Chapter 3 - Interchange Project

As part of the Federal Blvd. and 6th Ave. interchange reconstruction project, access from Federal Blvd. to 6th Ave. and Bryant Street is being added. The ramp from Federal Blvd. to 6th Ave (called the SE Ramp) splits to provide access to Bryant Street. This lab illustrates the InRoads design process for creating this interchange. This lab is concerned with the mergers of the SE Ramp with the 6th Ave. edge of pavement and the mergers of the Bryant Street ramp with the SE Ramp. Therefore, the intersections of the ramps at Bryant Street and Federal Blvd. will not be modeled.

Chapter Objectives:

- Give a project overview
- Create a corridor for the SE Ramp.
- Define Point Controls to tie to the existing 6th Ave. edge of pavement.
- Create a corridor for Bryant Ramp.
- Create initial design surfaces for SE Ramp and Bryant Ramp.
- Determine key stations for ramp mergers.
- Define Point Controls for street returns in both corridors
- Modify Bryant Ramp template for the area in the intersection.
- Create a combined surface of SE Ramp and Bryant Ramp.

Project Overview

Project Description

This project creates accesses to 6th Ave. and Bryant Street from Federal Blvd. The Ramp from Federal Blvd. merges into the existing edge of pavement of 6th Ave. The ramp from Bryant Street merges into the SE Ramp (from Federal to 6th).

Project Data

- Existing_Ground.dtm This contains the survey data for the existing terrain.
- Interchange.alg This contains all of the horizontal and vertical alignments used for this project.
- Interchange.itl The initial templates are stored in this file.

InRoads Design Process

- 1. Open Data files.
- 2. Initial Modeling for SE Ramp and Bryant Ramp.
- 3. Determine Key Stations for ramp mergers.
- 4. Modify templates for merger areas.

- 5. Make changes to corridor data.
- 6. Create the combined design surface.
- 7. Review the results

Getting Started

- 1. Open the Interchange.alg.
- 2. Open the Interchange.itl template library.
- 3. Open the Existing Ground.dtm.

Initial Modeling

There are two areas of special importance on this project, where the SE Ramps merges with the existing 6^{th} Ave. edge of pavement and where the Bryant Ramp merges with the SE Ramp. In these areas, the templates change to accommodate the narrowing pavement width. To determine the stations where template changes occur, initial design surfaces are created for the SE Ramp and the Bryant Ramp.

Initial SE Ramp Corridor Model

The initial run of the SE Ramp is primarily concerned with locating stations for template changes. Do not be concerned that the template crosses into the 6th Ave. driving lanes, as this will be corrected in the final modeling.

Section Objectives:

- Create a corridor for the SE Ramp alignment
- Add template drops to the corridor
- Create the initial SE Ramp surface

Build the SE Ramp Corridor

- 1. Select **Modeler > Roadway Designer** from the InRoads menu bar. This displays the *Roadway Designer* dialog box.
- In the *Roadway Designer* dialog box, select Corridor > Corridor Management or
 <D> the button. This displays the *Manage Corridors* dialog box.
- 3. In the *Manage Corridors* dialog box, key in *SE Ramp* for the *Name*.
- 4. In the *Surface Symbology* field, select **D_Finished-Grade**.
- 5. Set the *Type* to Alignment.
- 6. Select SE Ramp as the *Horizontal Alignment*.
- 7. Select **SE Ramp_V** as the *Vertical Alignment*.
- 8. **<D> Add** to complete the corridor.

Name: SE Rar Surface Symbol Type: Horizontal Align Vertical Alignme PI Rounding Ta	logy: D_Finished- Alignment SE Ramp ent: SE Ramp_V	-Grade	Limits Station Start: 00+-0.00 Stop: 16+52.23	Add Close Change Copy Copy From Help
Corridors: Name	Туре	Source Name	Start Station	Stop Station
SE Ramp	Alignment	SE Ramp	00+-0.00	16+52.23

9. **<D> Close** to dismiss the *Manage Corridors* dialog box.

Add the SE Ramp Template Drops

- 1. In the *Roadway Designer* dialog box, select **Corridor** > **Template Drops** or <**D**> the button. This displays the *Template Drops* dialog box.
- 2. In the **Template Drops** dialog box, Key in *O+OO.OO* for the *Station*.
- 3. Key in *25* for the *Interval*.
- 4. In the *Library Templates* area, expand the **1 Templates** folder.
- 5. Highlight the **SE Ramp** template.
- 6. **<D> Add**.

7. **<D> Close**.

🕌 Templ	ate Drop	5			- • •
Corridor:	SE Ram	p	•		Add
Station:	0+00.00			+	Close
Interval:	25.00			+	Change
Library Ter	mplates:			_	
	≺ CONC ≺ CONC	_Divided_Type/ _Off-Ramp _Ramp Crowned_B10	4_4L ▲		Copy Help
	× HMA_ × HMA_	Divided_TypeA Full_Depth_Wid <u>Urban_</u> 4Lane	4La		
Current Te	-				
Station	Inter	Template	Revi		
0+00.0	25.00	SE_Ramp	ITL	C:\Project	ts∖InRoads
Synchror	nize with L	ibrary		Edit	Delete

Create the Initial SE Ramp Design Surface

- 1. In the *Roadway Designer* dialog box, select Corridor > Create Surface or <D> the solution. This displays the *Create Surface* dialog box.
- 2. Key in *SE Ramp* for the *Name*.
- 3. Select **Proposed** for the **Default Preference**.

