



## Memorandum

**TO:** Simon Blenski - City of Minneapolis

**FROM:** Steve Weser, PE – Alliant Engineering, Inc.

**DATE:** February 18, 2015

**SUBJECT:** City of Minneapolis – Stone Arch Bicycle Boulevard Traffic Circle Project  
Preliminary Drainage Analysis

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### **Introduction**

The City of Minneapolis is planning to construct traffic circles and reconstruct pedestrian ramps at two intersections along the existing Stone Arch Bicycle Boulevard route in Minneapolis as part of an ongoing effort to promote safe multi modal traffic operations and bring intersections up to current American Disability Act (ADA) standards. Traffic circles are proposed to be constructed at the intersections of 6<sup>th</sup> Street SE and 7<sup>th</sup> Street SE along SE 6<sup>th</sup> Avenue. The improvements are being designed by Alliant Engineering, Inc. and will be constructed by the City of Minneapolis with City forces in 2015.

### **Existing Conditions**

The two subject intersections currently experience flooding during larger rainfall events. There appears to be approximately 29.4 acres of direct overland flow area tributary to the subject intersections. There is a much larger area that is connected hydraulically to the subject area via storm sewers. There is a trunk storm sewer draining in the easterly direction along 6<sup>th</sup> Street SE and then southerly along SE 8<sup>th</sup> Avenue eventually connecting into a large storm tunnel near I35W. The storm sewer serving the subject neighborhood becomes overwhelmed during larger rainfall events and the intersections at 6<sup>th</sup> Street SE and 7<sup>th</sup> Street SE along SE 6<sup>th</sup> Avenue experience flooding until capacity is available in the downstream sewers. The water surface frequently overtops the street curbs and the water surface has reached several feet deep on occasion at the 7<sup>th</sup> Street SE intersection. In consideration of these concerns, the City has requested that the proposed traffic circle project be analyzed to determine what effect the improvements will have on the current drainage/flooding characteristics of the intersection.

### **Proposed Improvements**

Traffic circles are essentially small roundabouts designed to fit within the existing curb lines. Traffic approaching the circles yield to users traversing the circle from other directions. The diameter of the proposed circles as measured at the face of the curb will be approximately 22 feet at the 6<sup>th</sup> Street SE intersection and approximately 24 feet at the 7<sup>th</sup> Street SE intersection.

To construct the circles, the existing pavement will be removed and new curb and gutter with a 6-inch B-style curb with a 24-inch tip out gutter pan will be constructed. The 6-inch curb and gutter will be the same as the curb and gutter present on the outside curb lines of the roadway. The B style curb provides a vertical element that is visible to approaching drivers. The center of the circles will be planted with a tree, shrubs, perennials, and/or annuals. The underlying soils in the center of the circle will be excavated and loosened to provide decompaction thereby promoting plant growth. Planting soil will be added and the area will be topped off with 4-inches of single shredded wood mulch.

Pedestrian ramps will be reconstructed at both intersections to meet current Minneapolis design practices and ADA standards. There are existing pedestrian ramps at the intersections, however there is only one ramp at each corner directing pedestrian traffic along a single direction. The preferred City standard is to provide directional ramps. This will require reconstructing the existing sidewalk surface to add ramps in the other directions. The curb will be reconstructed to the extent necessary to facilitate construction of the new ramps. Sidewalk grades will be slightly modified to meet ADA standards.

### **Drainage Analysis**

The hydrologic/hydraulic impacts to the area resulting from the project can be looked at in two ways. The first is the change in runoff generated by the project which is directly attributed to the increase or decrease in impervious surface. The second is the change in flood storage available due to the project.

#### **Change in Runoff**

As mentioned above, the pavement will be removed for construction of the traffic circles and replaced with a landscaped area inside of a raised curb. The reduction in the impervious surface resulting from the construction of the circles will be approximately 335 square feet at 6<sup>th</sup> Street SE and 403 square feet at 7<sup>th</sup> Street SE for a total of 738 square feet. The surface area of concrete sidewalk resulting from the reconstructed pedestrian ramps is expected to approximately match the surface area of the existing concrete sidewalk. Therefore, the project will reduce the impervious surface area by approximately 738 square feet, which will result in a small decrease in the amount of direct runoff.

