



MEMORANDUM

To: Derek Berube – Metro Transit

From: Matthew D. Jensen, P.E. – Kimley-Horn *MDJ*

Cc: Brad Pickering, P.E. (TX), CFM – Kimley-Horn

Date: August 24, 2016

Subject: Mall of America Transit Station Renovations Project
Existing Ponding Elevation

The proposed Mall of America (MOA) Transit Station renovations are located in an existing parking garage bound on the east by 24th Avenue South and south by Killebrew Drive. During review of the construction documents for the improvements, the City of Bloomington commented the proposed facilities may be impacted by flooding in the lower level of the existing parking garage.

Kimley-Horn reviewed the XPSWMM model prepared for the Lindau Lane Grade Separation project to determine the maximum 100-year hydraulic grade line elevation adjacent to the MOA Transit Station. The elevations are shown on the attached *Exhibit 1 – Existing 100-Year HGL Elevation*. The XPSWMM model indicates ponding to an elevation of approximately 806.2 will occur west of the Transit Station during a 100-year event. Based on existing ground elevation, the 100-year ponding depth may approach four feet.

The City of Bloomington provided security footage from the parking garage during a storm event that occurred July 10, 2008. The footage shows manholes surcharging and flooding occurring within the parking garage during this event. A review of the footage indicates the flooding location is consistent with the XPSWMM model. Kimley-Horn is unable to determine the maximum ponding depth based on the provided information; however, it appears to be less than one foot. The City of Bloomington provided rainfall data for this event from a tipping bucket gage located at 1700 W. 98th Street. The gage data shows that 1.19 inches of rain occurred during a 30-minute period, which would equate to a 2- to 5-year storm event. The City also commented that another nearby gage located at Minneapolis-St. Paul International Airport recorded 0.77 inches of rain for the same event, which is indicative of the highly variable nature of short duration storm events.

The proposed Transit Station finished floor elevation is set at 807.0, providing approximately 0.8 feet of freeboard above the anticipated ponding elevation during the 100-year event. The improvements will result in the placement of approximately 270 cubic feet of fill below the anticipated ponding elevation. Kimley-Horn does not anticipate the limited fill volume will negatively affect the maximum ponding elevation.

Kimley-Horn reviewed the XPSWMM model to determine if the ponding is due to an undersized lateral that could be improved as part of the Transit Station project, or if it is the result of an offsite issue. The results indicate that ponding near the Transit Station is due to a combination of undersized local laterals and an undersized trunk line downstream of the Transit Station.

The attached *Exhibits 2 and 3* show the 100-year hydraulic grade line of the storm sewer downstream of the Transit Station at two points in time during a hypothetical 24-hour storm event. *Exhibit 2* is the profile at approximately 11.75 hours into the event. This profile shows a steep hydraulic grade line through the storm sewer immediately adjacent to the Transit Station and a low tailwater in the downstream trunk line. This indicates local ponding may occur due to an undersized lateral near the Transit Station.

Exhibit 3 is the profile approximately 12.25 hours into the event. This profile shows a flat hydraulic grade line in storm sewer immediately adjacent to the Transit Station and a high tailwater in the downstream trunk line. This indicates local ponding also occurs due to an undersized trunk line downstream of the Transit Station.

The maximum ponding in the vicinity of the Transit Station occurs when the tailwater in the downstream trunk line controls the hydraulic grade line at the Transit Station. As such it is unlikely that local improvements in the vicinity of the Transit Station will have any impact on the maximum ponding elevation without additional offsite improvements. The attached *Exhibit 4 – Overall Drainage System Schematic* shows the limits of the downstream trunk line that may need to be improved to reduce the overall ponding at the Transit Station.