- Create Surface X Name: SE Ramp Apply Default Preference: Proposed Close Create Surface(s) from: Preferences. Help Al None Clipping Options... General Options New Surface for Each Corridor Create Alternate Surfaces Process Visible Range Only Empty Design Surface Remove Loops Include Null Points **V** Triangulate Features Duplicate Names: Append Replace Rename Modify Add Transverse Features Style: Default -Add Exterior Boundary Style: Exterior Boundary 💌 Densify using Chord Height Tolerance Display in Plan View Horizontal Curves Features Vertical Curves Components
- 4. The remaining settings should be correct. If not, set them to match the illustration below.

- 5. **<D> Apply**.
- 6. **<D> Close**.

Initial Bryant Ramp Corridor Model

As with the SE Ramp, do not worry about the Bryant Ramp crossing into the SE Ramp. In fact, this has to occur in order to determine the stations required for new template drops.

Section Objectives:

- Create a corridor for the Bryant Ramp alignment
- Add template drops to the corridor
- Create the initial Bryant Ramp surface

Build the Bryant Ramp Corridor

- In the *Roadway Designer* dialog box, select Corridor > Corridor Management or
 D> the button.
- 2. In the *Manage Corridors* dialog box, key in *Bryant Ramp* for the *Name*.
- 3. In the *Surface Symbology* field, select **D_Surface_2**.
- 4. Set the *Type* to Alignment.

- 5. Select Bryant Ramp as the Horizontal Alignment.
- 6. Select Bryant Ramp_V as the *Vertical Alignment*.
- 7. **<D> Add** to complete the corridor.
- 8. **<D> Close** to dismiss the *Manage Corridors* dialog box.

Add the Bryant Ramp Template Drops

- 1. In the *Roadway Designer* dialog box, select Corridor > Template Drops or <D> the button.
- 2. In the *Template Drops* dialog box, Key in *O+OO.OO* for the *Station*.
- 3. Key in *25* for the *Interval*.
- 4. In the *Library Templates* area, expand the 1 Templates folder.
- 5. Highlight the Bryant Ramp template.
- 6. **<D> Add**.
- 7. **<D> Close**.

Create the Initial Bryant Ramp Design Surface

- 1. In the *Roadway Designer* dialog box, select Corridor > Create Surface or <D> the solution.
- 2. Key in *Bryant Ramp* for the *Name*.
- 3. In the *Create Surface(s)* from area, highlight Bryant Ramp only.
- 4. The remaining settings should be correct. If not, set them to match the illustration below.
- 5. **<D> Apply**.

6. **<D> Close**.

Create Surface		×
Name:	Bryant Ramp	- Apply
Default Preference:	Proposed	
	<u> </u>	Close
Create Surface(s) fro Bryant Ramp	m:	Preferences
SE Ramp		Help
		All
		None
	pping Options	
	pping options	
General Options New Surface for	r Each Comidor 🔲 C	Create Alternate Surfaces
Empty Design S	Surface 🔄 F	Process Visible Range Only
Empty Design S		Process Visible Range Only Remove Loops
		2 .
☐ Include Null Poi ✓ Triangulate		2 ,
Include Null Poi		2 ,
Include Null Pol Triangulate Features Duplicate Names:		lemove Loops
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 Include Null Pol Triangulate Features Duplicate Names: Ø Append Add Transverse Style: Ø Add Exterior Bo Style: 	ints ♥ F Replace Re Features Default	lemove Loops
 Include Null Pol Triangulate Features Duplicate Names: Ø Append Add Transverse Style: Ø Add Exterior Bo Style: 	ints I Factoria Provide America Provide America Provide America Provided A	Remove Loops

- 7. **<D> File > Save** from the Roadway Designer menu bar.
- 8. In the Save As dialog box, navigate to the InRoads folder.
- 9. Key in *SE Ramp and Bryant Ramp* for the *File Name*.
- 10. **<D> Save**.
- 11. **<D> Cancel** to dismiss the *Save As* dialog box.
- 12. <D> Close to dismiss the *Roadway Designer* dialog box.

Determine Key Stations for Ramp Mergers

It was determined that the gore between the merger of SE Ramp and 6th Ave would end at the intersection of the RT_POSS and the existing edge of pavement of 6th Ave. the gore between the merger of SE Ramp and Bryant St ends at the intersection of SE Ramp's LT_POSS and Bryant Ramp's RT_POSS. The stations of these intersections, along with the intersection of the SE Ramp's LT_POSS and Bryant Ramp's LT_POSS, must be determined for the additional template drops needed in the final surface.

Display Design Data

The relevant horizontal alignments are displayed in the dgn file to give a reference location when determining the key stations.

Section Objectives:

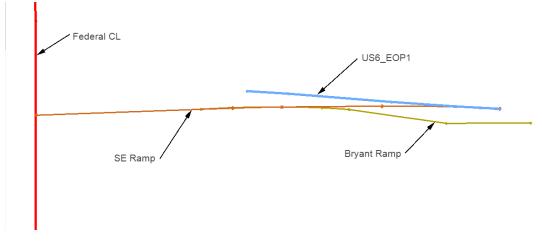
• Display the horizontal alignments

Display Horizontal Alignment Data

- 1. **<D>** the **Geometry** tab in the InRoads Explorer.
- 2. **<R>** on the **Interchange** geometry project.
- 3. Select View All Horizontals from the menu.

