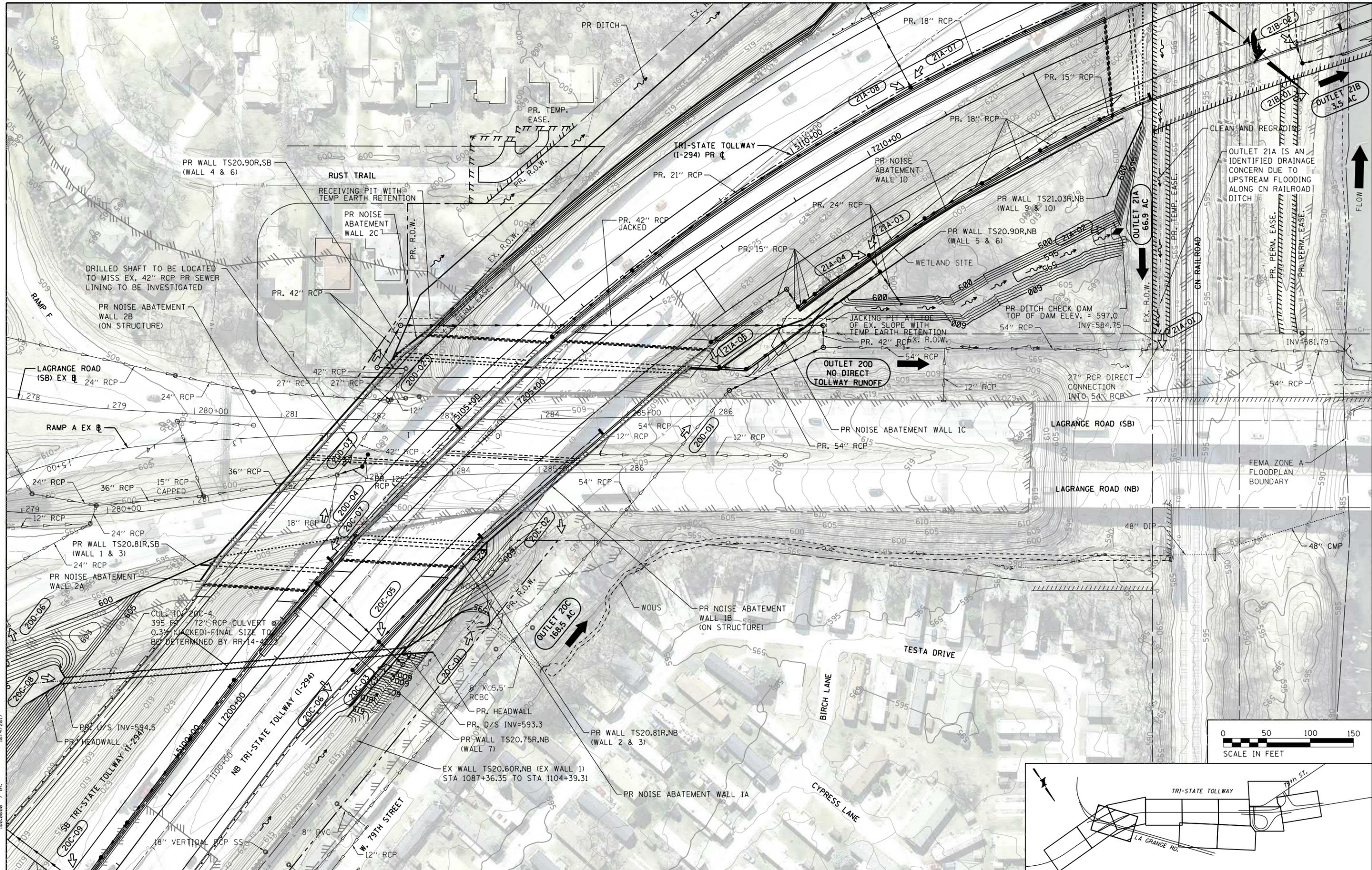


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

REVISIONS		DESCRIPTION
NO.	DATE	

CONTRACT NO. RR-14-4221
 PROPOSED DRAINAGE PLAN
 STA. 5172+00 TO STA. 5187+00

SHEET NO.
EXHIBIT A-5.8
 DRAWING NO.
 8 OF 12



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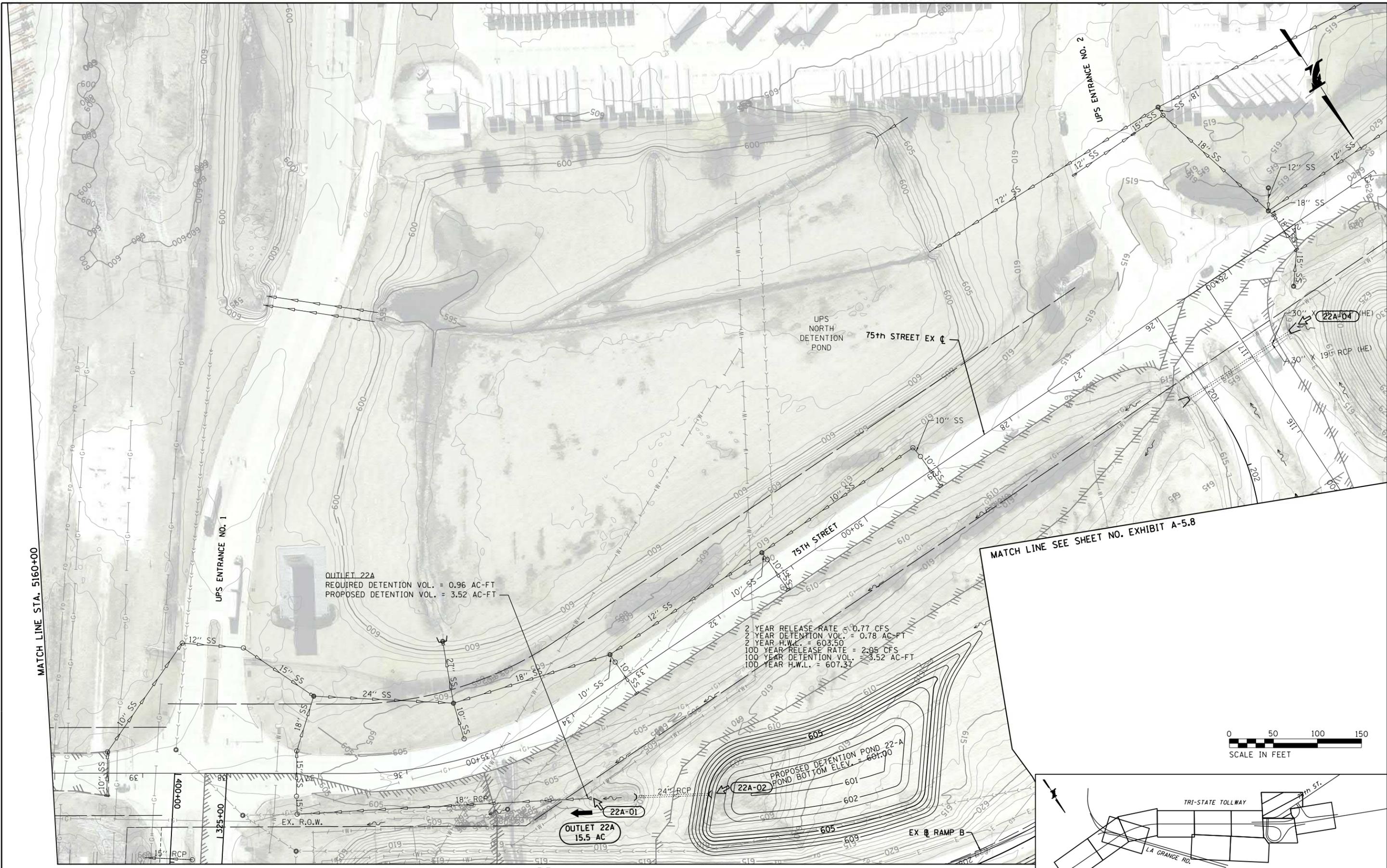
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

NO.	DATE	REVISIONS	DESCRIPTION

CONTRACT NO. RR-14-4221
 PROPOSED DRAINAGE PLAN
 LAGRANGE ROAD

SHEET NO. EXHIBIT A-5.11
 DRAWING NO. 11 OF 12

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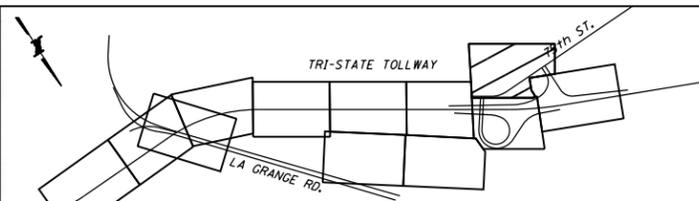


MATCH LINE STA. 5160+00

MATCH LINE SEE SHEET NO. EXHIBIT A-5.8

OUTLET 22A
 REQUIRED DETENTION VOL. = 0.96 AC-FT
 PROPOSED DETENTION VOL. = 3.52 AC-FT

2 YEAR RELEASE RATE = 0.77 CFS
 2 YEAR DETENTION VOL. = 0.78 AC-FT
 2 YEAR H.W.L. = 603.50
 100 YEAR RELEASE RATE = 2.95 CFS
 100 YEAR DETENTION VOL. = 3.52 AC-FT
 100 YEAR H.W.L. = 607.37



MATCH LINE SEE SHEET NO. EXHIBIT A-5.7

DRAWN BY DA SCALE 1"=50'
 CHECKED BY AWM DATE 9/29/2017



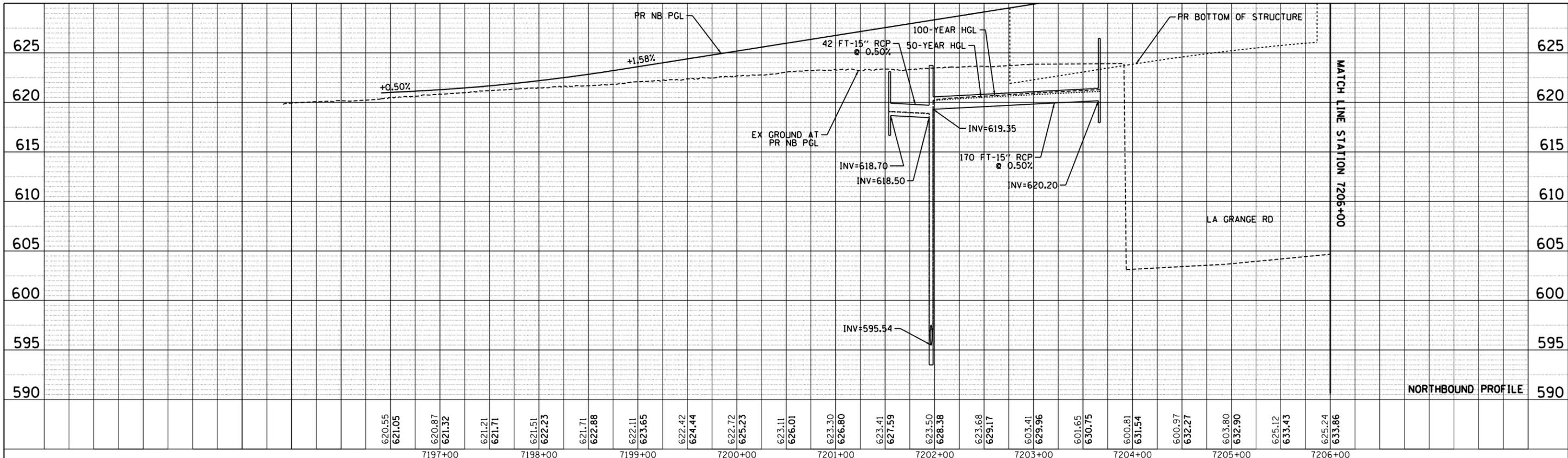
THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE, ILLINOIS 60515

REVISIONS		DESCRIPTION
NO.	DATE	

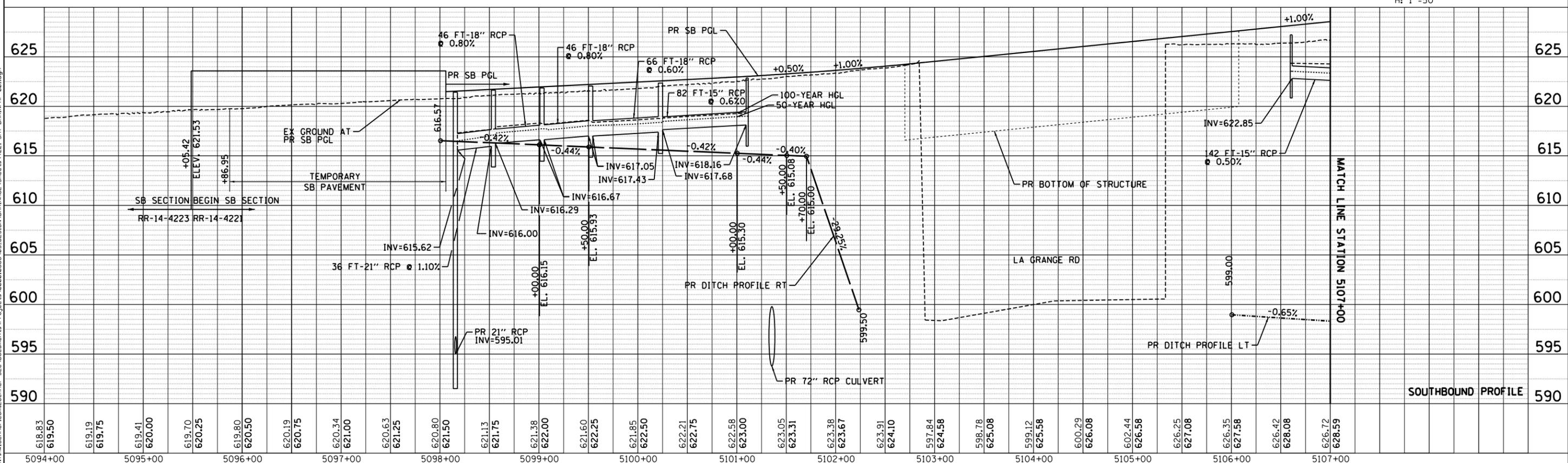
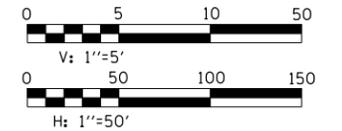
CONTRACT NO. RR-14-4221
 PROPOSED DRAINAGE PLAN
 RAMP B/75TH STREET INFIELD