#### **Change in Flood Storage**

The proposed curb for the traffic circles will be above the existing roadway surface. The planting area in the center of the traffic circles will be filled in to the top of curb around the perimeter but will be depressed 3-inches measured at the center of the circle. The upper 4-inches of the planting area will consist of wood mulch to retain moisture and limit weed growth. The wood mulch is a loose material that mats together with voids between the chips estimated at 30% of the total volume. The voids will fill with water. The resulting fill from the traffic circles was analyzed to determine the impact on the available flood storage capacity in the intersections.

The construction of the traffic circles and accounting for the voids in the landscaping mulch will result in a fill above existing grade of:

6<sup>th</sup> Street SE Circle – 130 cubic feet

7<sup>th</sup> Street SE Circle – 150 cubic feet

The area of fill above the in-place pavement surface will include raised curb, planting soil and wood mulch particles. To put the above numbers in perspective, the fill material listed above for each intersection would fit into the beds of two pick-up trucks.

### **Conclusions**

The construction of the traffic circles will neither increase or decrease the flooding frequency or water surface elevations experienced at the intersections. The project will result in a net decrease in impervious surface, which will result in slightly less direct runoff and slightly more infiltration in the post project condition. The additional planned fill will only consume a small fraction of a percent of total flood storage available.

The analysis performed for this project was undertaken solely to determine if the project will exacerbate the flooding situation at the intersections. The analysis did not include determining a long term solution to the flooding situation.