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<u>F</u> ile <u>S</u> urface <u>G</u> eometry <u>D</u> rai	ainage <u>E</u> valuation <u>M</u> odeler Site	Modeler Dr <u>a</u> fting <u>Q</u> uantities <u>T</u> ools	<u>H</u> elp	
<unnamed></unnamed>	- 🚡 🗟 🔪 🏏 📘	1 5.00 E TE		
	Name	Description	By Whom	Last
品 Geometry Projects	📝 Bryant Ramp	Off Ramp to Bryant St	cferree	5/1:
i Default	Cogo Buffer		chengh	11/:
Interchange	New	rsection test	chengh	2/4,
Cogo Buf ⊕ √ Bryant Ra		I Blvd to 6th .	cferree	5/1:
in federal C	Save		chengh	2/1:
	Save As			
	Set Active			
	Copy			
📇 Geometry 📸 Pre	Close			•
Toggles the Style Lock				
	Empty			
	View All Horizontals			
	View All Turnouts			
	View All Rails, Joints and Distan	ice Keepers		
	Fit			
	Details			

The illustration below identifies each of the alignments displayed



Key Station Locations

To determine the key stations, the POSS and EOP features of both initial design surfaces are displayed. Then tracking is used on both the SE Ramp alignment and the Bryant Ramp alignment. The stations are needed on each alignment so that template drops can be entered correctly.

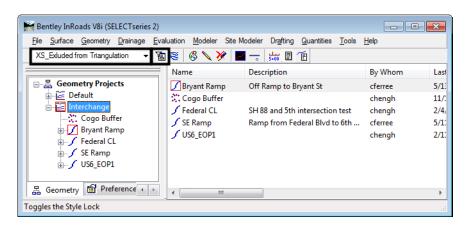
Section Objectives:

- Display the required surface features from the initial design surfaces
- Use Tracking to identify the key stations

Locate Key Stations for SE Ramp at 6th Ave.

Each point on a template creates a feature in the design surface which can make it difficult to find the desired features for display. To reduce the number of features that have to be combed through, feature filters are used. There is a predefined filter that excludes untriangulated features. This is used reduce the number of features in the dialog box to a manageable number.

1. On the InRoads Locks toolbar, set the *Feature Filter* to XS_Excluded from Triangulation.



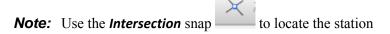
2. Toggle on the Feature Filter Lock.

- 3. On the InRoads menu bar, select Surface > Update 3d/Plan Surface Display.
- 4. In the Update 3d/Plan Surface Display select the SE Ramp surface.
- 5. In the *Features* list, select the features with **EOP** or **POSS** in the name. Hold the *Ctrl* key to highlight each of the features. Highlighted features are automatically displayed.
- 6. **<D> Close**.

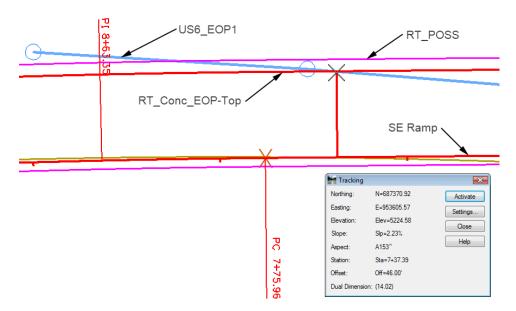
🐂 Update 3-D/Pla	an Surface Display		
Fence Mode: Igr	iore 🔻		Close
Surfaces: SE	Ramp 👻		Refresh All
Perimeter	Surface Elevations	Color-Coded Aspects	Filter
Triangles	Slope Vectors	Color-Coded Elevations	
Contours	Profiled Model	Color-Coded Slopes	Edit Style
Cridded Model			Help
Features:			
Name	Style	Description	<u>+</u>
Exterior Boundary	Exterior Boundary	Created by roadway	_
LT_Conc_EOP-To	D_EOP	Created by roadway	=
LT_Curb-Back-Top	D_CONC_Sw	Created by roadway	
LT_Curb-Flowline	D_CURB_FL_Rt	Created by roadway	
LT Curb-Top	D CURB Top	Created by roadway	
LT_POSS	D_POSS	Created by roadway	
LT_Toe-of-Fill	D_Toe-of-Fill	Created by roadway	-

After the features are displayed, tracking is used to determine the key stations for the SE Ramp along the 6th Ave. edge of pavement.

- 7. Using the MicroStation view controls, zoom in on the left end of the 6th Ave alignment.
- 8. Set the **SE Ramp** alignment active.
- 9. From the InRoads menu bar, select Tools > Tracking > Tracking.
- 10. <T> where the feature RT_Conc_EOP-Top crosses the US6_EOP1 alignment and note the station.



11. <T> where the feature RT_POSS crosses the US6_EOP1 alignment and note the station.



The stations for the two points above are:

- RT_Conc_EOP-Top and US6_EOP1 7+37.39
- ♦ RT_POSS and US6_EOP1 8+23.46

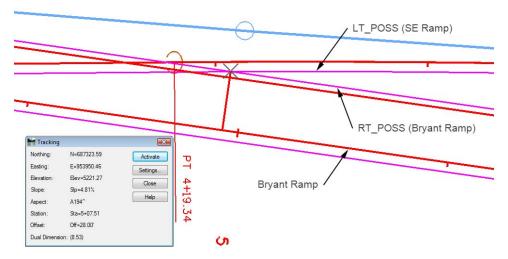
12. **<D> Close** on the *Tracking* dialog box.

Locate Key Stations for Bryant Ramp at SE Ramp

The same procedure is used for locating the key stations at the merger of the SE Ramp and the Bryant Ramp.