SHEET NO. EXHIBIT A-5.12
 DRAWING NO. 12 OF 12

A-5.13 to A-5.16 Proposed Drainage Profile



NORTHBOUND PROFILE



SOUTHBOUND PROFILE

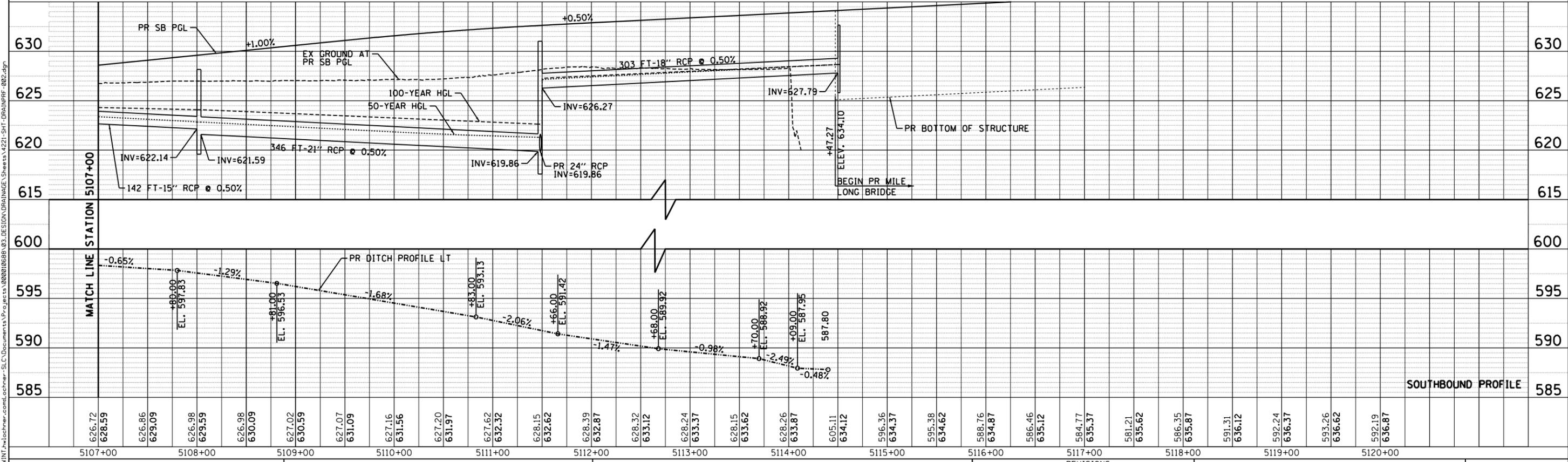
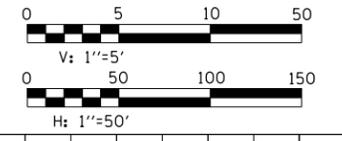
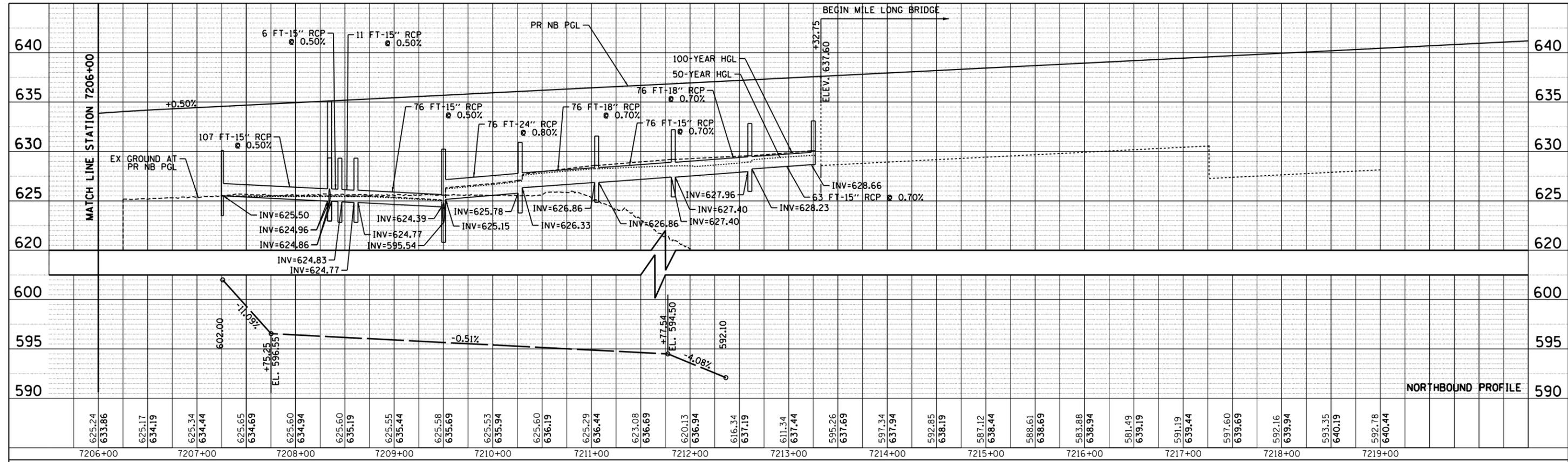
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 CHECKED BY AWM DATE 10/03/2017



THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE,
 ILLINOIS 60515

REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
 PROPOSED DRAINAGE PROFILES
 STA. 5094+00 TO 5107+00
 EXHIBIT A-5.13
 DRAWING NO.
 1 OF 4



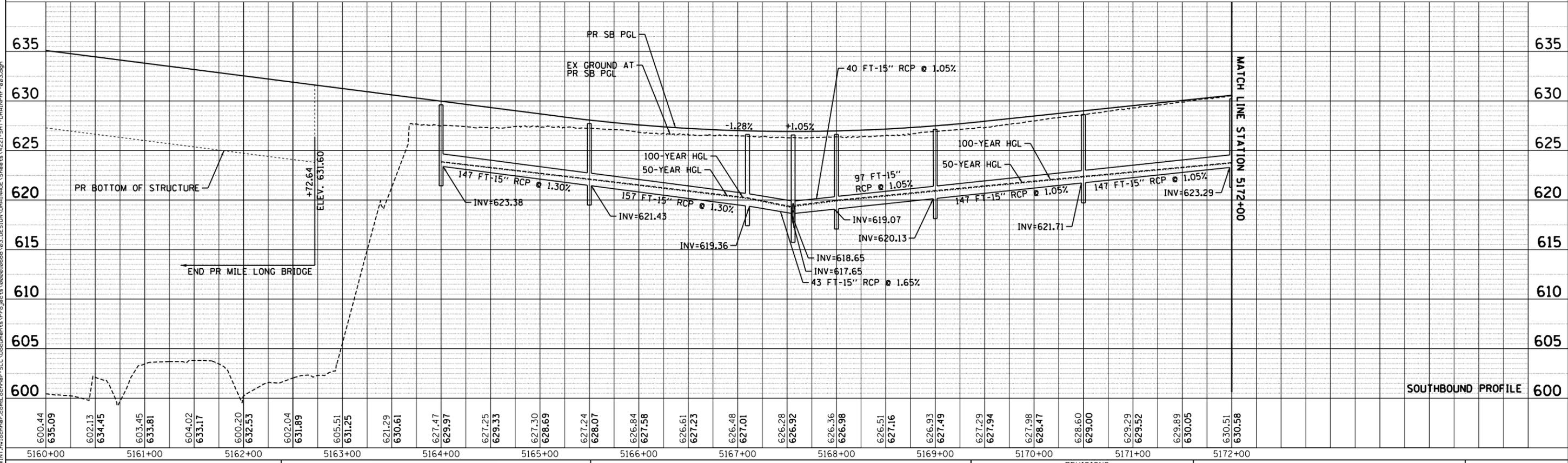
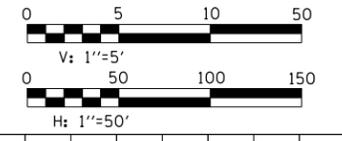
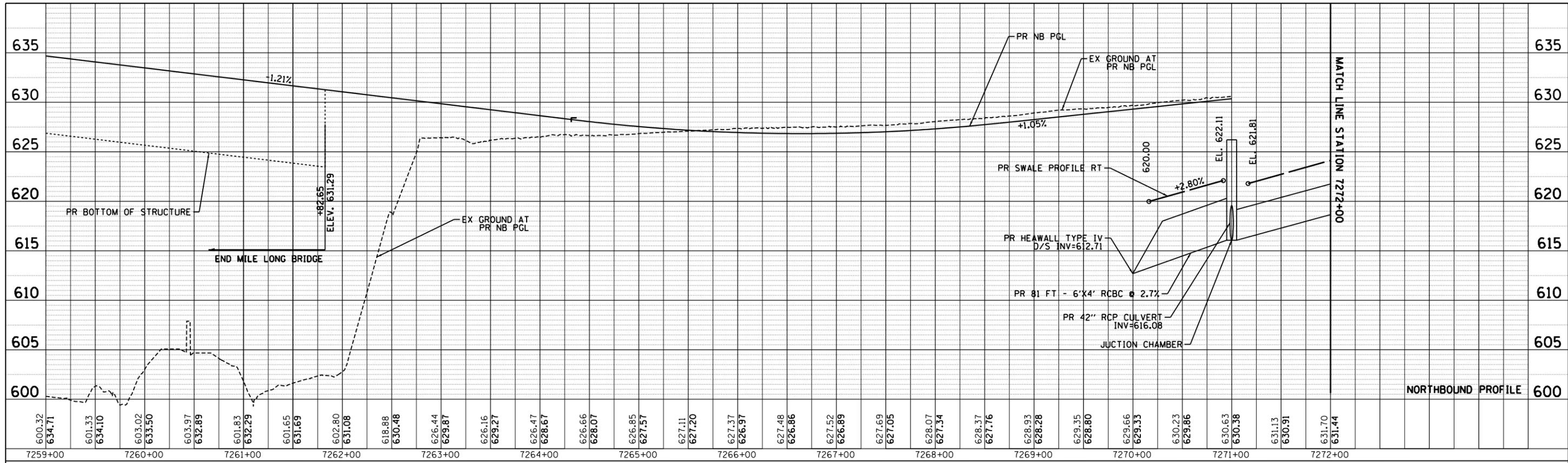
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CHECKED BY AWM DATE 10/03/2017



REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
PROPOSED DRAINAGE PROFILES
STA. 5107+00 TO 5120+00
DRAWING NO. 2 OF 4

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CHECKED BY AWM DATE 10/03/2017