Attachments

- Exhibit 1 – Existing 100-Year HGL Elevation
- Exhibit 2 – 100-Year Hydraulic Grade Line at 11.75 Hours
- Exhibit 3 – 100-Year Hydraulic Grade Line at 12.25 Hours
- Exhibit 4 – Overall Drainage System Schematic

XXX.XX HGL₁₀₀
--- Overflow path @ Q₁₀₀

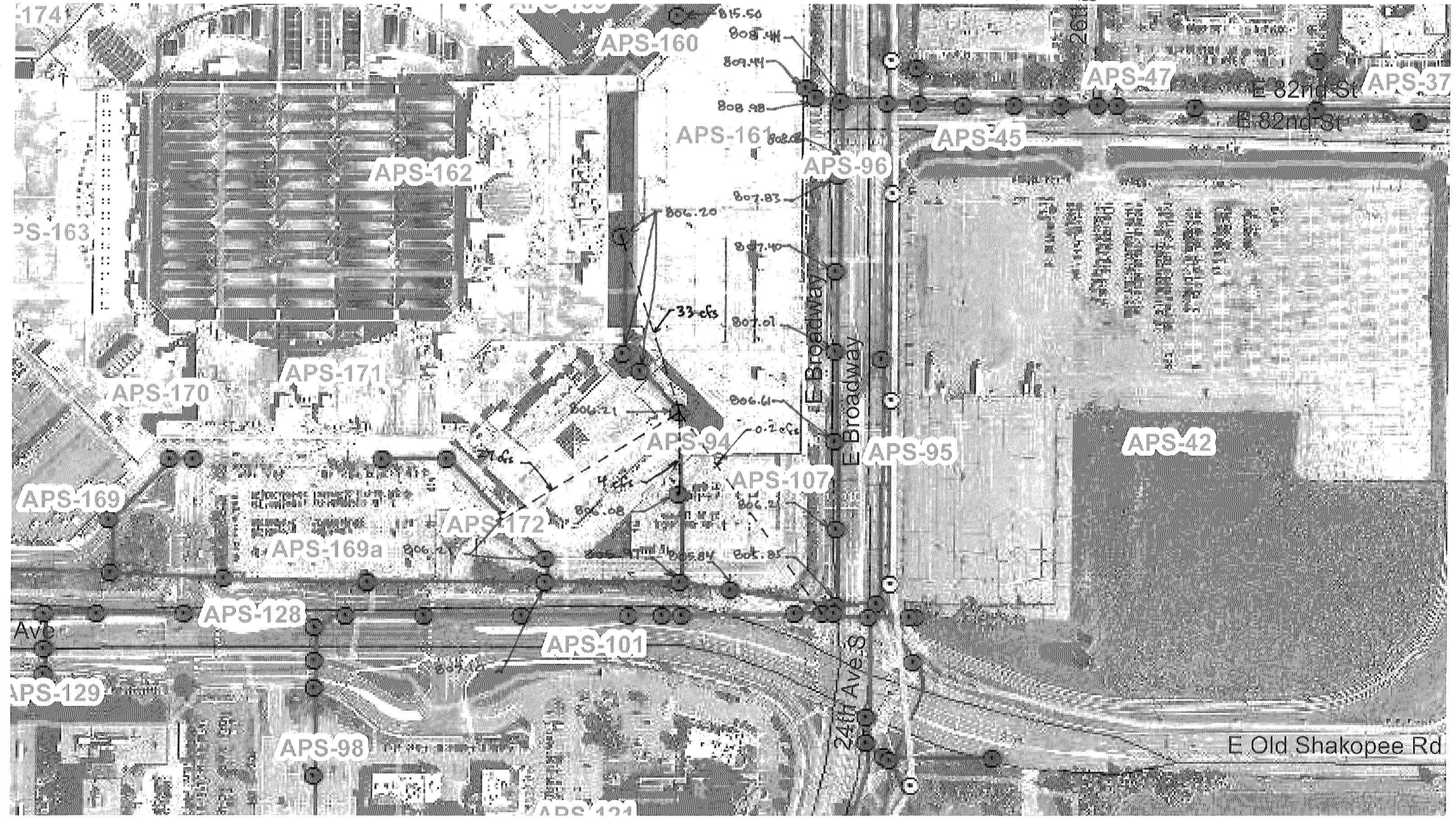