- 1. On the InRoads menu bar, select Surface > Update 3d/Plan Surface Display.
- 2. In the Update 3d/Plan Surface Display select the Bryant Ramp surface.
- 3. Toggle on the Features check box.
- 4. In the Features list, select the features with **EOP** or **POSS** in the name.

- 5. **<D> Apply** and **<D> Close**.
- 6. Using the MicroStation view controls, zoom in to the area where SE Ramp and Bryant Ramp intersect.
- 7. Set the Bryant Ramp alignment active.
- 8. From the InRoads menu bar, select Tools > Tracking > Tracking.
- 9. <T> where the feature RT_POSS from the *Bryant Ramp* crosses the LT_POSS from the *SE Ramp* and note the station.



- ♦ Intersection of **RT_POSS** and **LT_POSS** *5+07.51*
- 10. <T> where the feature LT_POSS from the *Bryant Ramp* crosses the LT_POSS from the *SE Ramp* and note the station.
 - ♦ Intersection of LT_POSS and LT_POSS *8+39.60*
- 11. Set the **SE Ramp** alignment active and determine the stations for the locations in 9 and 10 above for this alignment also.
 - Intersection of RT_POSS and LT_POSS 3+92.92
 - Intersection of LT_POSS and LT_POSS 7+27.40
- 12. **<D> Close** on the *Tracking* dialog box.

Template Modifications

As designed, the SE Ramp and Bryant Ramp templates have curb and end conditions on both sides. Templates must be created for the merger areas that do not have the restrictive components.

SE Ramp Template at 6th Ave.

• Copy the SE Ramp template

• Modify the copy for the 6th Ave merger area

Copy the SE Ramp Template

The basic SE Ramp template is used once all of the merger areas are cleared. A copy of this template is made so that one can be modified and the other left intact.

- 1. On the InRoads menu bar, select **Modeler > Create Template**.
- 2. In the *Create Template* dialog box, expand the template library to show the contents of the *1-Templates* folder.
- 3. **<R>** on the **SE Ramp** template and select **Copy** from the menu.

Template Library: C:\Projects\InRoads XM Templates Point Name List Tomplates Set Bryant Ramp CONC_Divided_ CONC_Ramp CONC_Ramp HMA_Crowned_ HMA_Divided_T HMA_Full_Depth HMA_Uthan_4L SE_Ramp 2 - Sections - Pa	TypeA_4La B10 TypeA_4Lar TyPeA_4Lar	Current Template Name: Description:	
3 - Sections - Er	Cut		Ctrl-X
	Сору		Ctrl-C
	Paste		Ctrl-V
	Delete		Del
	Rename		F2
	Templat	e Documentation Link	
	Display		

4. **<R>** on the **1 – Template** folder and select **Paste**.

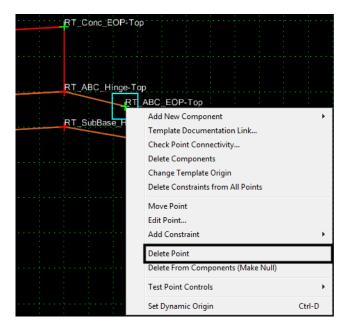
Template Library: C:\Projects\InRoads XM E Point Name List 1 - Templates	Current Templ: Name: Description:	
Servent Rar Server Conc Div	New	•
CONC_Ra	Cut	Ctrl-X
HMA_Crov	Сору	Ctrl-C
HMA_Divid	Paste	Ctrl-V
→ HMA_Urba → SE_Ramp	Delete	Del
2 - Sections - F	Rename	F2

5. <R> on the SE Ramp1 template and select Rename. Key in *SE Ramp at 6th Ave* for the name.

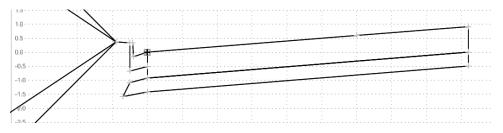
Modify the SE Ramp at 6th Template

This template needs to be modified on the right (6th Ave.) side only.

- 1. **<D> <D> SE Ramp at 6th** template to make it active.
- 2. Zoom in on the right side of the template.
- 3. **<R>** in the Template view and select **Delete Components** from the menu.
- 4. Drag a line through the RT_C/G_Type2-IIB and the RT_Benching components.
 - **Note:** The end conditions are also deleted because of the parent/child relationship they have with RT_Benching.
- 5. **<R>** on the **RT_ABC_EOP-Top** and select **Delete Point** from the menu.



6. Delete the **RT_SubBase_EOP-Top** point also. The illustration below shows the template completed to this point.



Add an End condition to the SE Ramp at 6th Ave template

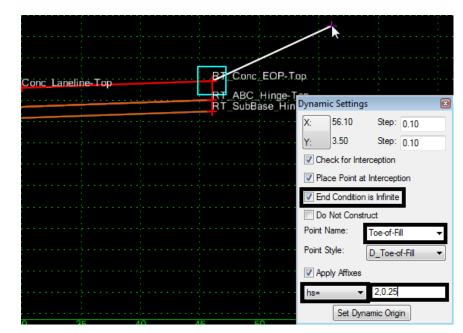
This end condition is used to create the gore after the SE Ramp edge of pavement separates from the 6th Ave. pavement edge.

- Select Tools > Dynamic Settings from the Create Template menu bar or <D> the Dynamic Settings in button.
- 2. Select **Tools > Options** from the *Create Template* menu bar.
- 3. Toggle on Apply Affixes.
- 4. Set the *X* and *Y* Step Options to **0.1**.
- 5. <D> OK.
- 6. **<R>** in the Template view and select **Add New Component > End Condition**.
- 7. In the *Component Properties* area, key in *Tie_6th_EOP* for the *Name*.
- 8. Set the *Target Type* to Alignment XYZ.
- 9. Select **US6_EOP1** for the *Horizontal Alignment*. This automatically sets the vertical alignment.
- 10. Set the *Style* to D_Toe-of-Fill.