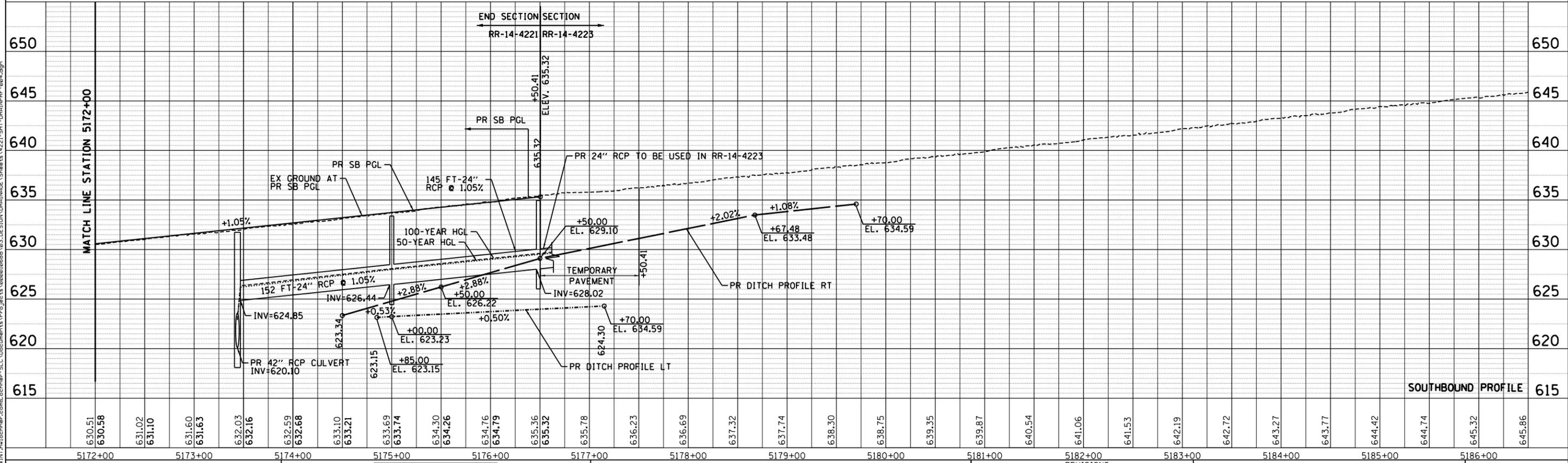
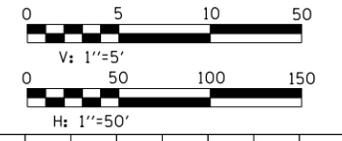
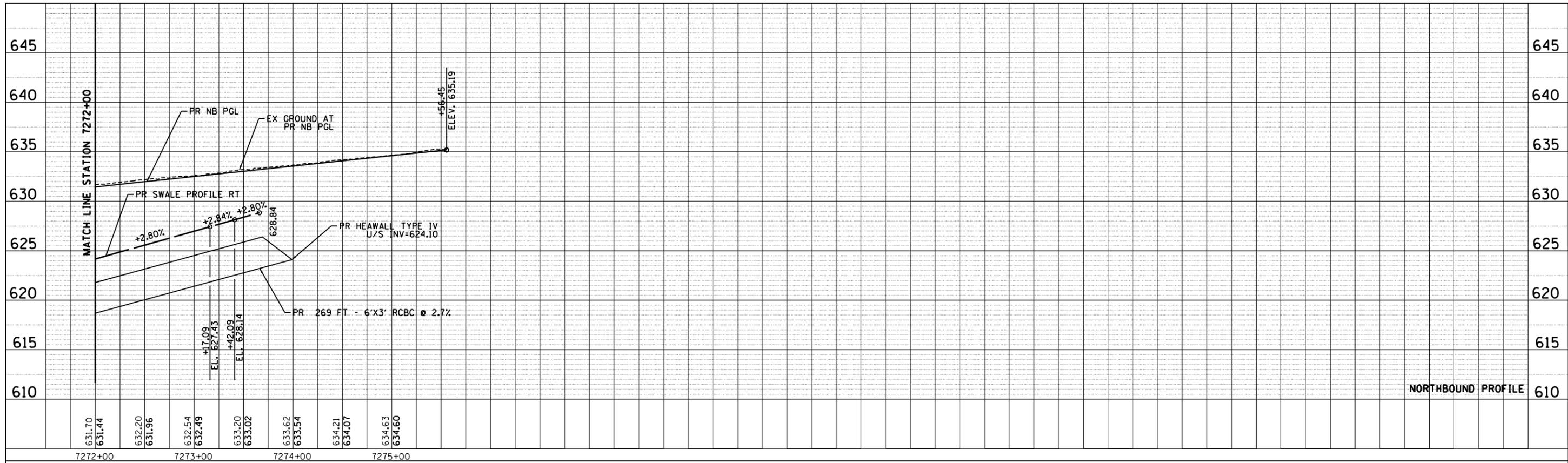


REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221

PROPOSED DRAINAGE PROFILES
STA. 5160+00 TO 5172+00

EXHIBIT A-5.15
DRAWING NO.
3 OF 4



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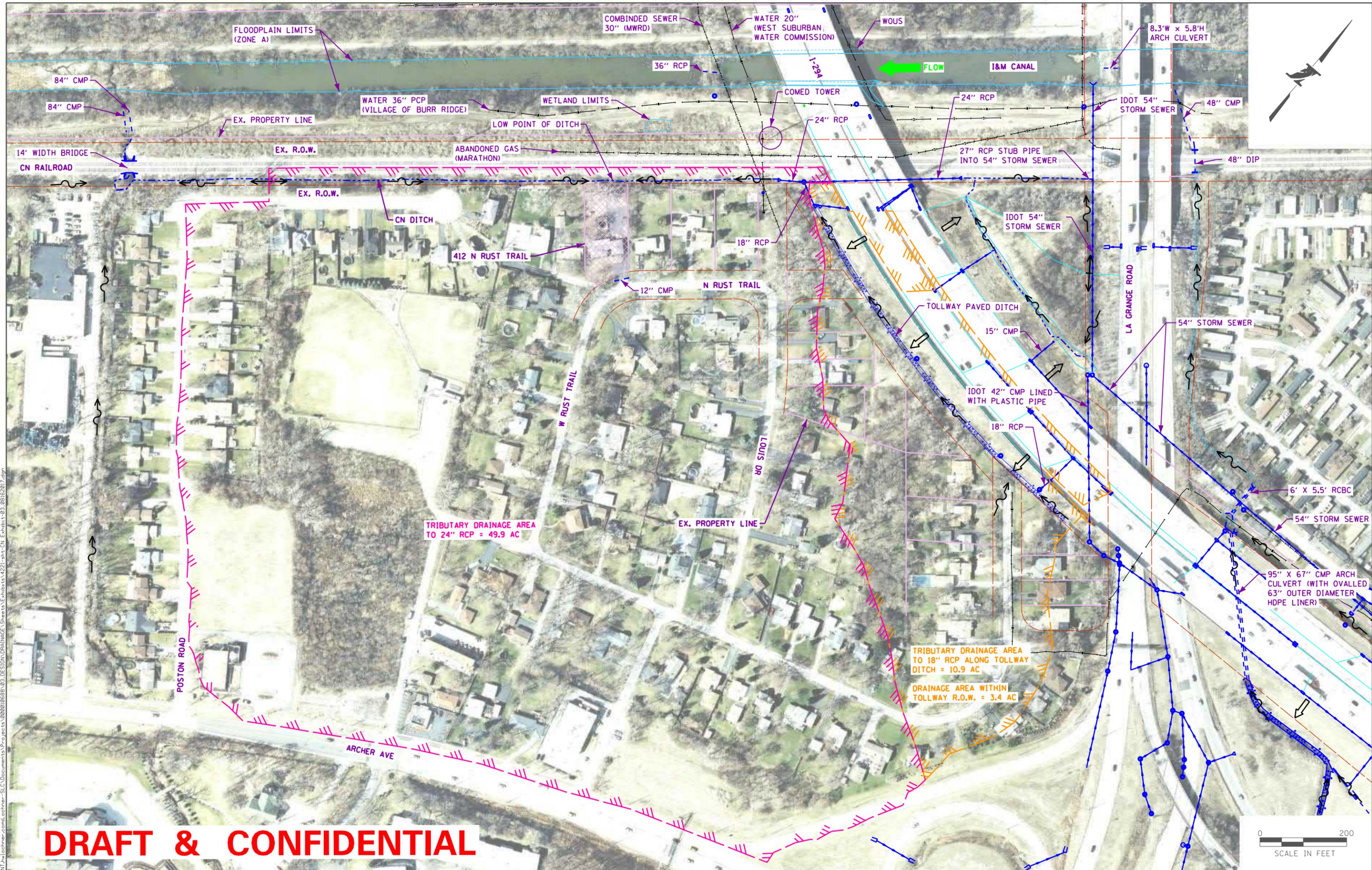


REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
PROPOSED DRAINAGE PROFILES
STA. 5172+00 TO 5186+00

EXHIBIT A-5.16
DRAWING NO.
4 OF 4

A-5.17 to A-5.21 Willow Springs/CN Drainage Existing and
Proposed Conditions and Alternatives



DRAFT & CONFIDENTIAL

DRAWN BY AL DATE 10/06/2017
 CHECKED BY AM DATE 10/09/2017

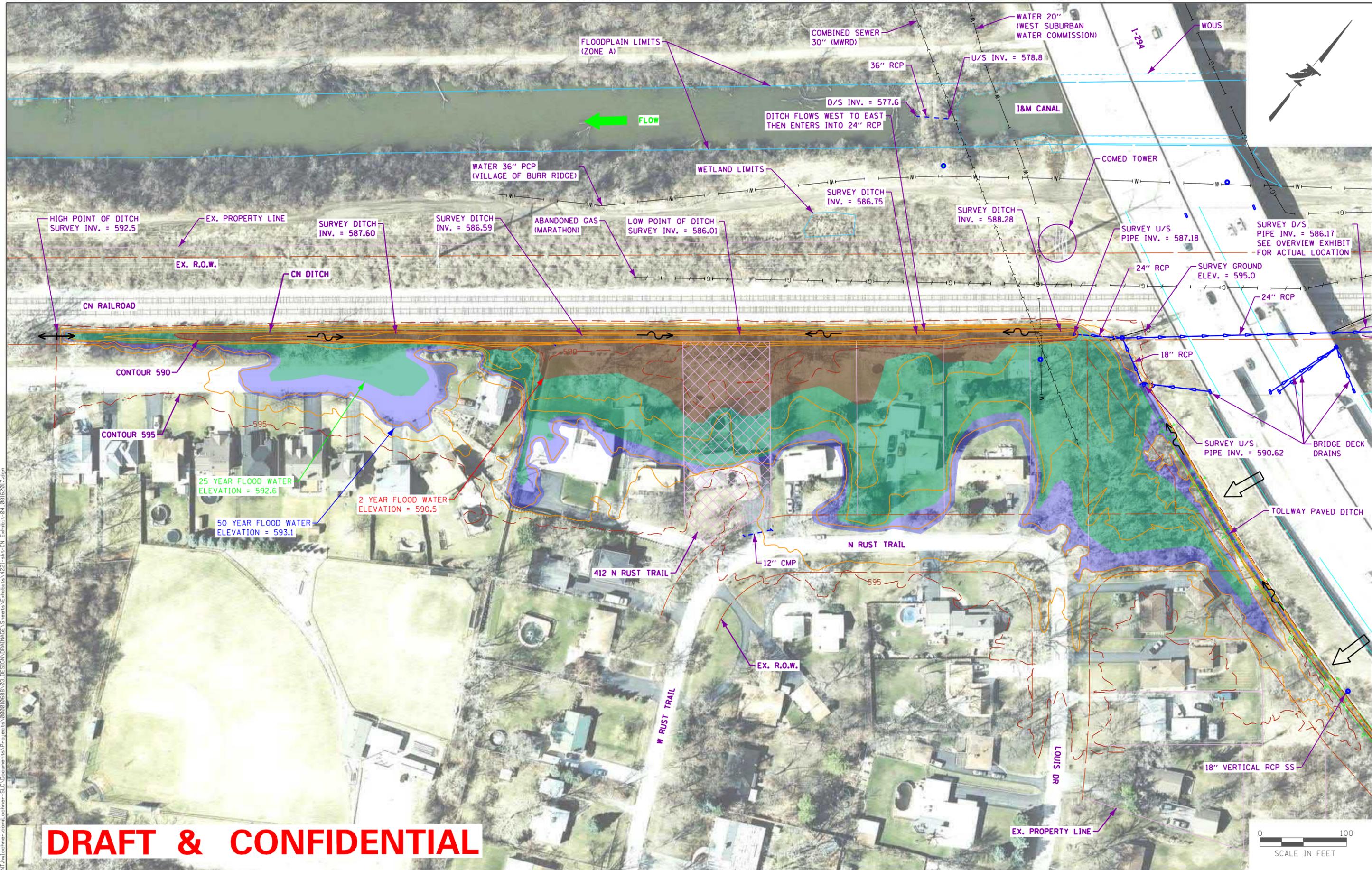


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE,
 ILLINOIS 60515

CONTRACT NO. RR-14-4221
 I-294 MILE LONG BRIDGE
 WILLOW SPRINGS/CN DRAINAGE EXISTING OVERVIEW

EXHIBIT A-5.17

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DRAFT & CONFIDENTIAL



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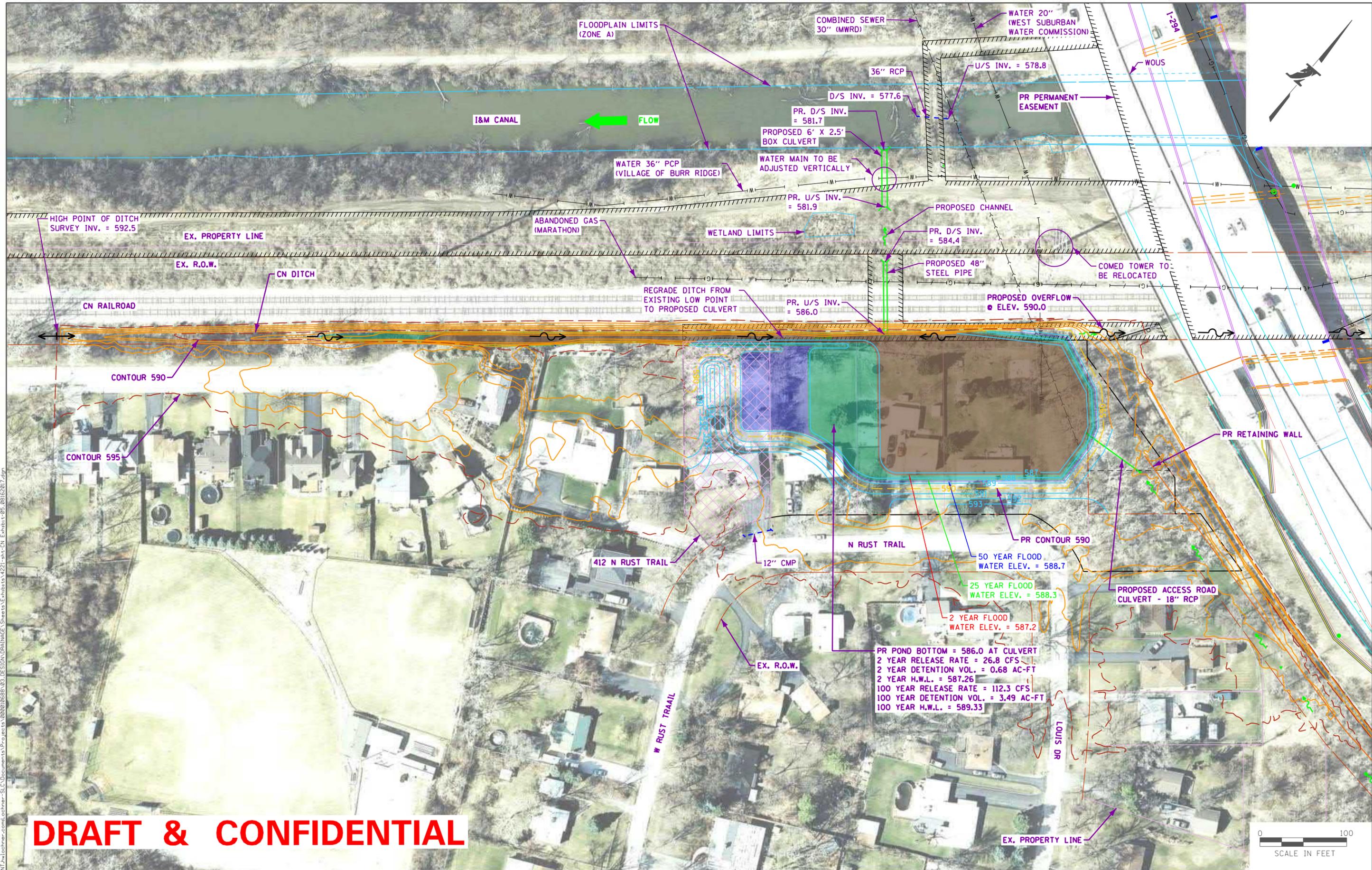


