

Memo



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**DESIGN MEMO: PLAN LINE STUDY FOR THE SOUTHEAST CONNECTOR
TASK 2.1.D.3 DRAINAGE ANALYSIS - ADDENDUM**

Stantec Consulting was retained by the RTC to perform a plan line study of the SouthEast Connector extending from the intersection of South Meadows Parkway and Veterans Parkway to the intersection of Greg Street and Sparks Boulevard. This addendum has been prepared as an update to Appendix F of the *Plan Line Study for the SouthEast Connector Task 2.1.D.3 Drainage Analysis*, dated January 20, 2009 and should be incorporated into Appendix F.

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Introduction

Key components of the drainage analysis for the SouthEast Connector are to verify that the proposed improvements do not adversely impact the Zone 1 Critical Flood Pool (Zone 1 CFP) and specifically that they do not raise water surface elevations (WSEL's) or decrease volumes in the flood pool, and that the SouthEast Connector does not impact the proposed Truckee Meadows Flood Project (TRFP) flood control improvements. Stantec has utilized the United States Army Corps of Engineers (USACE) / (TRFP) comprehensive HEC-RAS flood model of the lower Truckee Meadows to demonstrate that the proposed SouthEast Connector improvements comply with these components.

The effort *prior* to this addendum focused on ensuring that the SouthEast Connector did not impact the Zone 1 CFP under future conditions where the TRFP flood control improvements are in place. The future conditions analysis was completed first for two reasons: the need to demonstrate that there is no impact to the TRFP flood control improvements and that the water surface elevations resulting from the TRFP were lower under existing conditions.

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The USACE had indicated that the proposed conditions modeling resulted in water surface elevations between 0.7 and 0.8 feet lower than existing conditions, but that the backup model demonstrating existing conditions could not be located.

For this addendum Stantec created an existing conditions HEC-RAS model that closely approximates current conditions as well as replicates the water surface elevations reported by the USACE for existing conditions. The following provides a brief description of the model modification process, the modeling results and a discussion of the outcome. Also refer to the original *Task 2.1.E.3 Drainage Analysis, Appendix F* section for further discussion on the full drainage analysis.

Model Modification Process

The USACE / TRFP HEC-RAS model originally provided to Stantec by Scott Stonestreet, Senior Hydraulic Engineer for the USACE, included two existing conditions and one proposed conditions plans (submodels) as described below:

- Plan 1: NewBC w/ Debris – 100yr Update (BC = base or existing conditions w/ Steamboat Restoration)
- Plan 2: NewBC w/ Debris – 117yr Update (BC = base or existing conditions w/ Steamboat Restoration)
- Plan 3: Alt 5 (117YR Des) – 117yr LPP (proposed conditions or TRFP “Locally Preferred Project”)

For this effort Stantec focused on Plan 2 which closely approximates existing conditions as seen in the area today, but includes a portion of the proposed flood project; the Steamboat Creek Restoration (SCR). During the USACE’s modeling effort, the SCR was a fast track project that was expected to be, but has not been constructed to date. Stantec has modified the geometry file within the plan to remove the proposed SCR geometry and re-establish Steamboat Creek as the low flow channel.

The first step in the model modification process involved identifying model parameters including boundary conditions, initial conditions, DSS files (hydrograph information) and model error/warnings data from Plan 2 and then researching and documenting the functionality and operation of each parameter.

The USACE was then contacted to verify that an alternate existing conditions geometry file (that did not include the (SCR) they released to Stantec in 2008 was valid to use in developing an existing conditions model. Once the USACE verified the geometry file, this file was then used to replace the SCR geometry with the existing Steamboat Creek geometry.

Next, boundary conditions, initial conditions, reach geometry, storage areas, storage area connections, and levee geometries were updated using HEC-RAS 4.0 Beta, and HEC-GEO-RAS for ArcMap 9.2. Finally, extensive troubleshooting and model modifications were required to produce the revised existing conditions plan (without the SCR) that closely resembles conditions in the area today.

Modeling Results

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As anticipated, the revised existing conditions plan (without SCR) results in higher water surface elevations (WSEL's) than the USACE's existing conditions model (with SCR). *Figure 3.2 – SouthEast Connector Drainage and Flood Control Modeling Sparks Boulevard to Mira Loma Drive* and *Figure 4.2 – SouthEast Connector Drainage and Flood Control Modeling Mira Loma Drive to South Meadows Parkway* display the location of the existing Steamboat Creek, cross section locations, storage area delineations, and surrounding area points of significance. These figures, along with Table 2.2 below, illustrate the differences in WSEL's and storage area volumes for affected or nearby storage areas.