Current Component		-	
Name: Tie_6th_EOP		Style: D_T	oe-of-Fill 🔻
Target Type:	Alignment XYZ 🛛 👻	Priority:	1
Horizontal Alignment:	Horizontal Alignment: US6_EOP1 -		: 0
Vertical Alignment: US6_EOP1 -		From Datum:	0.00
Horizon	ital Vertical	Step Elevation:	0.00
Offsets: 0.00	0.00	Rounding Length	0.00

- 11. **<D>** on the **RT_Conc_EOP-Top** point to place the first point.
- 12. In the Dynamic Settings dialog box, toggle on End Condition Is Infinite.
- 13. Select **Toe-of-Fill** for the *Point Name*. This automatically sets the *Point Style*.
- 14. Select **hs**= for the key in type.

15. Key in *2,0.25* and press *Enter*.



16. **<R>** and select **Finish**.

SE Ramp Template at Bryant St.

The merger areas for the SE Ramp at 6th Ave. and the SE Ramp at the Bryant ramp overlap. A copy of the SE Ramp at 6th Ave template is modified for use in this merger area. A separate template is used here because using target aliasing and clipping options would result in the loss of the ABC component in the clipped template.

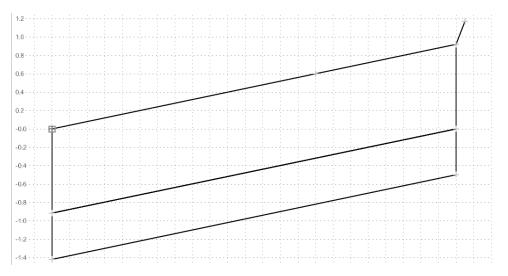
Section Objectives:

- Copy the SE Ramp at 6^{th} Ave template
- Modify the copy for the Bryant Ramp merger area

Copy and Modify the SE Ramp at 6th Ave Template

1. Make a copy of the SE Ramp at 6th Ave and key in SE Ramp at Bryant for the name.

2. Modify the *SE Ramp at Bryant* template as described above deleting the curb and end condition components and sub base points on the left side of the template. The illustration below shows the completed template.



Bryant Ramp at the SE Ramp

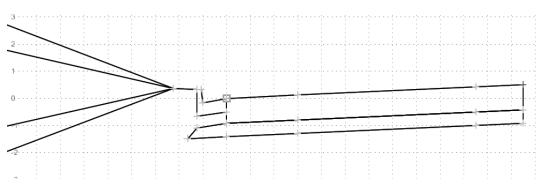
A copy of the Bryant Ramp template is also modified to work in the merger area.

Section Objectives:

- Copy the Bryant Ramp template
- Modify the copy for the SE Ramp merger area

Copy and Modify the Bryant Ramp Template

- 1. Make copy of the **Bryant Ramp** template as described above. Name it **Bryant Ramp** *at SE Ramp*.
- 2. Modify the *Bryant Ramp at SE Ramp* template as described above making the changes on the right side of the template. The illustration below shows the completed template.



Set Up For Final Modeling

With the key stations determined and the new templates created, the corridors are modified to use this data. Changes in corridor stations, additional template drops, point controls, and target aliasing are used to incorporate this data. Also, after reviewing the initial design surface data, some sideslopes require modification

Set Up for the SE Ramp

Section Objectives:

- Add template drops for the new SE Ramp templates
- Add point controls to match the template to the 6th Ave edge of pavement
- Modify sideslopes in the template view

Adding Template Drops

These are added to include the new templates into the corridor.

- 1. Open Roadway Designer.
- 2. Set the *Corridor* to SE Ramp and the *Active Surface* to Existing_Ground.

Corridor:	SE Ramp 🗸	
Active Surface:	Existing_Ground 🔹	

3. Open the Template Drops dialog box.

Because this alignment runs west to east, the first template drop is at the edge of 6th Ave. Therefore, the template for this drop is changed to use the SE Ramp at 6th Ave template.

- 4. Highlight the template drop in the *Current Template Drops* list.
- 5. In the *Library Templates* area, expand the **1 Templates** folder and select the **SE Ramp** at 6th Ave template.

6. **<D> Change**.

🕌 Templa	ate Drops			- • •
Corridor:	SE Ramp	•		Add
Station:	0+00.00		+	Close
Interval:	25.00		+	Change
Library Ter				Сору
	≺ CONC_Ramp ≺ HMA Crowned B10	-		
	≺ HMA_Divided_TypeA	_		Help
	≺ HMA_Full_Depth_Wio <u>≺ HMA_Urban_4Lane</u>	Jenini ≣		
	SE Ramp at 6th Ave			
	≺ SE Ramp at Bryant ≺ SE_Ramp			
I ← 1	Continue Downwort	+	/	
Current Te	mplate Drops:			
Station	Inter Templat	e	Revi Li	brary
0+00.00	25.00 SE_Ram	p ľ	TL C:	\Projects\InRoads
•		11		+
Synchron	ize with Library		Edit	Delete

The next two template drops define the change from the SE Ramp at 6th Ave to the SE Ramp at Bryant Ramp template. This change occurs in 0.01 feet so that there is an abrupt change from a template with a curb to a template without one.

- 7. Key in *3+88.03* for the *Station*.
- 8. Key in *25* for the *Interval*.