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE,
 ILLINOIS 60515

CONTRACT NO. RR-14-4221
 I-294 MILE LONG BRIDGE
 WILLOW SPRINGS/CN DRAINAGE EXISTING CONDITION

EXHIBIT A-5.18

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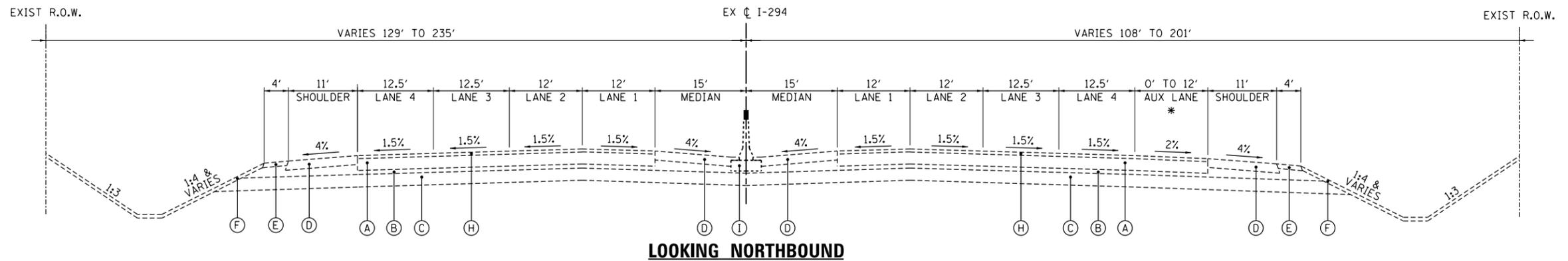


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE,
 ILLINOIS 60515

CONTRACT NO. RR-14-4221
 I-294 MILE LONG BRIDGE
 WILLOW SPRINGS/CN DRAINAGE PROPOSED ALTERNATIVE 1
 EXHIBIT A-5.19

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A-6.1 to A-6.5 Existing Typical Cross Sections

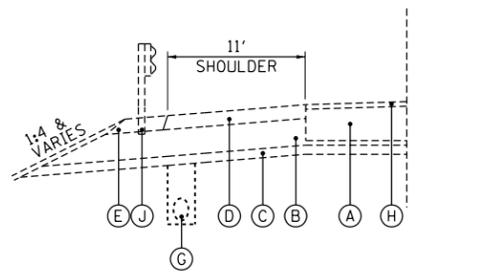


I-294 SOUTHBOUND – EXISTING

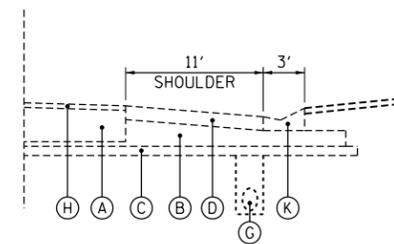
STA 1092+50 TO STA 1101+36
 MILE LONG BRIDGE BRIDGE OMISSION- STA. 1114+25 TO STA. 1163+63
 STA 1163+63 TO STA 1166+03
 STA 1176+39 TO STA 1187+69

I-294 NORTHBOUND – EXISTING

STA 1092+50 TO STA 1102+99
 MILE LONG BRIDGE BRIDGE OMISSION- STA. 1114+25 TO STA. 1163+63
 STA 1163+63 TO STA 1189+08
 * STA 1178+02 TO STA 1193+94 (AUX LANE)



EXISTING SHOULDER WITH GUARDRAIL



EXISTING SHOULDER WITH GUTTER

EXISTING LEGEND

- (A) PORTLAND CEMENT CONCRETE PAVEMENT 12"
- (B) GRANULAR SUBBASE
- (C) SELECTED SUBGRADE
- (D) BITUMINOUS SHOULDER 9.75"
- (E) AGGREGATE SHOULDER
- (F) TOPSOIL
- (G) SUBSURFACE PAVEMENT DRAIN
- (H) EXISTING BITUMINOUS BINDER AND SURFACE COURSE 3.75"
- (I) EXISTING CONCRETE BARRIER AND BASE
- (J) EXISTING GUARDRAIL
- (K) EXISTING GUTTER

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CHECKED BY	DP	DATE	09/08/17

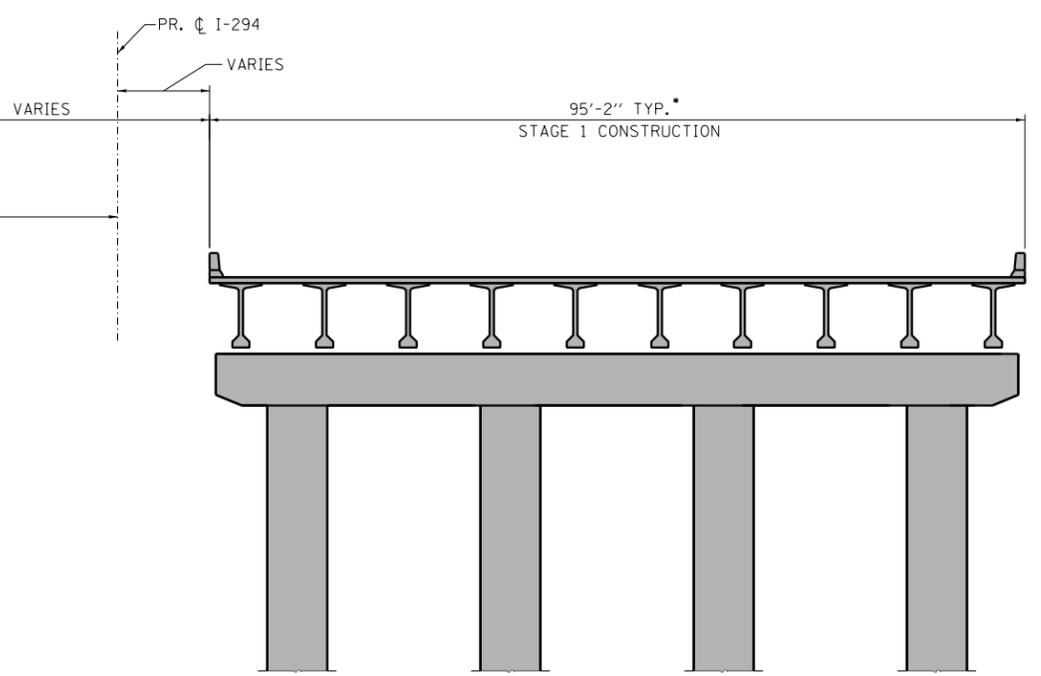
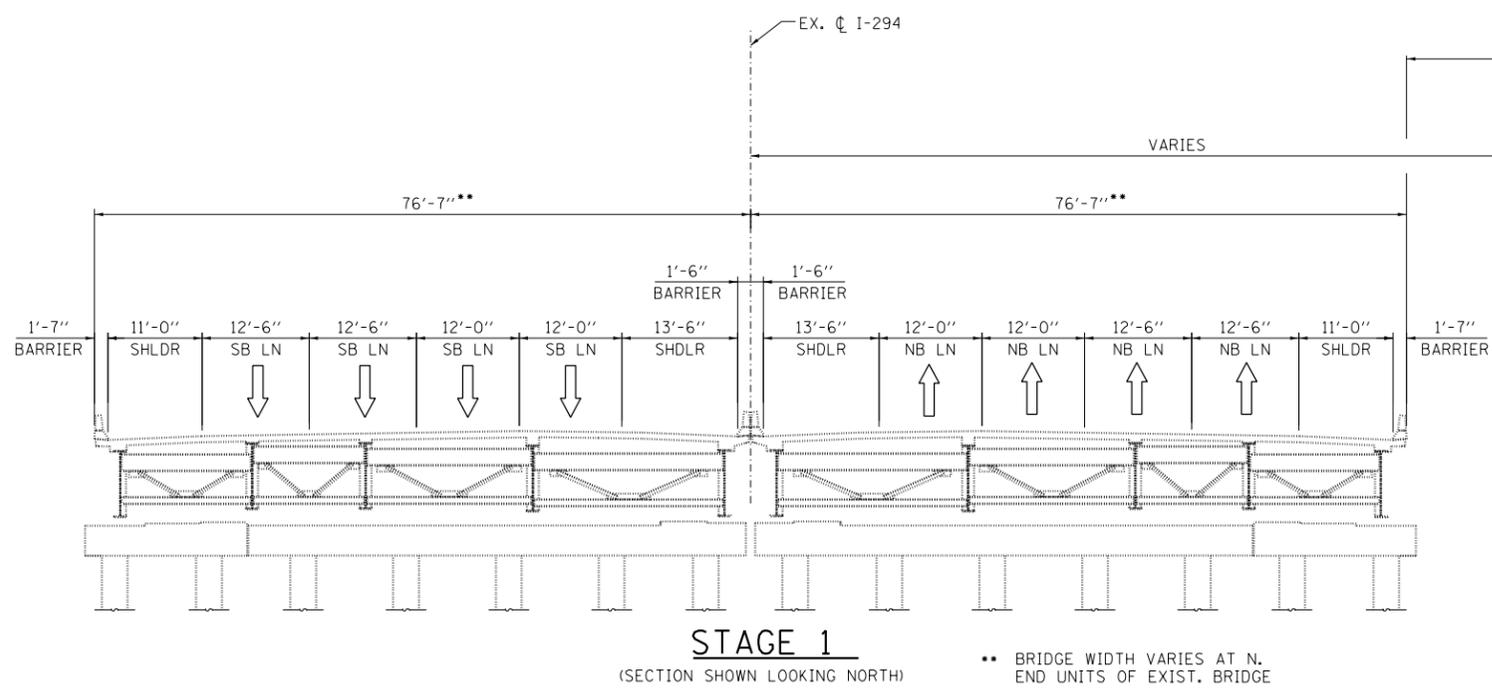
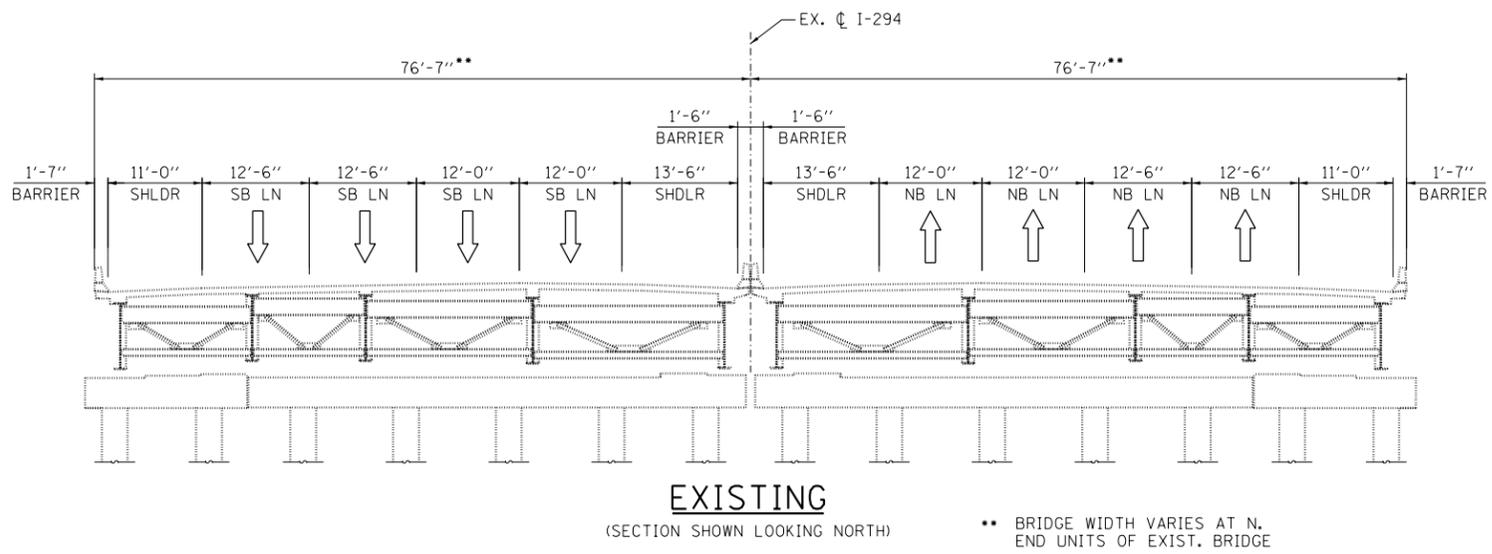


REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
EXISTING TYPICAL SECTIONS I-294 MAINLINE

EXHIBIT A-6.1

\$TIMES\$
\$DATES\$
\$FILES\$



• TYPICAL FOR UNIT 2 THRU UNIT 6.
VARIES AT UNIT 1 AND UNIT 7

DRAWN BY BFL DATE 08/28/2017
CHECKED BY RH DATE 08/28/2017



THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
2700 OGDEN AVENUE
DOWNERS GROVE,
ILLINOIS 60515

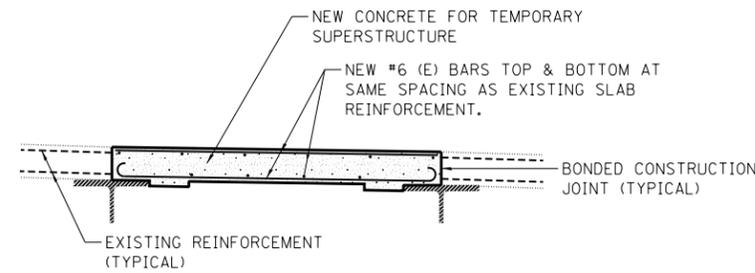
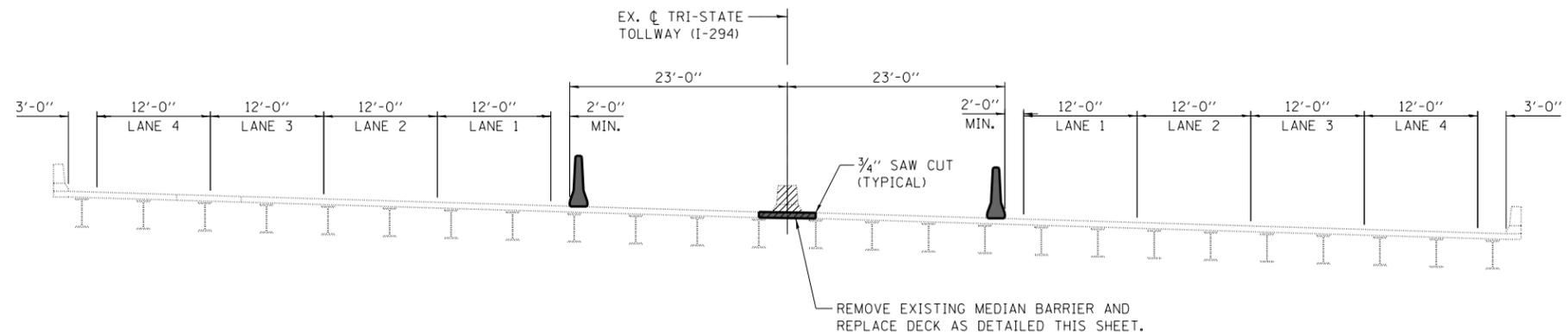
REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
CONST. STAGING CROSS SECTIONS 1
MILE LONG BRIDGE

EXHIBIT
A-6.4

NOTE: EX. MEDIAN LIGHT POLE SHALL BE REMOVED. ELECTRICAL SERVICE SHALL BE CONTINUED SO AS NOT TO DISRUPT ADJACENT LIGHTING.

NOTE: HATCHED AREAS INDICATE CONCRETE SECTIONS TO BE REMOVED. PERIMETERS OF CONCRETE REMOVAL AREAS SHALL BE SAW CUT 3/4" PRIOR TO THE REMOVAL OF THE CONCRETE. EXISTING TRANSVERSE REINFORCEMENT SHALL BE CLEANED, STRAIGHTENED, AND INCORPORATED INTO THE NEW CONSTRUCTION. NEW REINFORCEMENT BARS SHALL BE EPOXY COATED.



RECONSTRUCTED LONGITUDINAL JOINT

PRE-STAGE 1

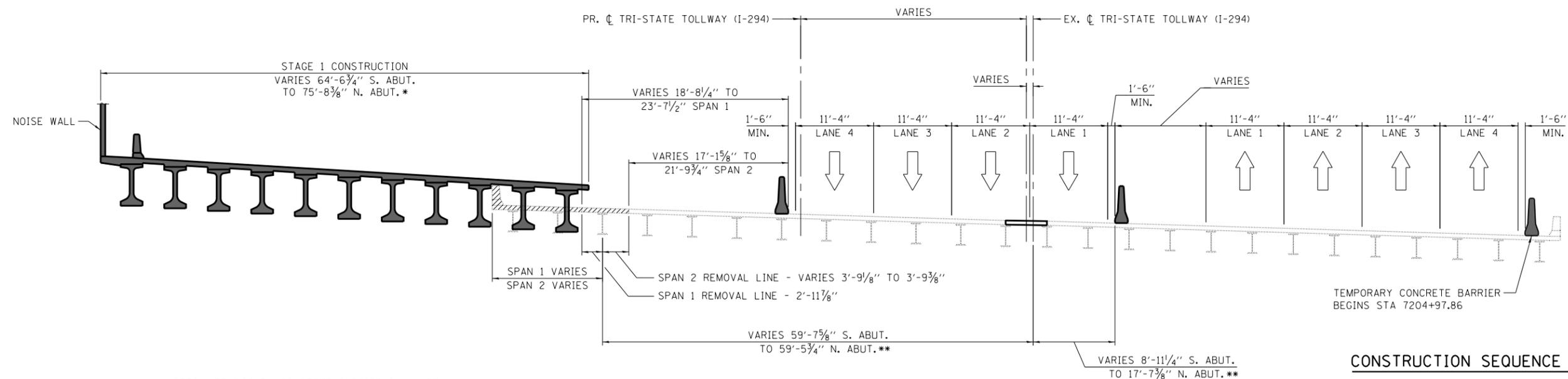
(LOOKING NORTHBOUND)

CONSTRUCTION SEQUENCE NOTES

PRE-STAGE 1

WORK: REMOVE MEDIAN BARRIER AND CLOSE MEDIAN DECK JOINT

I-294 TRAFFIC: SHIFT TRAFFIC TO THE OUTSIDE, PROTECT MEDIAN USING TEMP. BARRIER



NOTES: TEMPORARY CONCRETE BARRIER SHALL BE PINNED TO EXISTING BRIDGE DECK.

SEE "MOT PLANS" FOR CONTROL OF TRAVEL WAY RELATED DIMENSIONS.

* MEASURED PERPENDICULAR TO EDGE OF DECK.

** MEASURED PERPENDICULAR TO EXISTING CENTERLINE (I-294).

STAGE 1

(LOOKING NORTHBOUND)

CONSTRUCTION SEQUENCE NOTES

STAGE 1

WORK: REMOVE WEST (OUTSIDE) PORTION OF EX SBL. CONSTRUCT WEST PORTION OF PR SBL.

I-294 TRAFFIC: SHIFT NBL TRAFFIC TO OUTSIDE. SHIFT SBL TRAFFIC TO MEDIAN.

LAGRANGE TRAFFIC: MAINTAIN IN EXISTING LANES, INSTALL TEMP BARRIER AT INSIDE AND OUTSIDE EDGES OF PAVEMENT. SHORT TERM LANE CLOSURES AS NEEDED FOR SUBSTRUCTURE DEMOLITION. SHORT TERM ROAD CLOSURES AS NEEDED FOR BEAM REMOVAL AND/OR ERECTION.

8/18/2017
4221-SHT-OE1-STR-LRB-TSAL04.dgn
0.1667 / 1 in.
JBarrow

DRAWN BY **RPW** SCALE **NONE**
CHECKED BY **DRB** DATE **08/18/17**

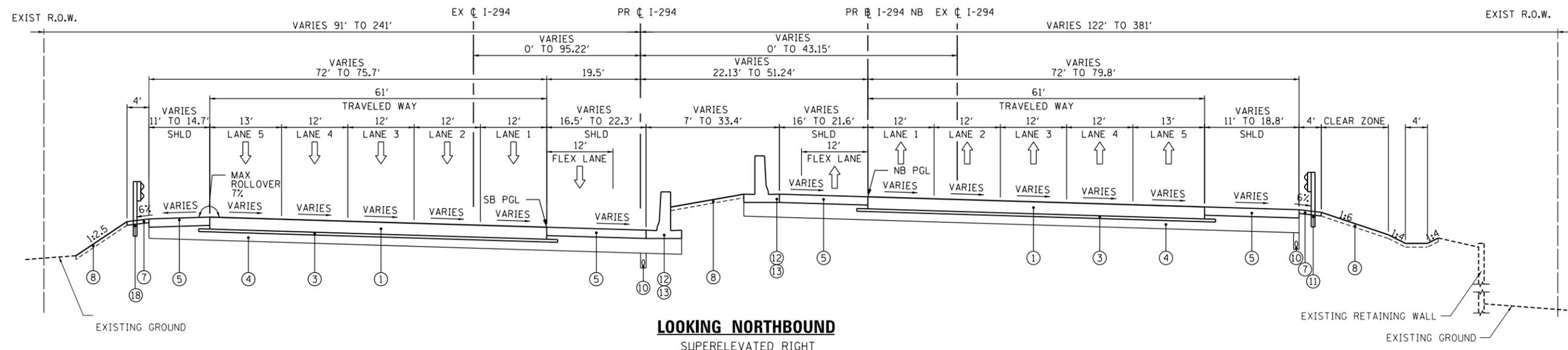


REVISIONS		DESCRIPTION
NO.	DATE	

CONTRACT NO. **RR-14-4221**
STAGING TYPICAL SECTIONS
LAGRANGE ROAD BRIDGE

EXHIBIT
A-6.5

A-6.6 to A-6.13 Proposed Typical Cross Sections



I-294 - PROPOSED SOUTHBOUND

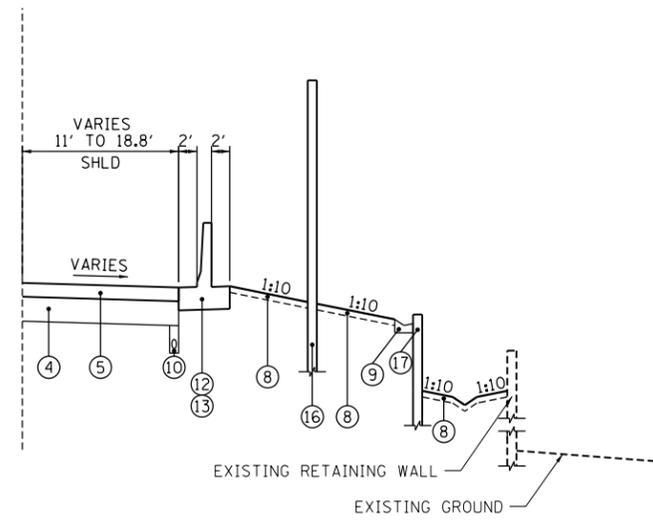
STA 5098+05.42 TO STA 5101+18.02
 LA GRANGE ROAD BRIDGE OMISSION- STA 5101+18.02 TO STA 5106+88.07
 STA 5106+88.07 TO STA 5113+48.63
 MILE LONG BRIDGE BRIDGE OMISSION- STA 5113+48.63 TO STA 5122+48.55

I-294 - PROPOSED NORTHBOUND

STA 7196+40.00 TO STA 7201+78.42
 LA GRANGE ROAD BRIDGE OMISSION- STA 7201+78.42 TO STA 7207+59.62
 STA 7207+59.62 TO STA 7212+11.05
 MILE LONG BRIDGE BRIDGE OMISSION- STA 7212+11.05 TO STA 7221+53.00

NOTES:

1. ULTIMATE SHOULDER CONSTRUCTION OMITTED IN THIS CONTRACT FROM STA 5091+99.26 TO 5097+00.00 AND STA 7196+40.00 TO STA 7199+28.39. TO BE CONSTRUCTED BY OTHERS.
2. ULTIMATE MEDIAN CONSTRUCTION OMITTED IN THIS CONTRACT FROM STA 5091+99.26 TO STA 5101+52.62. TO BE CONSTRUCTED BY OTHERS.