Exhibit 1 - Existing 100-Year HGL Elevation

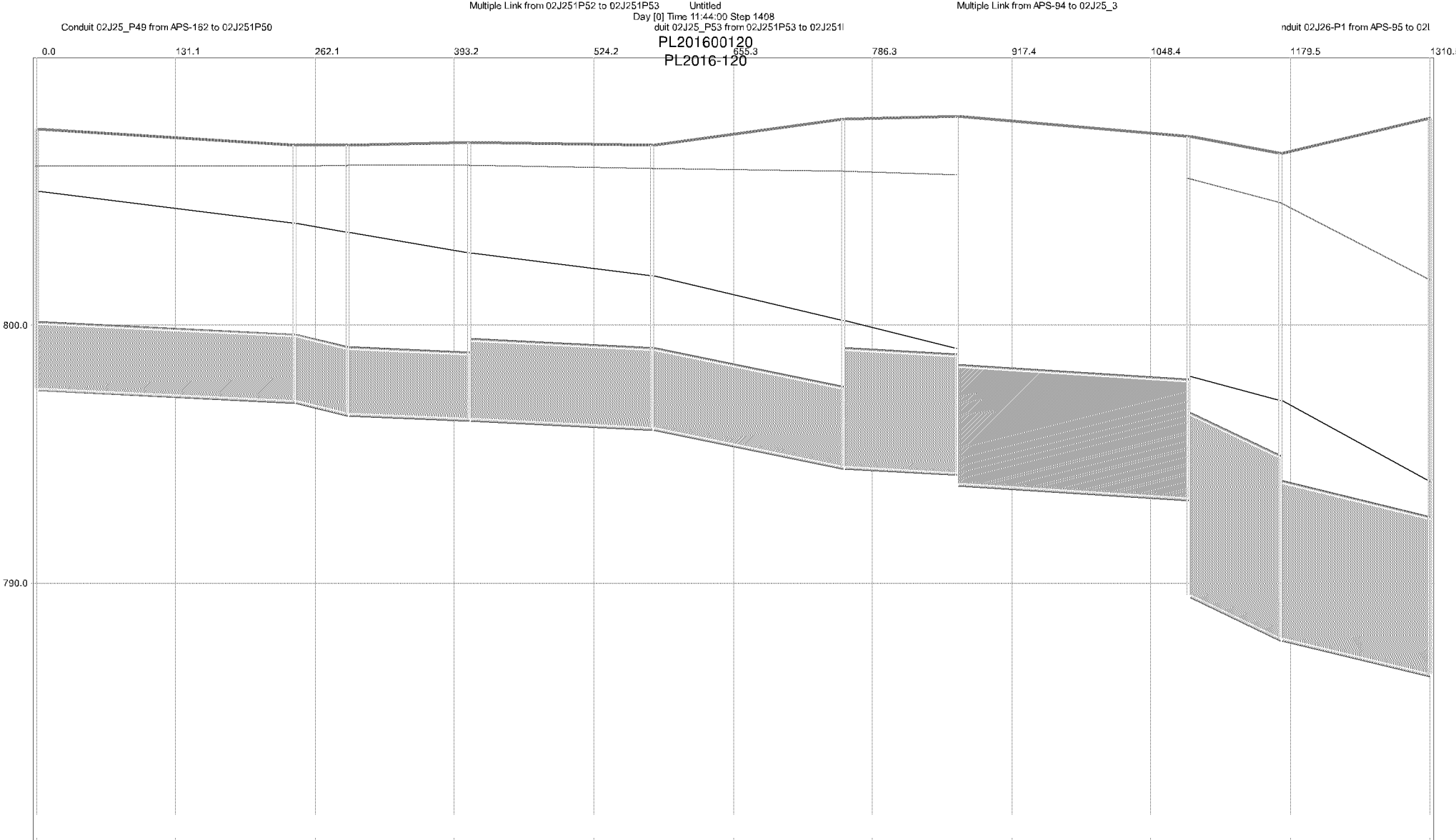


Exhibit 2 - 100-Year Hydraulic Grade Line at 11.75 Hours

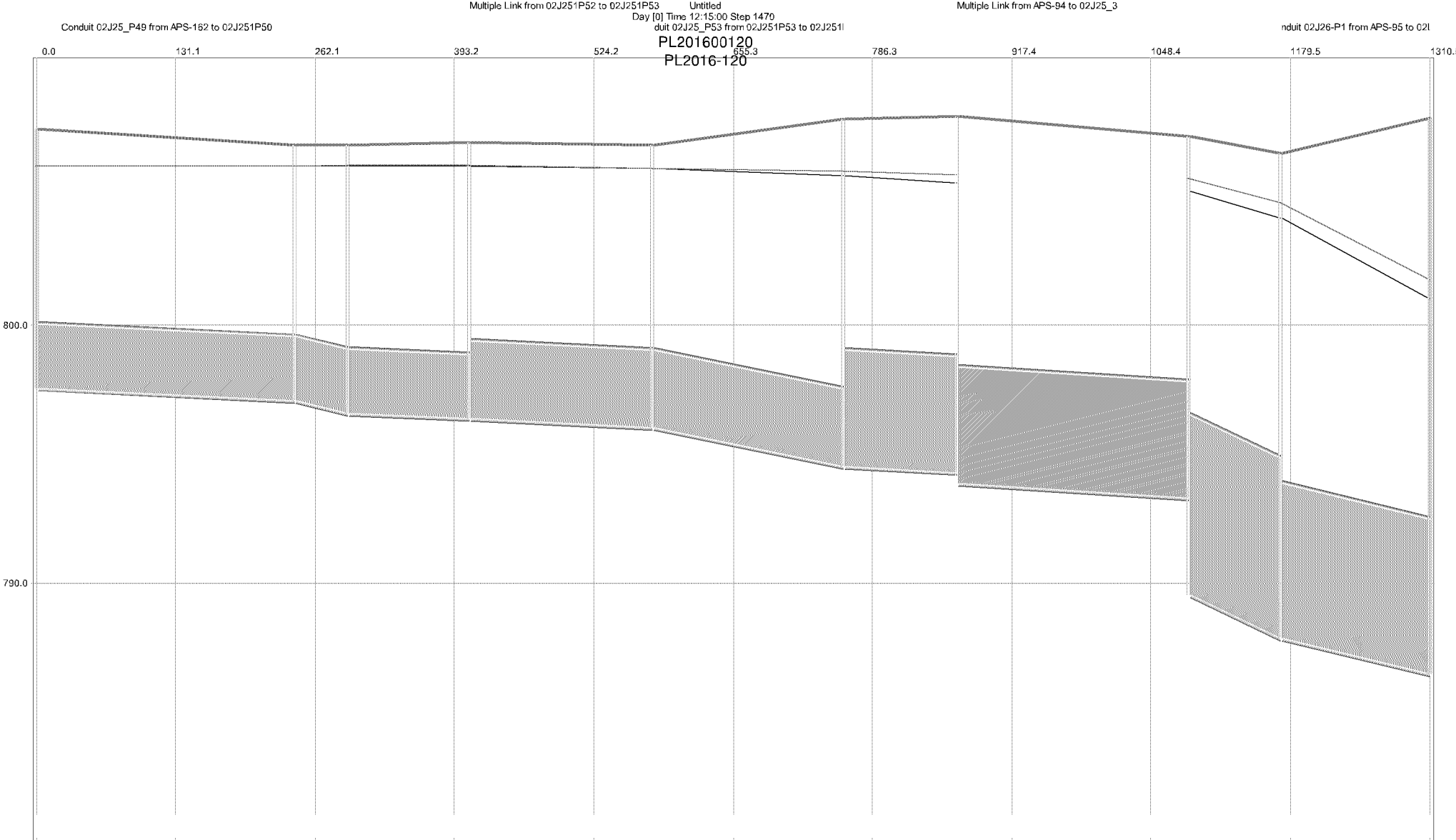