Note: The interval for this template drop could be anything greater than 0.01.

- 9. In the *Library Templates* area, highlight the SE Ramp at 6th Ave template.
- 10. **<D> Add**.
- 11. Key in *3+88.04* for the *Station*.
- 12. Key in *25* for the *Interval*.
- 13. In the *Library Templates* area, highlight the SE Ramp at Bryant Ramp template.
- 14. **<D> Add**.

The next transitions define the end of the Bryant ramp merger. Again, an abrupt change between templates is needed so the transition occurs in 0.01 feet.

- 15. Key in **7+72.78** for the **Station**.
- 16. Key in *25* for the *Interval*.
- 17. In the *Library Templates* area, highlight the SE Ramp at Bryant Ramp template.
- 18. **<D> Add**.
- 19. Key in **7+72.79** for the **Station**.
- 20. Key in *25* for the *Interval*.
- 21. In the *Library Templates* area, highlight the SE Ramp at 6th Ave template.
- 22. **<D> Add**.

Finally the transition to an independent SE Ramp is defined.

- 23. Key in *8+23.46* for the *Station*.
- 24. Key in *25* for the *Interval*.
- 25. In the *Library Templates* area, highlight the SE Ramp at 6th Ave template.
- 26. **<D> Add**.
- 27. Key in *8+23.47* for the *Station*.
- 28. Key in *25* for the *Interval*.
- 29. In the *Library Templates* area, highlight the SE Ramp template.

🕌 Templ	ate Drop	s		
Corridor:	SE Ram	p 🔻		Add
Station:	8+23.47		+	Close
Interval:	25.00		+	
Library Ter	nplates:			Change
	<pre> < CONC < HMA_ < HMA_ < HMA_ < HMA_ < SE Ra < SE_Ra < SE_Ra </pre>	Crowned_B10 Divided_TypeA_4La Full_Depth_Widenin Urban_4Lane mp at Bryant amp		Copy Help
Station	Inter	Template	Revi	Library
0+00.00	25.00	SE_Ramp at 6th Ave	ITL	C:\Projects\InRoa
3+88.03	25.00	SE_Ramp at 6th Ave	ITL	C:\Projects\InRoa
3+88.04	25.00	SE Ramp at Bryant	ITL	C:\Projects\InRoa
7+72.78	25.00	SE Ramp at Bryant	ITL	C:\Projects\InRoa
7+72.79	25.00	SE_Ramp at 6th Ave	ITL	C:\Projects\InRoa
8+23.46	25.00	SE_Ramp at 6th Ave	ITL	C:\Projects\InRoa
8+23.47	25.00	SE_Ramp	ITL	C:\Projects\InRoa
•				4
Synchror	nize with l	ibrary	Edit	Delete

30. **<D> Add**. The completed Template Drops dialog box is shown below.

31. **<D> Close**.

Add Point Controls for the SE Ramp

A point control is used to match the right edge of pavement of the SE Ramp templates to the existing pavement edge of 6th Ave. (defined by the US6_EOP1 alignment).

- 1. Select **Corridor** > **Point Controls** from the InRoads menu bar. This displays the **Point** *Controls* dialog box.
- 2. In the Control Description field, key in SE Ramp EOP RT at 6th Control.
- 3. Select **RT_Conc_EOP-Top** for the *Point*.
- 4. Toggle on **Both** for the *Mode*.
- 5. Set the *Control Type* to Alignment.
- 6. Select **US6_EOP1** for the *Horizontal Alignment*. The vertical alignment is automatically set.

7. In the *Station Limits* area, leave the *Start* at *O+OO.OO* and key in *8+23.46* for the *Stop* station.

 <d> Add and Clope</d> 	ose.
-------------------------------------------	------

Point Controls	
Corridor: SE Ramp	Add
Control Description: SE Ramp EOP RT at 6th Cont	rol Close
Point: RT_Conc_EOP-Top ▼ ♥ Mode	Station Limits Change Statt: 00+0.00 + Stop: 8+23.46 +
Control Type: Alignment Horizontal Alignment: US6_EOP1 Vertical Alignment: US6_EOP1 USe as Secondary Alignment Priority: 1 Horizontal and Vertical Controls:	Horizontal Offsets Stat: 0.00 \$top: 0.00 \$top: 0.00 \$top: 0.00 \$top: 0.00 \$top: 0.00
	Mode Type Control Description
<	Delete

Modify Side Slopes for SE Ramp

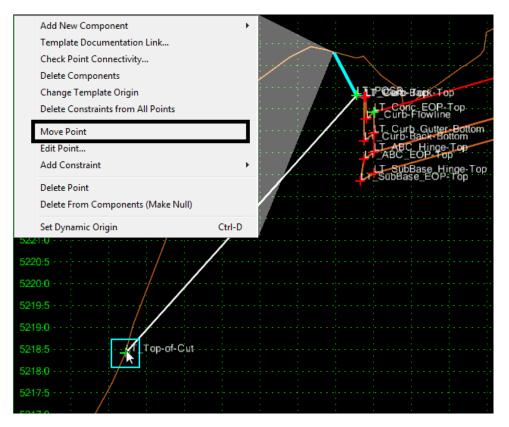
There is a area in this corridor where the computed end condition created an undesirable result. Because this area only covers two template drops, it is corrected by modifying the templates at those stations. If this area were larger, an end condition override or a new template should be used.

- 1. Set the *Station Indicator* to **7+72.79**.
- <D> <D> in the Template View to open the *Edit Template at Station 7+72.79 Only* dialog box.
- 3. Open the *Dynamic Settings* dialog box.
- 4. **<D>** on the Readout button to change it to **X** and **Slope**.