PROPOSED NB SHOULDER AT NOISE WALL

STA 7201+09.91 TO STA 7202+82.55

PROPOSED LEGEND

- ① PERFORMANCE RELATED PORTLAND CEMENT CONCRETE PAVEMENT, JOINTED - 13" (JT420186)
- ② PORTLAND CEMENT CONCRETE PAVEMENT 10" (JOINTED) (JI420005)
- ③ STABILIZED SUBBASE - WMA 3" (JI312022)
- ④ SUBGRADE AGGREGATE, SPECIAL, 9" (JT313010)
 A. CAPPING AGGREGATE, 3" MIN (THICKNESS VARIES UNDER SHOULDERS)
 B. POROUS GRANULAR EMBANKMENT, 6"
- ⑤ WARM-MIX ASPHALT SHOULDERS (9 IN) (JI482112)
- ⑥ WARM-MIX ASPHALT SHOULDERS (6 IN) (JI482104)
- ⑦ AGGREGATE SHOULDERS WITH FILTER FABRIC, TYPE B 4" (JI481130)
- ⑧ TOPSOIL EXCAVATION AND PLACEMENT (JI211110)
- ⑨ GUTTER, TYPE G-2, MODIFIED (JI606015)
- ⑩ PIPE UNDERDRAINS, FABRIC LINED TRENCH 6" (JI601320)
- ⑪ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS (JI630002)
- ⑫ CONCRETE BARRIER, SINGLE FACE, REINFORCED, 42 INCH (JI637030)
- ⑬ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (JI637032)
- ⑭ NOT USED
- ⑮ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (SPECIAL) (JI637036)
- ⑯ NOISE ABATEMENT WALL
- ⑰ RETAINING WALL
- ⑱ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 9 FOOT POSTS (JI630004)

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 CHECKED BY DP DATE 09/08/17

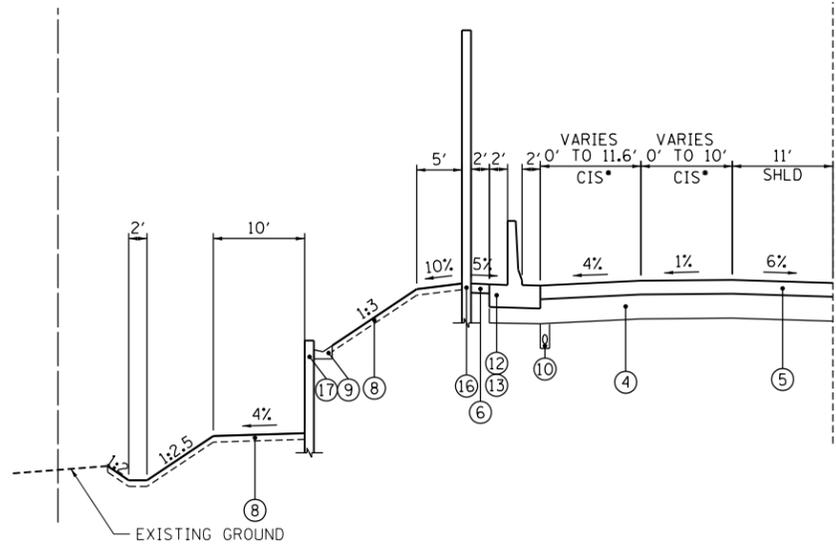


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CONTRACT NO. RR-14-4221
 PROPOSED TYPICAL SECTIONS
 I-294 MAINLINE

EXHIBIT
 A-6.6

EXIST R.O.W.

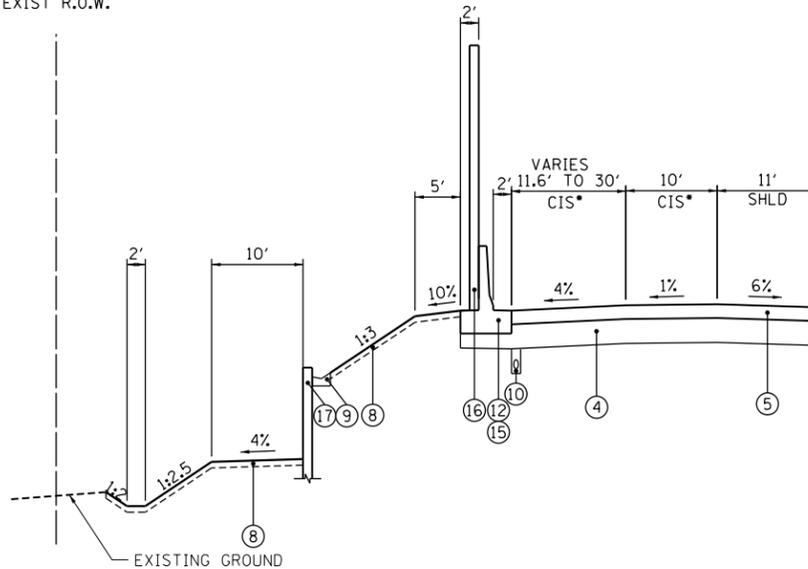


*ADDITIONAL SHOULDER FOR PROPOSED CRASH INVESTIGATION SITE.

PROPOSED SB SHOULDER AT NOISE WALL

STA 5105+76.81 TO STA 5110+99.11
STA 5113+57.51 TO STA 5114+36.40

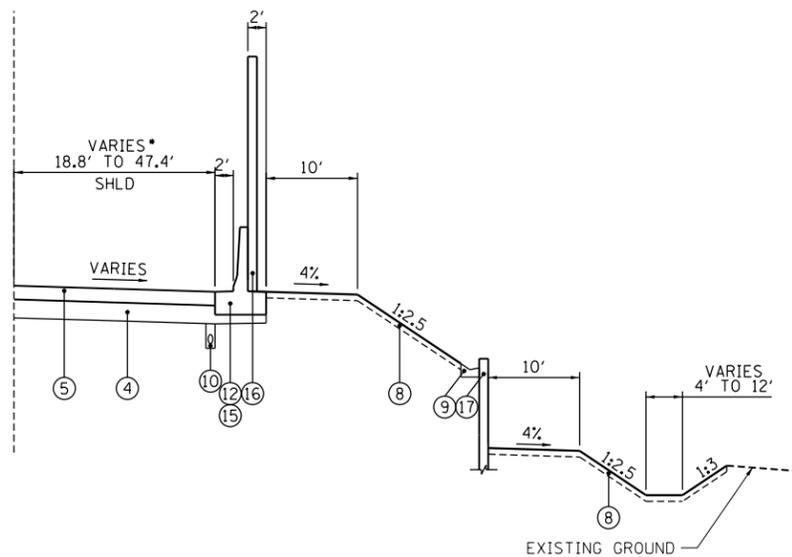
EXIST R.O.W.



*ADDITIONAL SHOULDER FOR PROPOSED CRASH INVESTIGATION SITE.

PROPOSED SB SHOULDER AT NOISE WALL

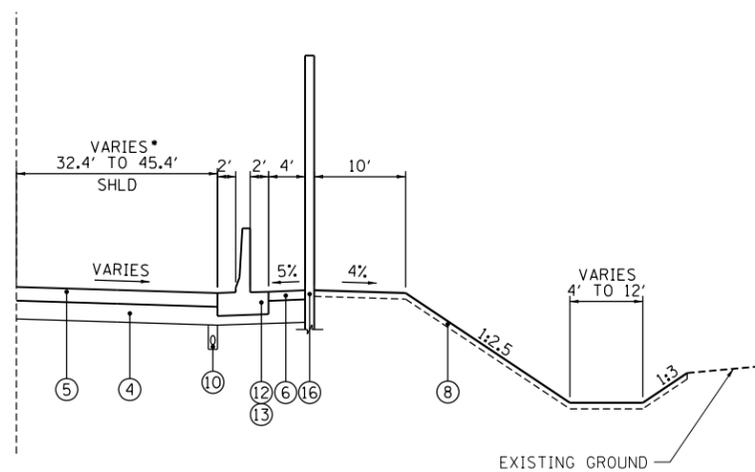
STA 5110+99.11 TO STA 5113+57.51



*ADDITIONAL SHOULDER FOR PROPOSED IPDC SITE.

PROPOSED NB SHOULDER AT NOISE WALL

STA 7207+29.22 TO STA 7210+49.63



*ADDITIONAL SHOULDER FOR PROPOSED IPDC SITE.

PROPOSED NB SHOULDER AT NOISE WALL

STA 7210+49.63 TO STA 7212+76.21

PROPOSED LEGEND

- ① PERFORMANCE RELATED PORTLAND CEMENT CONCRETE PAVEMENT, JOINTED - 13" (JT420186)
- ② PORTLAND CEMENT CONCRETE PAVEMENT 10" (JOINTED) (JI420005)
- ③ STABILIZED SUBBASE - WMA 3" (JI312022)
- ④ SUBGRADE AGGREGATE, SPECIAL, 9" (JT313010)
A. CAPPING AGGREGATE, 3" MIN (THICKNESS VARIES UNDER SHOULDERS)
B. POROUS GRANULAR EMBANKMENT, 6"
- ⑤ WARM-MIX ASPHALT SHOULDERS (9 IN) (JI482112)
- ⑥ WARM-MIX ASPHALT SHOULDERS (6 IN) (JI482104)
- ⑦ AGGREGATE SHOULDERS WITH FILTER FABRIC, TYPE B 4" (JI481130)
- ⑧ TOPSOIL EXCAVATION AND PLACEMENT (JI211110)
- ⑨ GUTTER, TYPE G-2, MODIFIED (JI606015)
- ⑩ PIPE UNDERDRAINS, FABRIC LINED TRENCH 6" (JI601320)
- ⑪ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS (JI630002)
- ⑫ CONCRETE BARRIER, SINGLE FACE, REINFORCED, 42 INCH (JI637030)
- ⑬ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (JI637032)
- ⑭ NOT USED
- ⑮ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (SPECIAL) (JI637036)
- ⑯ NOISE ABATEMENT WALL
- ⑰ RETAINING WALL
- ⑱ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 9 FOOT POSTS (JI630004)

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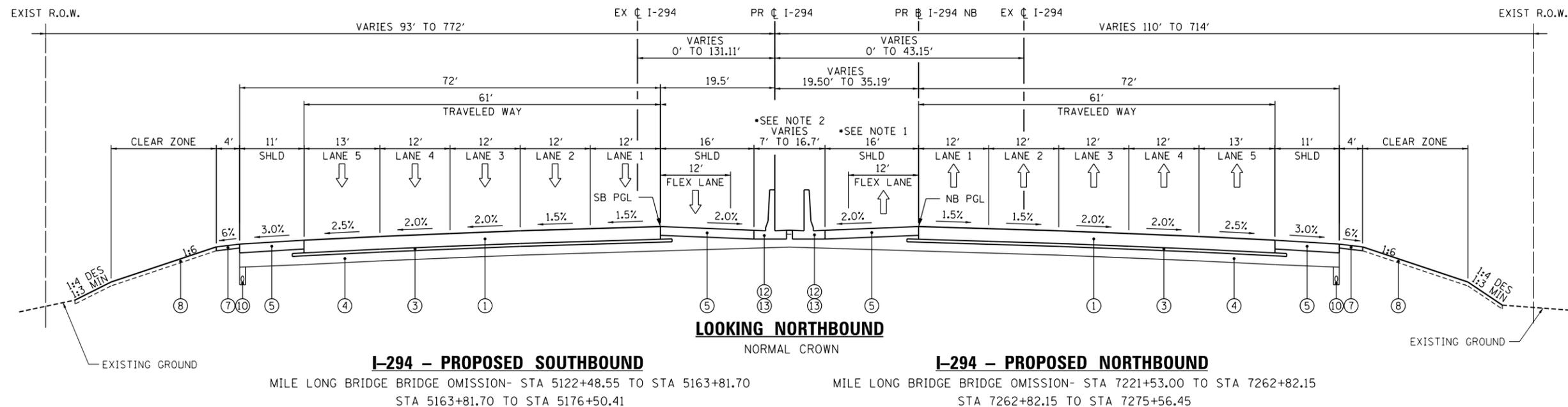
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		DESCRIPTION	

CONTRACT NO. RR-14-4221
PROPOSED TYPICAL SECTIONS
I-294 MAINLINE

EXHIBIT
A-6.7



NOTES:

1. ULTIMATE SHOULDER CONSTRUCTION OMITTED IN THIS CONTRACT FROM STA 5091+99.26 TO 5097+00.00 AND STA 7196+40.00 TO STA 7199+28.39. TO BE CONSTRUCTED BY OTHERS.
2. ULTIMATE MEDIAN CONSTRUCTION OMITTED IN THIS CONTRACT FROM STA 5091+99.26 TO STA 5101+52.62. TO BE CONSTRUCTED BY OTHERS.

