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MEMORANDUM

TO: Chad Millner and Ross Bintner

FROM: Chad Katzenberger & Miles Jensen

DATE: February 21, 2014

RE: GrandView Area Water Distribution System Analysis
SEH No. EDINA 104275 14.00

Background

This memo is intended to address future water distribution system water main sizing and location recommendations. The City is currently working toward the redevelopment of the GrandView area. The redevelopment includes a mix of high density residential, commercial and civic buildings. Redevelopment of the City's former public works facility site as well as an existing school bus garage site is included in phase 1 of the GrandView redevelopment plans. Ultimate redevelopment of the rest of the GrandView area is planned to occur in the next 10 plus years. Additional detail of the redevelopment plans can be found in the planning document titled "*GrandView District Development Framework April 5, 2012 Cunningham Group*".

The Grandview area is area is currently served by a network of 6, 8, 10, 12 and 16-inch water main. Water Treatment Plant No.6 is also located in this area. A 16-inch trunk water main extends south from the water treatment plant and another 12-inch trunk water main is located in the area with the remainder of the area being served by 6-inch and 8-inch distribution main. (See Figure 1)

The goal of this analysis is to provide a recommendation for future water main improvements in the proposed development area. Recommendations for future water main size and location will be made based on future anticipated water system demands as well as the ability to supply fire flow.

Water Model Analysis

The City's recently updated water distribution model was utilized to analyze existing water system capabilities as well as to simulate the operation of proposed recommended improvements. A previous memo titled "*GrandView Area Sanitary Sewer Analysis, January 29, 2014 Barr Engineering*" analyzed sanitary sewer capacity for the same development area and provided a basis for anticipated water system demands in the area. These demands were adjusted to simulate water system maximum day and peak hour conditions as follows:

	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)
Phase 1 Redevelopment	101	172
Ultimate Redevelopment	411	700

The model indicates that existing pipe sizes are capable of supplying demands as outlined above. However additional considerations were further analyzed to develop opportunities for addressing other potential system weaknesses. The model revealed that during normal water treatment plant operations there is an elevated flow velocity in the existing 8-inch main which travels north as it exists in Water Treatment Plant No.6. The velocity in this main approaches 5 feet per second (fps) due to the large amount of flow conducted by the pipe when the treatment plant is in operation. Within water distribution systems, it is recommended that pipe velocities do not exceed 5 fps during typical operation. As a

result it is suggested that this existing 8-inch water main extending from Water Treatment Plant No.6 to the Intersection of Vernon Avenue & Interlachen Boulevard be replaced with a minimum 12-inch main. This would provide more balanced water flow from Water Treatment Plant No. 6 and decrease flow velocities and head loss.

Fire Flow Analysis

Fire flow demand requirements are typically based on anticipated land use and local fire authority requirements. Fire protection needs vary with the physical characteristics of each building to be protected. For example, fire flow needed for a specific building can vary from 500 gpm to as high as 12,000 gpm, depending on habitual classifications, separation distances between buildings, height, materials of construction, size of the building, and the presence or absence of building sprinklers. Municipal fire insurance ratings are partially based on the City’s ability to provide needed fire flows up to 3,500 gpm. If a specific building has a needed fire flow greater than this amount, the City’s fire insurance rating will only be based on the water system’s ability to provide 3,500 gpm. As a result, for purposes of this analysis, a fire flow of 3,500 gpm was determined to be the minimum requirements for the project area.

A fire flow analysis within the water model was completed to determine existing fire flow availability (assuming WTP No.6 Off). Fire flow availability results for the area range from 1,400 gpm along Arcadia Ave. (existing 6-inch main) to 3,500+ gpm along the existing 12 & 16-inch trunk mains. (See Figure 1)

A preferred water main size and location layout was developed to achieve fire flow availability of 3,500 gpm + in the entire project area. The resulting proposed water main layout provides for looping in the project area for reliable supply as well as robust fire flow. (See Figure 2)