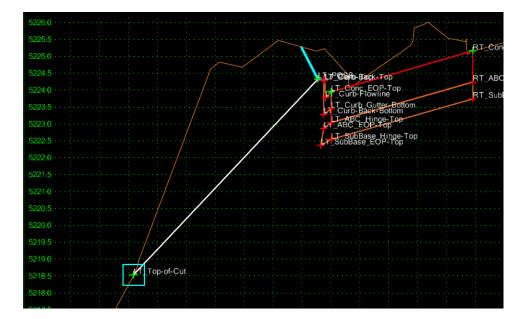
5. Key in **10.00%** for the slope **Step**.

Dynamic	Settings			×
X:	85.42	Step:	0.00	
Slope:	14751.28%	Step:	10.00%	
Point Na	ime:			•
Point Sty	/le:			•
🔲 Apply	/ Affixes			
hs=	•			
	Set Dynar	nic Orig	in	

- 6. **<R>** on the LT_Top-of-Cut point and select Move Point from the menu.
- 7. Move the point to the location shown in the illustration below. **<D>** to place it.



- **Note:** The point will snap to the Existing Ground line when the cursor is moved next to the line.
- 8. **<D> OK** to accept the change and dismiss the dialog box.



9. Modify station **7+75.00** in a similar manner as shown in the illustration below.

Set Up for the Bryant Ramp

Section Objectives:

- Change the end station for the Bryant Ramp corridor
- Add template drops for the new Bryant Ramp templates
- Add point controls to match the template to the SE Ramp edge of pavement
- Define target aliasing to target the SE Ramp surface
- Modify sideslopes in the template view

Edit Corridor Stations

The Bryant Ramp alignment runs past the point where the Bryant Ramp template is no longer used. The corridor is modified to end at the same place where the template needs to end.

- 1. Set the *Corridor* to Bryant Ramp.
- 2. Select **Corridor > Corridor Management** from the InRoads menu bar. This displays the *Manage Corridors* dialog box.
- 3. In the *Manage Corridors* dialog box, highlight the **Bryant Ramp** entry from the *Corridors* list.
- 4. In the *Limits* area, toggle on Station.
- 5. Key in *8+85.00* for the *Stop* station.

6. **<D> Change** and **Close**.

Name: Bryant Ram	-		imits ✓ Station	Add
Surface Symbology	D_SURFACE	_2 🔹 📕	Start:	Close
Туре:	Alignment	•	0+00.00	+ Change
Horizontal Alignmen	t: Bryant Ramp	+	Stop:	
Vertical Alignment:	Bryant Ramp	<u>v</u> -	8+85.00	+ Copy
PI Rounding Tange	ent: 0.00			Copy From
Corridors: Name	Туре	Source Name	Start Station	Help Stop Station
SE Ramp	Alignment	SE Ramp	00+-0.00	16+52.23
Bryant Ramp	Alignment	Bryant Ramp	0+00.00	8+85.00

Adding Template Drops

The additional template drops are added to include the modified template properly as explained above.

- 1. Open the **Template Drops** dialog box.
- 2. Key in *5+02.76* for the *Station*.
- 3. Key in *25* for the *Interval*.
- 4. In the *Library Templates* area, highlight the Bryant Ramp template.
- 5. **<D> Add**.
- 6. Key in *5+02.77* for the *Station*.
- 7. Key in *25* for the *Interval*.
- 8. In the *Library Templates* area, highlight the Bryant Ramp at SE Ramp template.

	te Drops			- • •	
Corridor:	Bryant Ramp	• •	(Add	
Station:	5+02.77	4	₽ [Close	
Interval:	25.00	-	₽	Change	
Library Tem	plates:		I	Сору	
Image: Second Constraint Constraint Help Help Help Help Help Help Help Hornor Help Hornor Help Help Help					
•		4	 		
•	nplate Drops:	Template	Revi	Library	
Current Terr	nplate Drops:		Revi.	Library C:\Projects	
Current Terr Station 0+00.00 5+02.76	Interval 25.00 25.00	Template Bryant Ramp Bryant Ramp	ITL ITL	C:\Projects C:\Projects	
Current Terr Station 0+00.00	Interval	Template Bryant Ramp	ITL ITL	C:\Projects	
Current Terr Station 0+00.00 5+02.76	Interval 25.00 25.00	Template Bryant Ramp Bryant Ramp	ITL ITL	C:\Projects C:\Projects	

9. **<D> Add** and **Close**. The completed Template Drops dialog box is shown below.

Add Point Controls for the Bryant Ramp

This point control matches the right edge of pavement of the Bryant Ramp to the left edge of pavement of the SE Ramp. It causes the Bryant ramp to transition to 0 by the end of the merger.

- 1. Select **Corridor > Point Controls** from the InRoads menu bar.
- 2. In the *Control Description* field, key in *Bryant Ramp EOP RT at SE Ramp Control*.
- 3. Select **RT_Conc_EOP-Top** for the *Point*.
- 4. Toggle on **Both** for the *Mode*.
- 5. Set the *Control Type* to Corridor Point.
- 6. Select SE Ramp for the *Corridor*.
- 7. Select LT_Conc_EOP-Top for the *Reference Point*.
- 8. In the *Station Limits* area, key in *5+02.77* for the *Start* station and key in *8+85.00* for the *Stop* station.

9. **<D> Add** and **Close**.