PROPOSED LEGEND

- ① PERFORMANCE RELATED PORTLAND CEMENT CONCRETE PAVEMENT, JOINTED - 13" (JT420186)
- ② PORTLAND CEMENT CONCRETE PAVEMENT 10" (JOINTED) (JI420005)
- ③ STABILIZED SUBBASE - WMA 3" (JI312022)
- ④ SUBGRADE AGGREGATE, SPECIAL, 9" (JT313010)
A. CAPPING AGGREGATE, 3" MIN (THICKNESS VARIES UNDER SHOULDERS)
B. POROUS GRANULAR EMBANKMENT, 6"
- ⑤ WARM-MIX ASPHALT SHOULDERS (9 IN) (JI482112)
- ⑥ WARM-MIX ASPHALT SHOULDERS (6 IN) (JI482104)
- ⑦ AGGREGATE SHOULDERS WITH FILTER FABRIC, TYPE B 4" (JI481130)
- ⑧ TOPSOIL EXCAVATION AND PLACEMENT (JI211110)
- ⑨ GUTTER, TYPE G-2, MODIFIED (JI606015)
- ⑩ PIPE UNDERDRAINS, FABRIC LINED TRENCH 6" (JI601320)
- ⑪ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS (JI630002)
- ⑫ CONCRETE BARRIER, SINGLE FACE, REINFORCED, 42 INCH (JI637030)
- ⑬ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (JI637032)
- ⑭ NOT USED
- ⑮ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (SPECIAL) (JI637036)
- ⑯ NOISE ABATEMENT WALL
- ⑰ RETAINING WALL
- ⑱ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 9 FOOT POSTS (JI630004)

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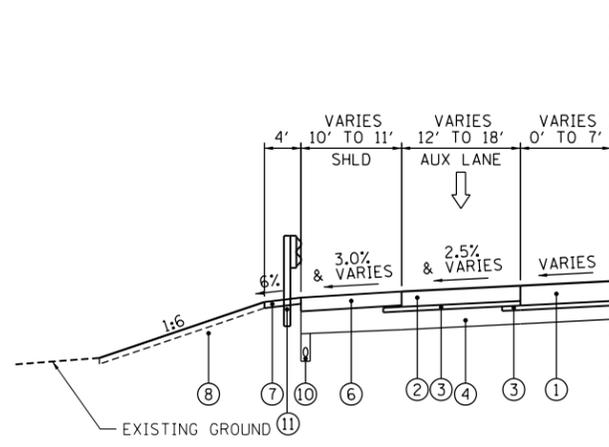
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 CHECKED BY **DP** DATE **09/08/17**



REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. **RR-14-4221**
 PROPOSED TYPICAL SECTIONS
I-294 MAINLINE

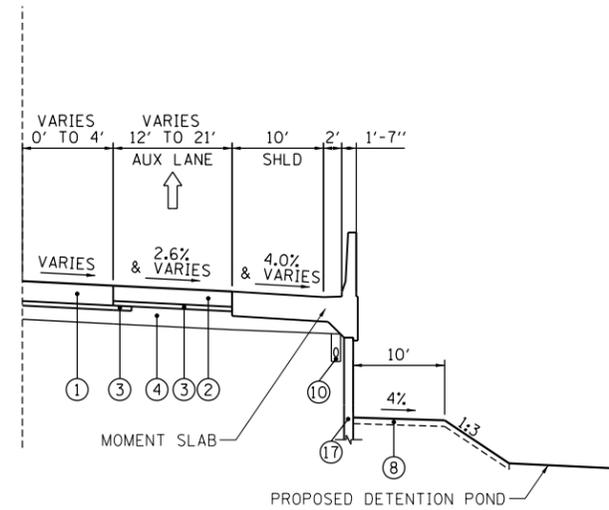
EXHIBIT
A-6.8



LOOKING NORTHBOUND

RAMP B GORE

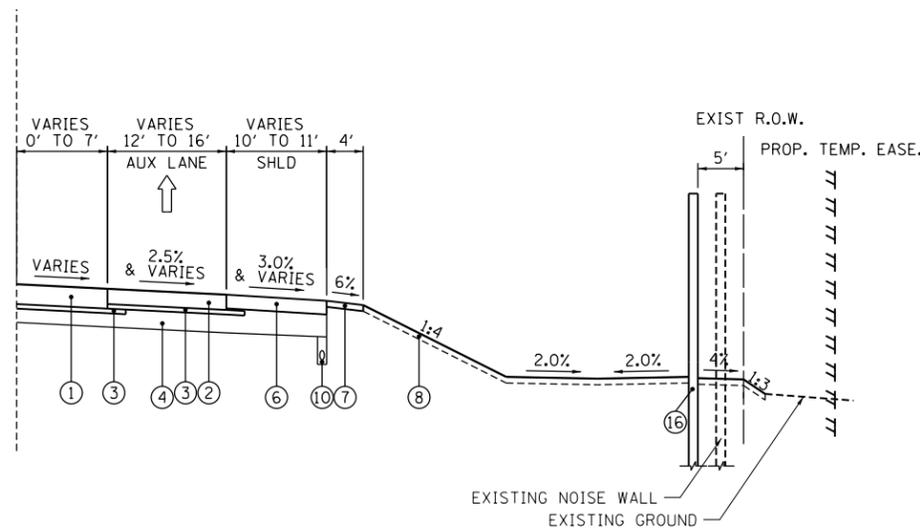
STA 5163+81.70 TO STA 5168+88.90



LOOKING NORTHBOUND

RAMP C GORE

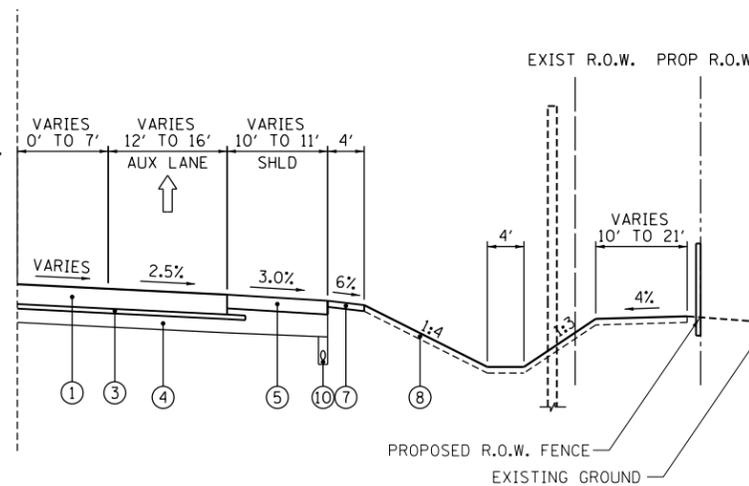
STA 7262+82.15 TO STA 7263+62.40



LOOKING NORTHBOUND

RAMP D GORE

STA 7271+31.75 TO STA 7274+75.08



LOOKING NORTHBOUND

RAMP D GORE

STA 7274+75.08 TO STA 7275+01.16

PROPOSED LEGEND

- ① PERFORMANCE RELATED PORTLAND CEMENT CONCRETE PAVEMENT, JOINTED - 13" (JT420186)
- ② PORTLAND CEMENT CONCRETE PAVEMENT 10" (JOINTED) (JI420005)
- ③ STABILIZED SUBBASE - WMA 3" (JI312022)
- ④ SUBGRADE AGGREGATE, SPECIAL, 9" (JT313010)
A. CAPPING AGGREGATE, 3" MIN (THICKNESS VARIES UNDER SHOULDERS)
B. POROUS GRANULAR EMBANKMENT, 6"
- ⑤ WARM-MIX ASPHALT SHOULDERS (9 IN) (JI482112)
- ⑥ WARM-MIX ASPHALT SHOULDERS (6 IN) (JI482104)
- ⑦ AGGREGATE SHOULDERS WITH FILTER FABRIC, TYPE B 4" (JI481130)
- ⑧ TOPSOIL EXCAVATION AND PLACEMENT (JI211110)
- ⑨ GUTTER, TYPE G-2, MODIFIED (JI606015)
- ⑩ PIPE UNDERDRAINS, FABRIC LINED TRENCH 6" (JI601320)
- ⑪ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 6 FOOT POSTS (JI630002)
- ⑫ CONCRETE BARRIER, SINGLE FACE, REINFORCED, 42 INCH (JI637030)
- ⑬ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (JI637032)
- ⑭ NOT USED
- ⑮ CONCRETE BARRIER BASE FOR SINGLE FACE BARRIER, REINFORCED, 42 INCH (SPECIAL) (JI637036)
- ⑯ NOISE ABATEMENT WALL
- ⑰ RETAINING WALL
- ⑱ GALVANIZED STEEL PLATE BEAM GUARDRAIL, TYPE A, 9 FOOT POSTS (JI630004)

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 user: 20.08.2017 9/6/2017

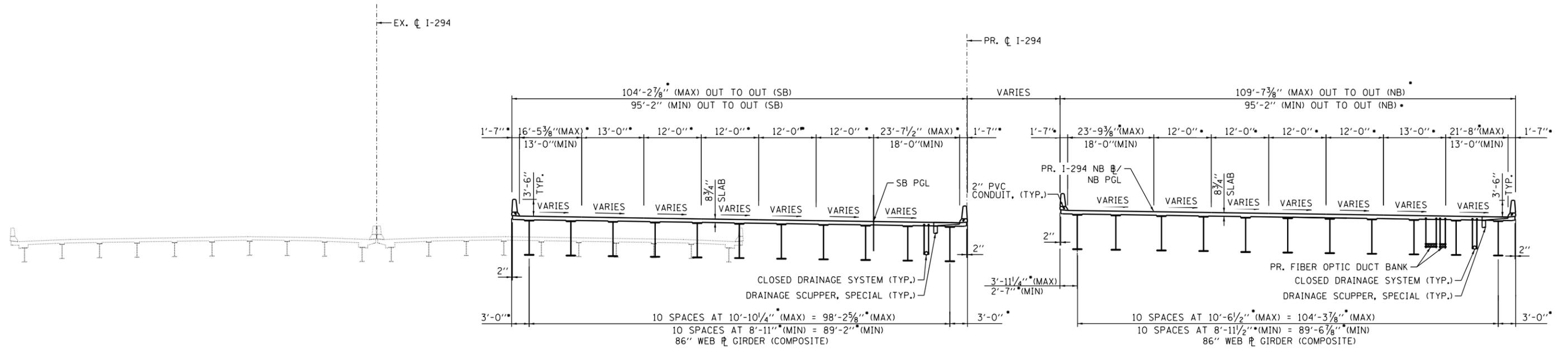
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CHECKED BY	DP	DATE	09/08/17



REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
PROPOSED TYPICAL SECTIONS I-294 MAINLINE

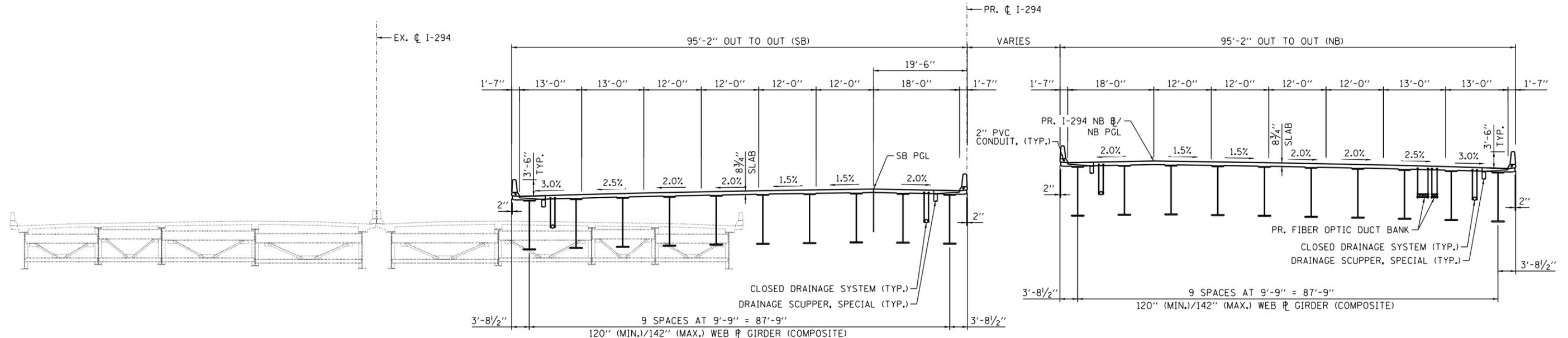
EXHIBIT A-6.9



CROSS SECTION

UNIT 1
(LOOKING NORTH)

• HORIZONTAL DIMENSIONS SHOWN ARE RADIAL



CROSS SECTION

UNIT 2
(LOOKING NORTH)

DRAWN BY EF DATE 08/28/2017
 CHECKED BY RH DATE 08/28/2017

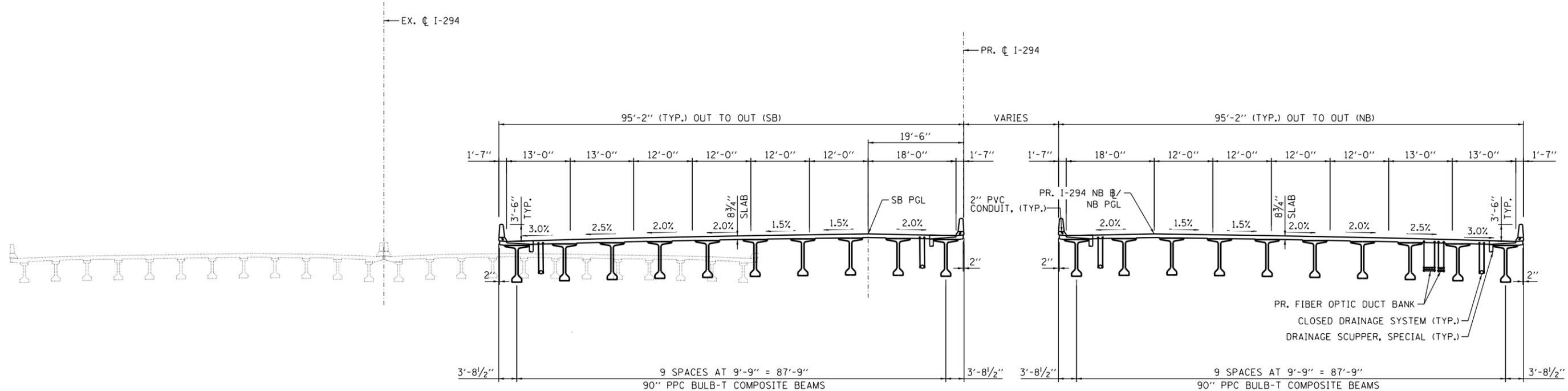


THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
 2700 OGDEN AVENUE
 DOWNERS GROVE,
 ILLINOIS 60515