Recommendations

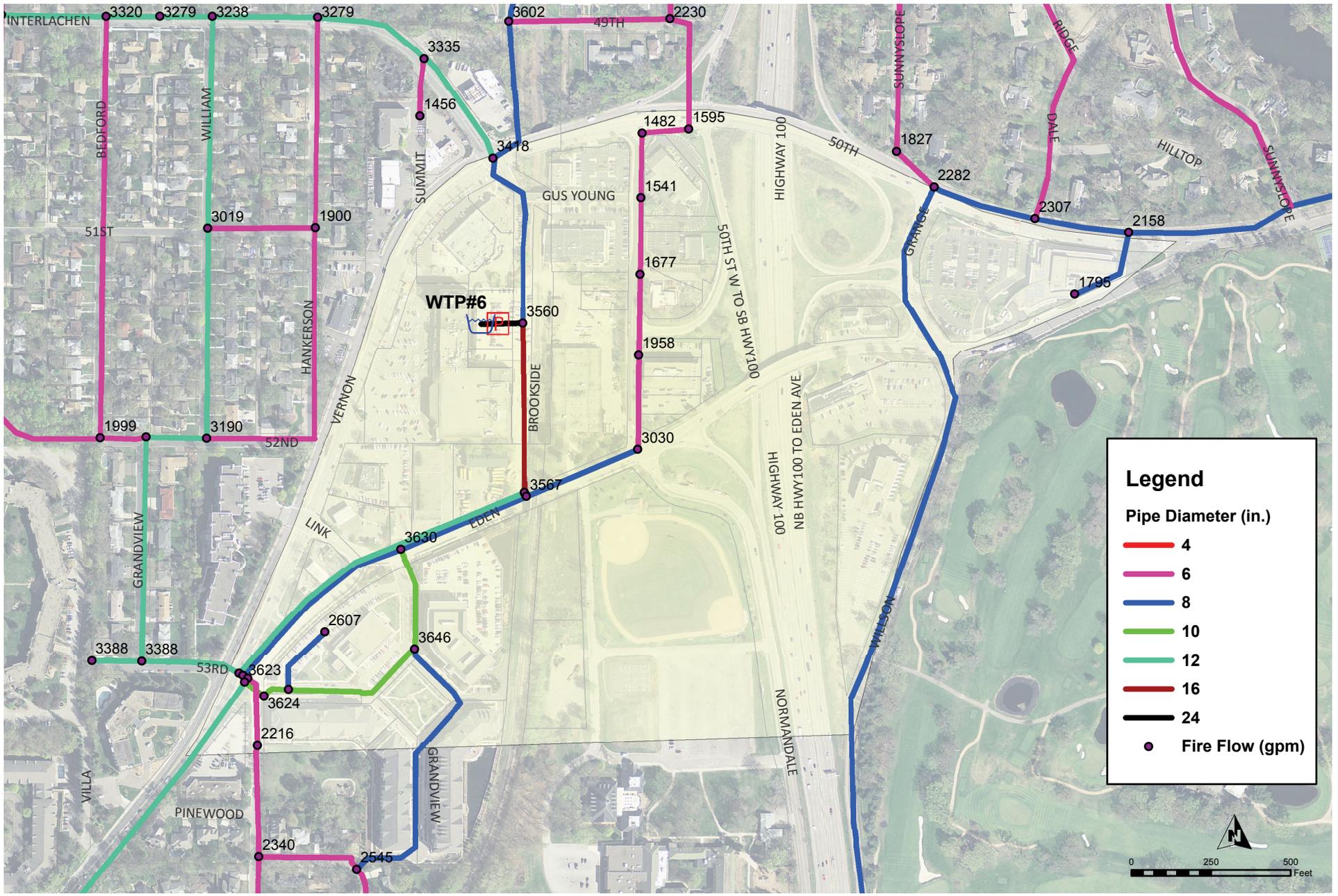
As a result of the water system model analysis for this area of re-development, the following improvement recommendations have been developed. These improvements will help to optimize water system performance, reliability and fire flow capabilities.

Priority	Item	Benefit
1	Install Looped 8” water main in areas of new service.	Redundant supply, available fire flow
2	Replace existing 6” main(s) with a minimum of 8” main along Arcadia Avenue between Eden Avenue & Vernon Avenue	Increase available fire flow
3	Replace existing 8” main with new 12” main along Eden Avenue between Brookside Avenue & Arcadia Avenue	Increase available fire flow
4	Replace existing 8” main with new 12” main traveling north from WTP No.6 to the Intersection of Vernon Avenue & Interlachen Boulevard	Reduce flow velocity in main during operation of WTP No.6, increase available fire flow.
5	Install new looped section of water main crossing Highway 100 from west side of Development to Grange Road Along West 50th Street	Increase fire flow on East side of Highway 100, provide looped section of water main and boost fire flow on East side of Highway 100.