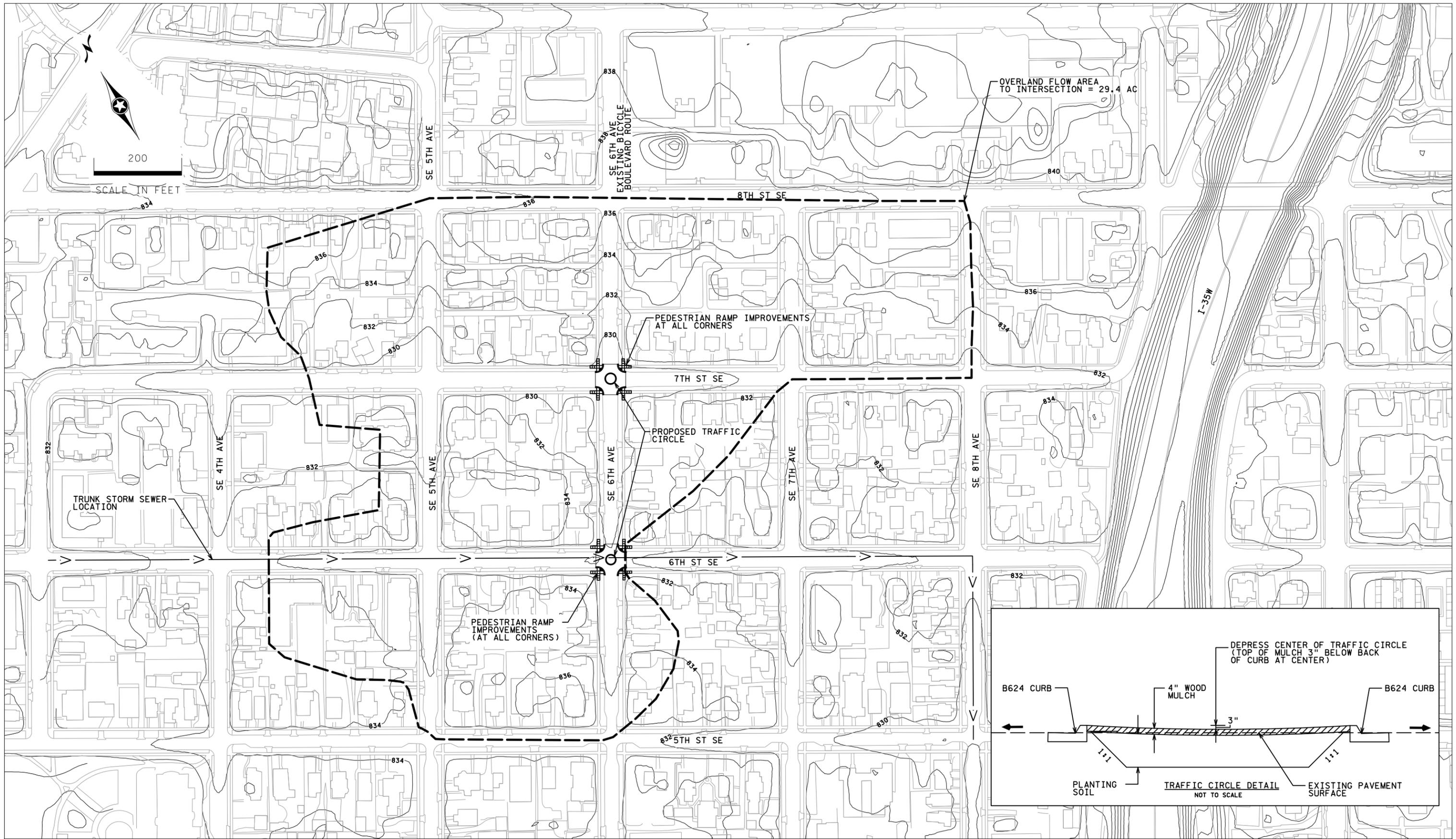
### **Exhibits**

Drainage Area Map

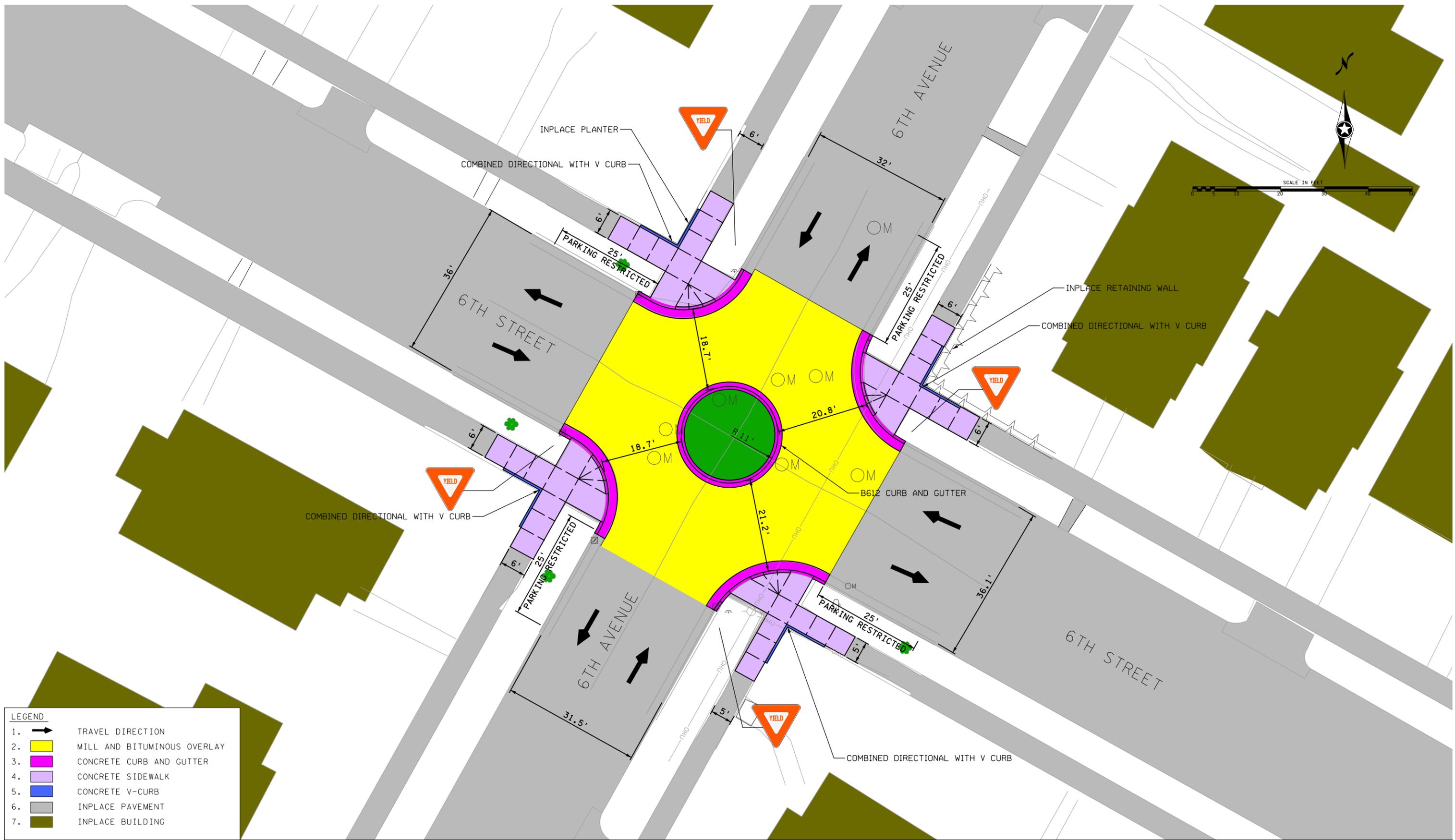
Intersection Layouts

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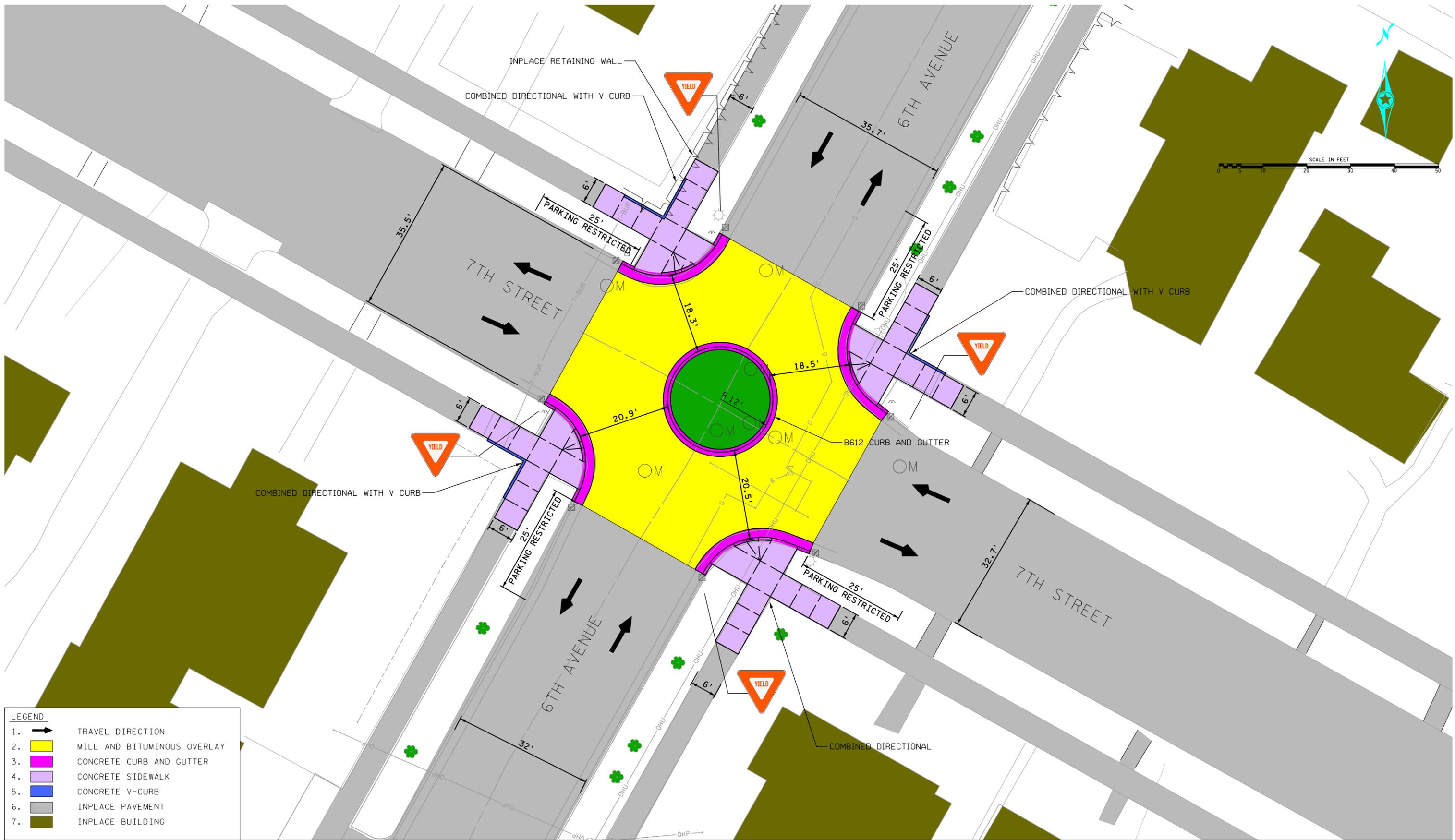
Mike Anderson – Alliant Engineering, Inc.



SE 6TH AVE. TRAFFIC CIRCLE PROJECT - DRAINAGE AREA MAP



6TH AVE. / 6TH ST. PRELIMINARY TRAFFIC CIRCLE LAYOUT



6TH AVE. / 7TH ST. PRELIMINARY TRAFFIC CIRCLE LAYOUT