Exhibit 3 - 100-Year Hydraulic Grade Line at 12.15 Hours

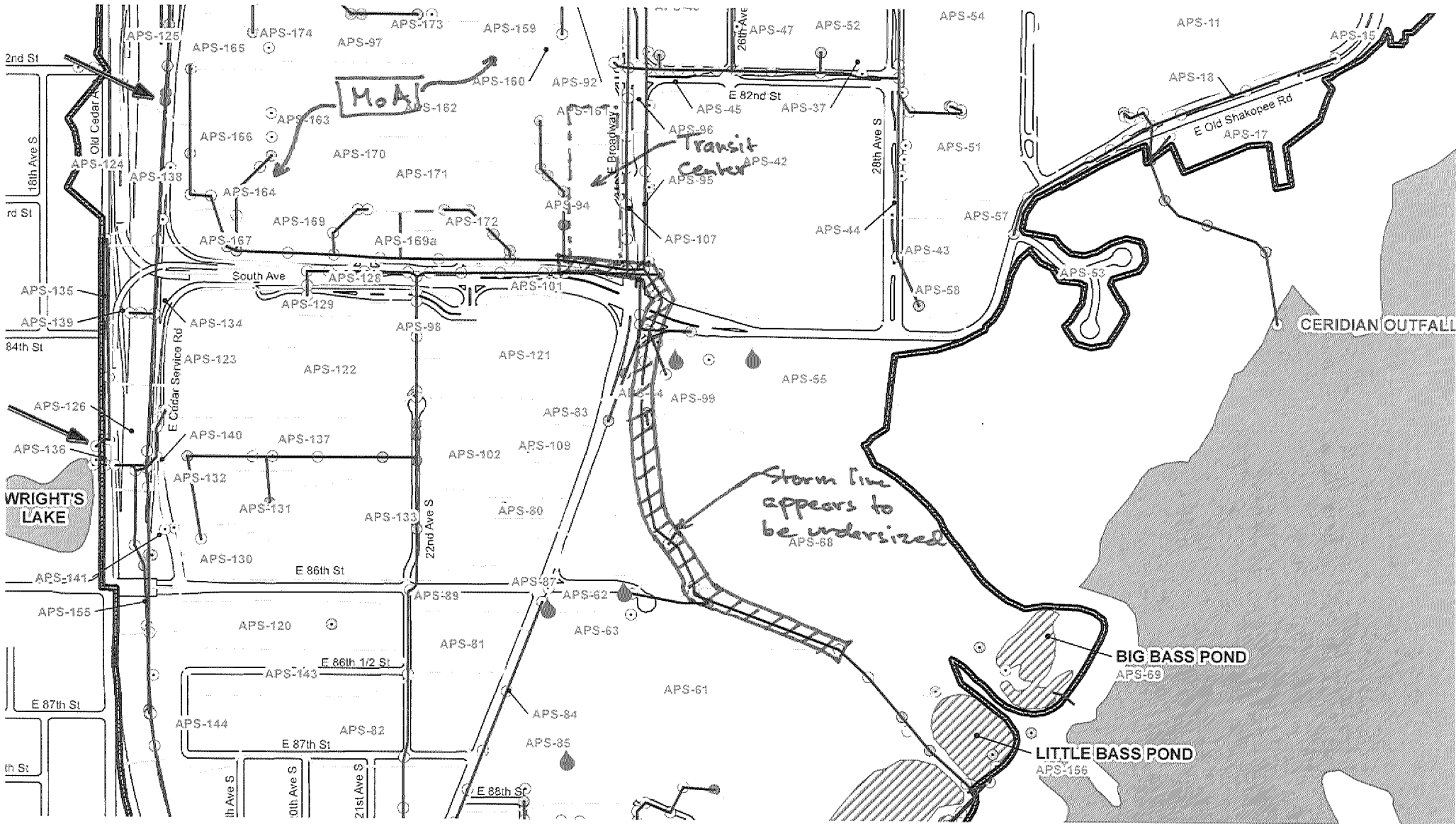


Exhibit 4 - Overall Drainage System Schematic