REVISIONS		
NO.	DATE	DESCRIPTION

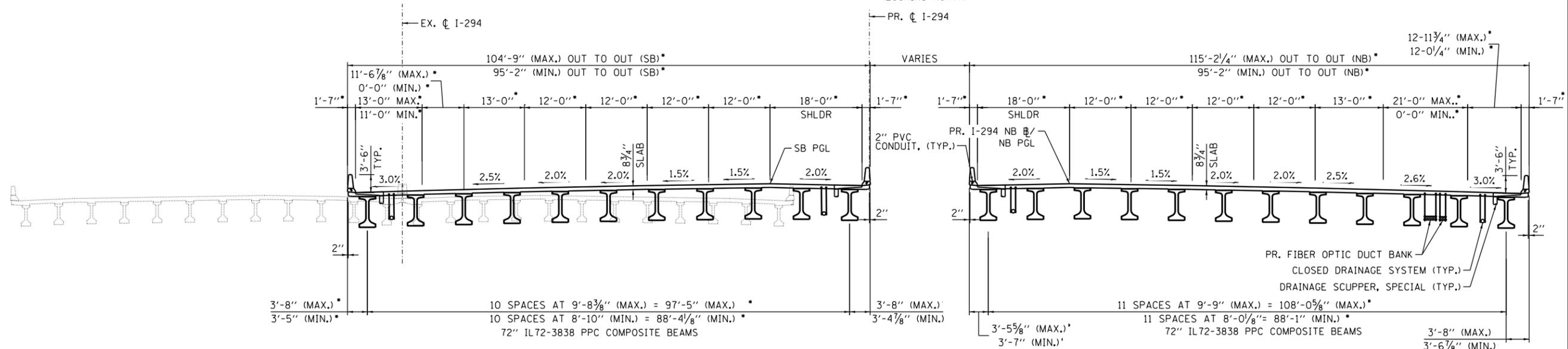
CONTRACT NO. RR-14-4221
 CROSS SECTIONS 1
 MILE LONG BRIDGE

EXHIBIT
 A-6.11



CROSS SECTION

UNIT 3 THRU UNIT 6
(LOOKING NORTH)



CROSS SECTION

UNIT 7
(LOOKING NORTH)

• HORIZONTAL DIMENSIONS SHOWN ARE RADIAL

DRAWN BY EF DATE 08/28/2017
 CHECKED BY RH DATE 08/28/2017

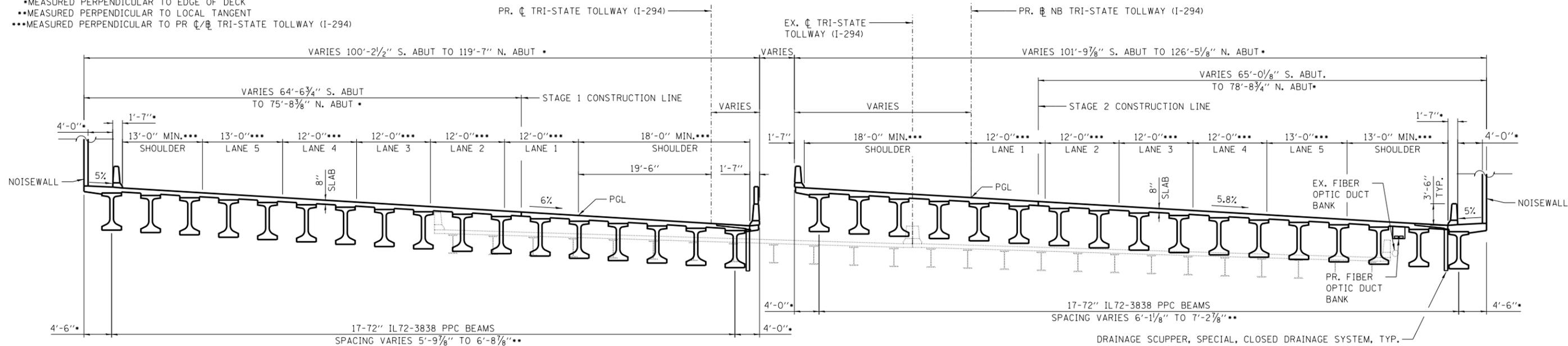


REVISIONS		
NO.	DATE	DESCRIPTION

CONTRACT NO. RR-14-4221
 CROSS SECTIONS 2
 MILE LONG BRIDGE

EXHIBIT
 A-6.12

- MEASURED PERPENDICULAR TO EDGE OF DECK
- MEASURED PERPENDICULAR TO LOCAL TANGENT
- MEASURED PERPENDICULAR TO PR CL TRI-STATE TOLLWAY (I-294)



SOUTHBOUND PROPOSED CROSS SECTION

NORTHBOUND PROPOSED CROSS SECTION

SEE DWG 4 & 5 OF 5 FOR STAGE CONSTRUCTION DETAILS

HIGHWAY CLASSIFICATION

LAGRANGE ROAD (US 45)
 FUNCTIONAL CLASS: OTHER PRINCIPAL ARTERIAL
 ADT: 76,200 (2013); 113,587 (2040)
 ADTT: 8% 6,096 (2013); 9,087 (2040)
 DHV: 7,620 (2 WAY)
 DESIGN SPEED: 50 M.P.H.
 POSTED SPEED: 45 M.P.H.
 TWO-WAY TRAFFIC
 DIRECTIONAL DISTRIBUTION: 50%-50%

HIGHWAY CLASSIFICATION

NB TRI-STATE TOLLWAY (I-294)
 FUNCTIONAL CLASS: INTERSTATE
 ADT: 68,720 (2013); 110,100 (2040)
 ADTT: 17% 11,683 (2013); 18,717 (2040)
 DHV: 8,700
 DESIGN SPEED: 60 M.P.H.
 POSTED SPEED: 55 M.P.H.
 ONE-WAY TRAFFIC
 DIRECTIONAL DISTRIBUTION: 100%-0%

HIGHWAY CLASSIFICATION

SB TRI-STATE TOLLWAY (I-294)
 FUNCTIONAL CLASS: INTERSTATE
 ADT: 62,310 (2013); 94,700 (2040)
 ADTT: 17% 10,593 (2013); 16,099 (2040)
 DHV: 8,070
 DESIGN SPEED: 60 M.P.H.
 POSTED SPEED: 60 M.P.H.
 ONE-WAY TRAFFIC
 DIRECTIONAL DISTRIBUTION: 100%-0%

STATION EQUATIONS

- A STA. 5104+13.08 (PR. \pm SB TRI-STATE TOLLWAY) = STA. 283+42.99 (EX. NB \pm LAGRANGE RD.) LOCAL TANGENT: 137° 24' 50.12"
- B STA. 5105+38.34 (PR. \pm SB TRI-STATE TOLLWAY) = STA. 2+50.46 (EX. SB \pm LAGRANGE RD.) LOCAL TANGENT: 135° 22' 28.44"
- C STA. 7203+86.33 (PR. CL NB TRI-STATE TOLLWAY) = STA. 283+92.18 (EX. NB \pm LAGRANGE RD.) LOCAL TANGENT: 139° 02' 03.27"
- D STA. 7205+12.59 (PR. CL NB TRI-STATE TOLLWAY) = STA. 3+04.72 (EX. SB \pm LAGRANGE RD.) LOCAL TANGENT: 138° 11' 46.86"

CURVE DATA

EX. CL NB LAGRANGE RD
 P.I. STA. = 283+42.86
 $\Delta = 7^\circ 51' 55''$ (RT)
 $D = 2^\circ 49' 46''$
 $R = 2,025.00'$
 $T = 139.21'$
 $L = 277.98'$
 $E = 4.78'$
 $e = \text{-----}$
 $\text{T.R.} = \text{-----}$
 $\text{S.E. RUN} = \text{-----}$
 $\text{P.C. STA.} = 282+03.65$
 $\text{P.T. STA.} = 284+81.63$

HORIZONTAL CURVE DATA

PR CL TRI-STATE TOLLWAY (I-294)
 P.I. STA. = 5109+07.24
 $\Delta = 35^\circ 29' 46''$ (RT)
 $D = 2^\circ 29' 59''$
 $R = 2,292.00'$
 $T = 733.59'$
 $L = 1,419.95'$
 $E = 114.54'$
 $e = 6\%$
 $\text{T.R.} = 177.02'$
 $\text{S.E. RUN} = 562.28'$
 $\text{P.C. Sta.} = 5101+73.65$
 $\text{P.T. Sta.} = 5115+93.60$

HORIZONTAL CURVE DATA

PR CL NB TRI-STATE TOLLWAY (I-294)
 P.I. STA. = 7207+81.95
 $\Delta = 35^\circ 15' 58''$ (RT)
 $D = 2^\circ 19' 45''$
 $R = 2,460.00'$
 $T = 781.92'$
 $L = 1,514.15'$
 $E = 121.28'$
 $e = 5.8\%$
 $\text{T.R.} = 177.02'$
 $\text{S.E. RUN} = 543.53'$
 $\text{P.C. Sta.} = 7200+00.03$
 $\text{P.T. Sta.} = 7215+14.18$

SEISMIC DATA

SEISMIC PERFORMANCE ZONE (SPZ) = 1
 DESIGN SPECTRAL ACCELERATION AT 1.0 SEC. (SD1) = 0.063
 DESIGN SPECTRAL ACCELERATION AT 0.2 SEC. (SDS) = 0.114
 SOIL SITE CLASS = C

BRIDGE LOADING HL-93 & IL-120

ALLOW 50#/SQ. FT. FOR FUTURE WEARING SURFACE
 ALLOWABLE LL DEFLECTION = L/800

NOISE WALL LOADING

WIND = 35 PSF
 ALLOWABLE DEFLECTION = L/180

DESIGN STRESSES

FIELD UNITS
 $f'_c = 3,500$ PSI (SUBSTRUCTURE (CLASS S1))
 $f'_c = 4,000$ PSI (HPC-DECK & DIAPHRAGM)
 $f'_c = 4,000$ PSI (SUPERSTRUCTURE (CLASS BS))
 $f'_c = 4,500$ PSI (NOISE WALL)
 $f_y = 50,000$ PSI (M270 GRADE 50-PILES)
 $f_y = 60,000$ PSI (REINFORCEMENT)
PRECAST PRESTRESSED UNITS
 $f'_c = 8,500$ PSI
 $f'_{ci} = 7,000$ PSI
 $f_{pu} = 270,000$ PSI (0.6" ϕ LOW LAX. STRANDS)
 $f_{pb} = 201,960$ PSI (0.6" ϕ LOW LAX. STRANDS)

DESIGN SPECIFICATIONS

2014 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION WITH 2016 INTERIMS

ILLINOIS DEPARTMENT OF TRANSPORTATION BRIDGE MANUAL, JANUARY 2012

IDOT ALL BRIDGE DESIGN MEMORANDUMS

ILLINOIS TOLLWAY GEOTECHNICAL ENGINEER'S MANUAL, MARCH 2017

ILLINOIS TOLLWAY STRUCTURE DESIGN MANUAL, MARCH 2017

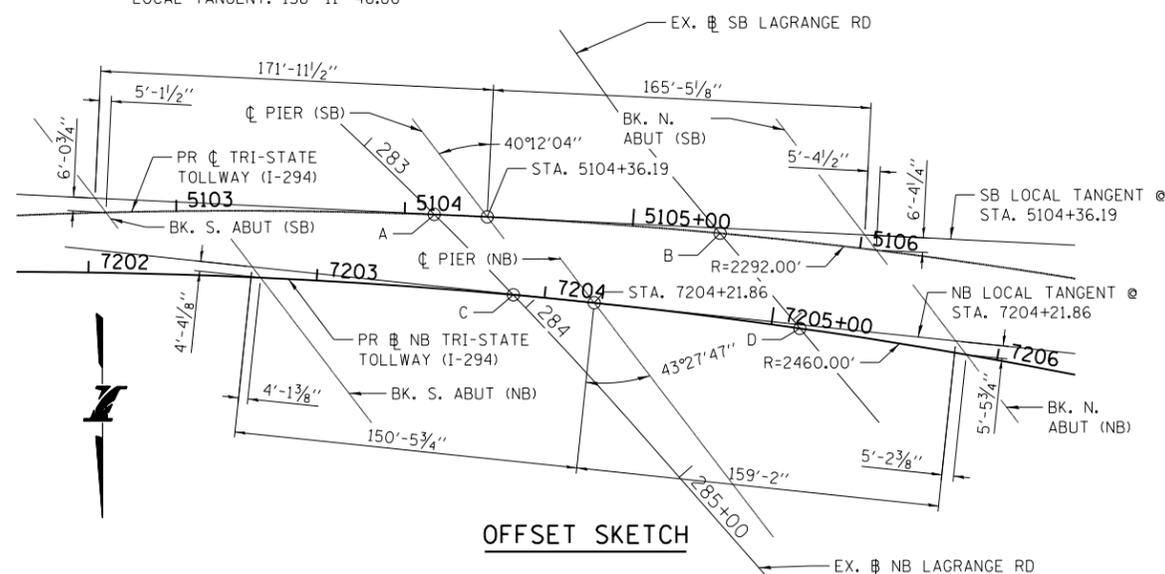
CONSTRUCTION SPECIFICATIONS

ILLINOIS DEPARTMENT OF TRANSPORTATION GUIDE BRIDGE SPECIAL PROVISIONS (GBSP'S)

TOLLWAY SUPPLEMENTAL SPECIFICATIONS TO THE ILLINOIS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION ADOPTED MAY 1, 2017

ILLINOIS DEPARTMENT OF TRANSPORTATION SUPPLEMENTAL SPECIFICATIONS AND RECURRING SPECIAL PROVISIONS ADOPTED JANUARY 1, 2017

ILLINOIS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION ADOPTED APRIL 1, 2016



OFFSET SKETCH

MODEL NAME: 4221-SHT-QE1-STR-LRB-TSAL02.dwg
 0.11667 / in.
 8/18/2017

DRAWN BY	RPW	SCALE	NONE
CHECKED BY	DRB	DATE	08/18/17



NO.	DATE	REVISIONS	
		DESCRIPTION	

CONTRACT NO. RR-14-4221
 DETAILS
 LAGRANGE ROAD BRIDGE

EXHIBIT
 A-6.13