ctk

Attachment

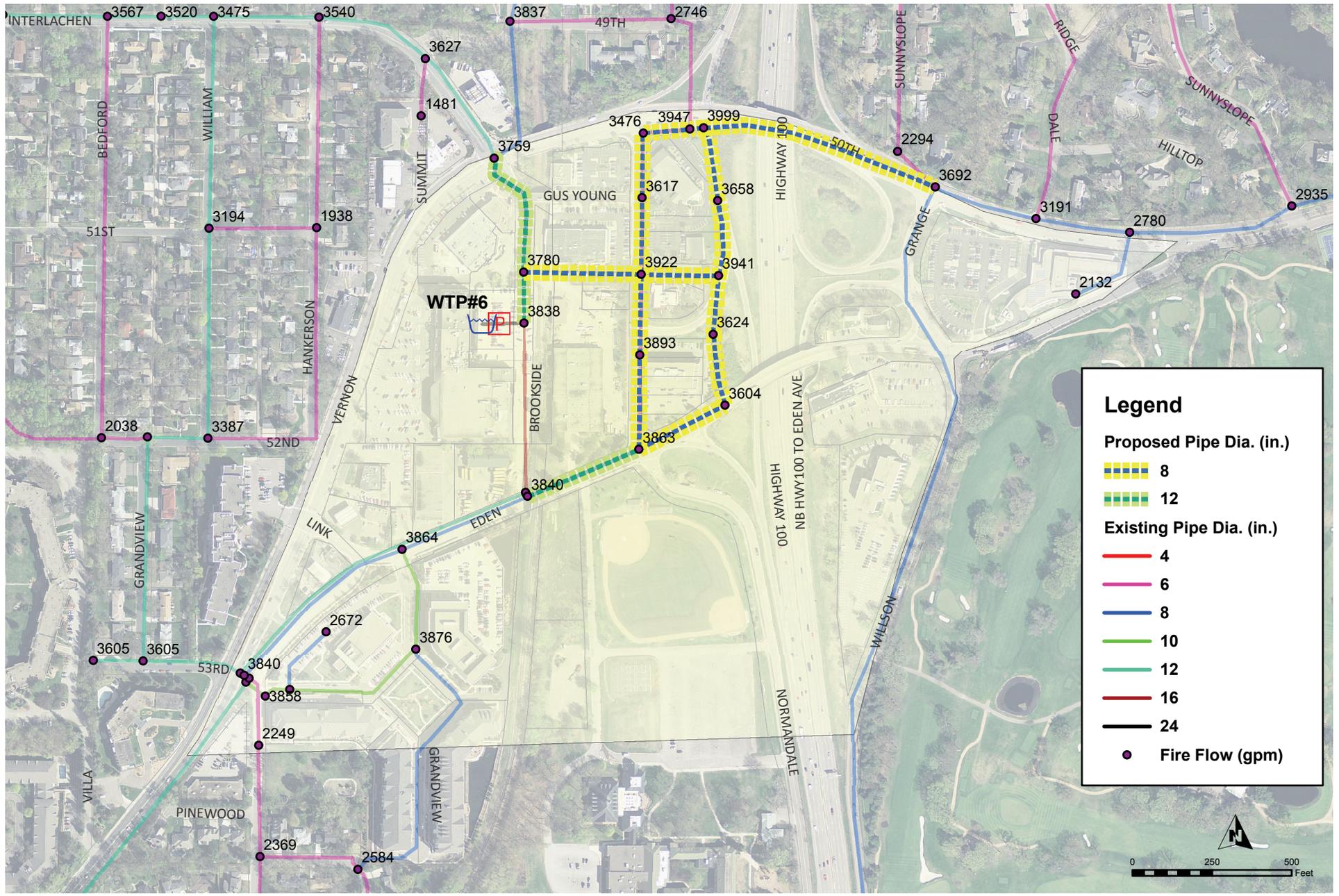
c: Miles Jensen



GrandView Development Water Model Analysis
 Edina, Minnesota

FIGURE 1
 Existing Maximum Day Fire Flow
 WTP #6 Status (off)

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GrandView Development Water Model Analysis
 Edina, Minnesota

FIGURE 2
 Proposed Maximum Day Fire Flow
 WTP #6 Status (off)

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