Table 2.2 - Water Surface Elevations by Storage Area Comparisons

| Storage Area | USACE / TRFP - 117Year Existing Conditions Flood Model (with SCR) <i>NewBC w/ Debris – 117yr Update</i> | | | Stantec - 117Year Existing Conditions Flood Model (w/out SCR) <i>NewBC w/ Debris-117yr Update-REV</i> | | |
|--------------|--|--------------------------------------|------------------------------|--|--------------------------------------|------------------------------|
| | Water Surface Elevation (ft.) | Storage Area Minimum Elevation (ft.) | Storage Area Volume (ac-ft.) | Water Surface Elevation (ft.) | Storage Area Minimum Elevation (ft.) | Storage Area Volume (ac-ft.) |
| Area 4 | 4398.42 | 4390.90 | 178.78 | 4398.50 | 4390.90 | 183.67 |
| Area 4B | 4397.48 | 4388.40 | 187.55 | 4397.80 | 4388.40 | 197.59 |
| Area 5 | 4397.40 | 4380.00 | 1111.85 | 4397.71 | 4384.70 | 979.58 |
| Area 5B | 4397.35 | 4380.00 | 442.55 | 4397.55 | 4383.00 | 740.00 |
| Area 6 | 4397.44 | 4383.90 | 1595.01 | 4397.78 | 4383.90 | 1610.12 |
| Area 7 | 4397.47 | 4381.10 | 1566.49 | 4397.80 | 4381.10 | 1644.87 |
| Area 8 | 4397.48 | 4386.90 | 928.63 | 4397.82 | 4386.90 | 999.64 |
| Area 9 | 4397.48 | 4386.10 | 1000.80 | 4397.82 | 4386.10 | 1058.19 |
| Area 10 | 4397.47 | 4379.90 | 1488.75 | 4397.80 | 4379.90 | 1500.13 |
| Area 11 | 4397.49 | 4385.50 | 108.25 | 4397.82 | 4385.50 | 113.65 |
| Area 12 | 4397.50 | 4385.50 | 495.27 | 4397.83 | 4385.50 | 540.53 |
| Area 23 | 4397.50 | 4387.80 | 50.41 | 4397.83 | 4387.80 | 64.40 |
| Area 24 | 4397.49 | 4387.50 | 668.46 | 4397.82 | 4386.00 | 683.07 |
| Area 25 | 4397.49 | 4386.00 | 456.36 | 4397.82 | 4386.00 | 462.11 |
| Area 26 | 4397.49 | 4389.30 | 58.34 | 4397.82 | 4389.30 | 63.68 |
| Area 28 | 4397.35 | 4384.70 | 661.04 | 4397.52 | 4384.70 | 679.49 |
| Area 29 | 4397.43 | 4383.10 | 2908.30 | 4397.73 | 4383.10 | 3037.60 |
| Area 35 | 4391.70 | 4391.70 | 0.01 | 4391.84 | 4391.70 | 0.37 |
| Area 47 | 4391.60 | 4391.60 | 0.00 | 4391.60 | 4391.60 | 0.00 |
| Area 48 | 4396.60 | 4396.60 | 0.00 | 4396.60 | 4396.60 | 0.00 |
| Area 49 | 4395.70 | 4395.70 | 0.00 | 4395.70 | 4395.70 | 0.00 |

Table 2.2 demonstrates that the WSEL's for all relevant storage areas are the same or higher under existing conditions without the SCR. In addition, a comparison of same location cross sections resulted in higher WSEL's within the revised area. Table 2.2 also illustrates that the storage area volumes decreased under existing conditions with the SCR with the exception of storage areas 5 and 5B due to the SCR restoration flow path decreasing the available storage area volumes in those locations.

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The new existing conditions model results in higher WSEL's for storage areas near the confluence of the Truckee River and existing Steamboat Creek. Specifically, the WSEL's for storage areas 5, 5B, 6 and 10 increased between 0.20-0.34 feet above the USACE's (w/SCR) original existing conditions model.

The increase in WSEL's between the newly created existing conditions model and the USACE's proposed conditions model (with TRFP project) for the same area range between 0.42-0.69 feet, the majority of which are closer to the 0.69 range. The increase in WSEL's is consistent with the increase reported by the USACE in discussions regarding their previous modeling efforts for existing conditions. The revised Stantec model will therefore be used as the baseline existing conditions model for future analyses.

Conclusions

This technical memorandum addendum outlines the steps Stantec completed to create an existing conditions HEC-RAS model without the Steamboat Creek Restoration project, and that closely approximates current conditions in the project area. This model provides baseline water surface elevations and storage area volumes for comparison to future conditions models as well as provides a basis for additional modeling efforts for the SouthEast Connector during the design phase.

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