Point Controls	
Corridor: Bryant Ramp	Add
Control Description: Bryant Ramp EOP RT at SE R	amp Control Close
Point: LT_ABC_EOP-Top	Station Limits Change Stati: 5+02.77 + Stop: 8+85.00 +
Control Type: Comidor: Reference Point: Priority: Horizontal and Vertical Controls:	Horizontal Offsets Stat: 0.00 \$top: 0.00 ↓ Vertical Offsets Stat: 0.00 \$top: 0.00 ↓
E P Name Start St Stop St M	Node Type Control Description
X 1 LT_ABC 5+02.77 8+85.00 Bo	xth Corridor P SE Ramp: Bryant Ramp EO
•	- F
	Delete

Create Target Aliasing for the Bryant Ramp

Target aliasing is used to tie the Bryant Ramp sideslope to the SE Ramp sideslope in the area before the merger. Without this, the combined surface will not triangulate properly in areas where the toes overlap.

- 1. Select **Tools > Target Aliasing** from the Roadway Designer menu bar.
- 2. Highlight Surface SE Ramp in the Surface or Corridor list.
- 3. **<D> Add**.

🖌 Target Aliasing		•••
Target: <a>Active Surface>	•	ОК
Surface or Conidor	Aliases:	Cancel
Corridor - SE Ramp Surface - Bryant Ramp Surface - Default Surface - Existing Ground Surface - SE Ramp	Add -> <- Remove Move Up Move Down	Help
	Use Closest	

4. Highlight Surface - Existing_Ground in the Surface or Corridor list.

5. **<D> Add**. The dialog box looks like the illustration below.

🐂 Target Alias	ing			×
Target:	<active surface=""></active>	•		ОК
Surface or Corric Corridor - SE Ra Surface - Bryan Surface - Defau	amp t Ramp	Add -> <- Remove Move Up Move Down	Aliases: Surface - SE Ramp Surface - Existing_Ground	Cancel Help
			Use Closest	

6. **<D>OK**.

Modify Side Slopes for Bryant Ramp

This corridor also has an undesirable result on a sideslope. Again, because this result occurred in a limited area, the template at the station is edited.

- 1. Set the *Station Indicator* to 8+50.00.
- 2. <D> <D> in the Template View to open the *Edit Template at Station 8+50.00 Only* dialog box.
- 3. Move the point LT_Toe-of-Fill as shown in the illustration below.
- 4. **<D> OK** to accept the change and dismiss the dialog box



Create the Final Combined Design Surface

The two corridors are combined into one surface of the interchange.

Section Objectives:

- Create a combined surface from the SE Ramp and Bryant Ramp corridors
- 1. Open the *Create Surface* dialog box.
- 2. In the *Name* field, key in *SE-Bryant Ramps*.
- 3. Set the *Default Preference* to **Proposed**.
- 4. In the *Create Surface(s) From* list box, highlight both **Bryant Ramp** and **SE Ramp**.

The clipping options are used to modify the combined surface where the end conditions overlap prior to the merger.

- 5. **<D>** the **Clipping Options** button.
- 6. Set the *Clipping Option* to End Conditions Only.
- 7. **<D>** OK to accept the change and close the *Clipping Options* dialog box.

🗑 Clipping	Options		—
Corridor	Clipping Corridor	Clipping Option	ОК
SE Ramp	Bryant Ramp	Clip End Conditions Only	Cancel
			Help

8. Verify that Add Exterior Boundary, Triangulate, and Remove Loops are toggled on.

- Create Surface X Name: SE_Bryant Ramps Apply Default Preference: Proposed Close Create Surface(s) from Preferences. Help All None Clipping Options... General Options New Surface for Each Corridor Create Alternate Surfaces Process Visible Range Only Empty Design Surface Include Null Points Remove Loops 🔽 Triangulate Features Duplicate Name: Append O Replace Rename Modify Add Transverse Features Style: Defa Add Exterior Boundary Style Exterior Boundary Densify using Chord Height Tolerance Display in Plan View Horizontal Curves Features Vertical Curves Components
- 9. **<D> Apply** and **Close**. Also, close the *Results* window if it is displayed.

- 10. Select **File > Save** from the Roadway Designer menu bar.
- 11. **<D> Close** to dismiss the Roadway Designer dialog box.

Review the Results

Once the design surface is created a review of that surface will determine if additional work is required.

Cross Sections

Cross sections are one of the standard design surface review tools.

Section Objectives:

• Create a set of cross sections

Display Cross Sections with the SE Ramp Alignment

The SE Ramp alignment is the main alignment for this project, so it is used when reviewing the data.

- 1. Set the **SE Ramp** alignment active.
- 2. Open the Create Cross Sections dialog box.
- 3. Set the *Left Offset* to *-150* and the *Right Offset* to *100*.

- 4. Select the Existing_Ground and SE-Bryant Ramps surfaces
- 5. **<D> Apply** and **<D>** to place the set.
- 6. Close the *Create Cross Sections* dialog box.
- 7. Review the cross sections paying particular attention to the merger areas.

View 3D Components

With the advent of template components, a new option has been added to the view surface commands. Viewing the design surface components in 3d is a new tool for reviewing surfaces.

Section Objectives:

- Display surface components into the MicroStation file
- 1. Select **Surface > View Surface > Components** from the InRoads Menu.
- 2. In the View Surface Components dialog box, select SE-Bryant Ramps for the Surface.
- 3. In the *Component* list, <R> and choose Select All from the menu.
- 4. Hold the *Ctrl* key and *<D>* on the ABC components to deselect them.
- 5. **<D> Apply** and **Close**.
- 6. Examine the components, rotating the view to see different perspectives.