

**Appendix E**  
**Infrastructure Assessment Summary**



**Idaho Transportation Department**  
**Project No. A023(630)**  
**Key No. 23630**

# **SH-44, I-84 to Star Rd**

## **PEL & NEPA Study**

### Infrastructure Assessment Summary Report

November 11, 2025

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## Project Description

The Idaho Transportation Department (ITD) SH-44, I-84 to Star Road PEL and NEPA Study project utilizes a Planning and Environmental Linkages (PEL) process to evaluate alternatives to improve travel safety and operations along the SH-44 highway corridor and accommodate all corridor users by enhancing pedestrian and bicyclist connectivity along, adjacent to, and across SH-44 in Canyon and Ada Counties from east of the I-84 interchange through the Star Road intersection (Figure 1). Through stakeholder and public engagement, ITD has identified four alternatives in addition to No Action for this corridor:

1. **Alternative 1:** (Figure 2) SH-44 Widening and Improvements on Existing Alignment
  - a. Existing SH-44 alignment with widening from I-84 to Star Road
2. **Alternative 2:** (Figure 3) SH-44 South Alternative Route around Middleton at Ballard Lane
  - a. Existing SH-44 alignment with widening for a portion of the project with a new alignment from Ballard Lane to east of North Middleton Road
3. **Alternative 3:** (Figure 4) SH-44 South Alternative Route around Middleton at Cemetery Road
  - a. Existing SH-44 alignment with widening for a portion of the project with a new alignment from west of Cemetery Road to east of North Middleton Road
4. **Alternative 4:** (Figure 5) SH-44 One-Way Couplet through Middleton
  - a. Existing SH-44 alignment with widening for a portion of the project with one-way couplet through downtown Middleton from west of Cemetery Road to east of N Middleton Road

Figure 6 provides a map of the project area with all four alternatives overlaid.

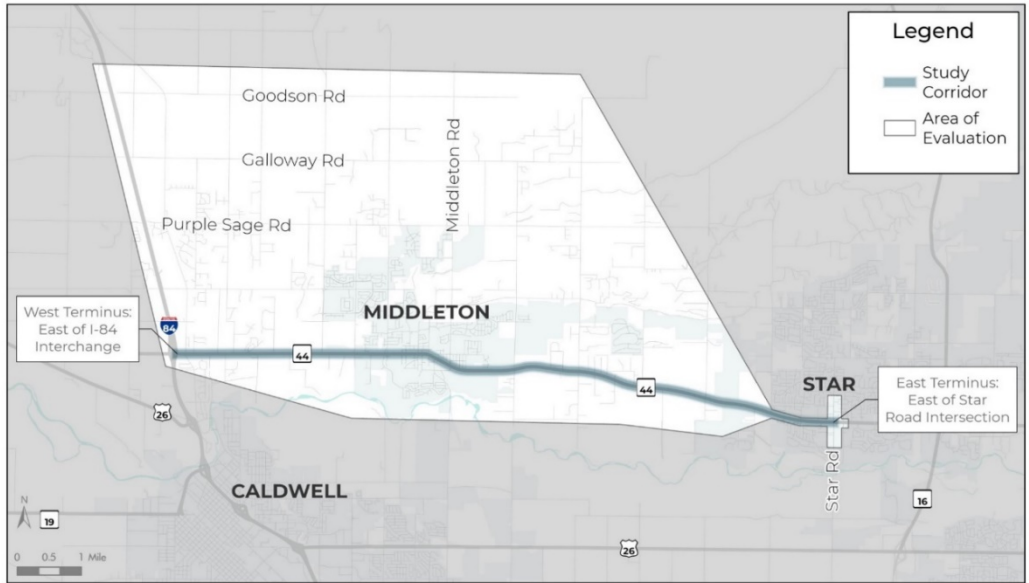


Figure 1 – Vicinity Map

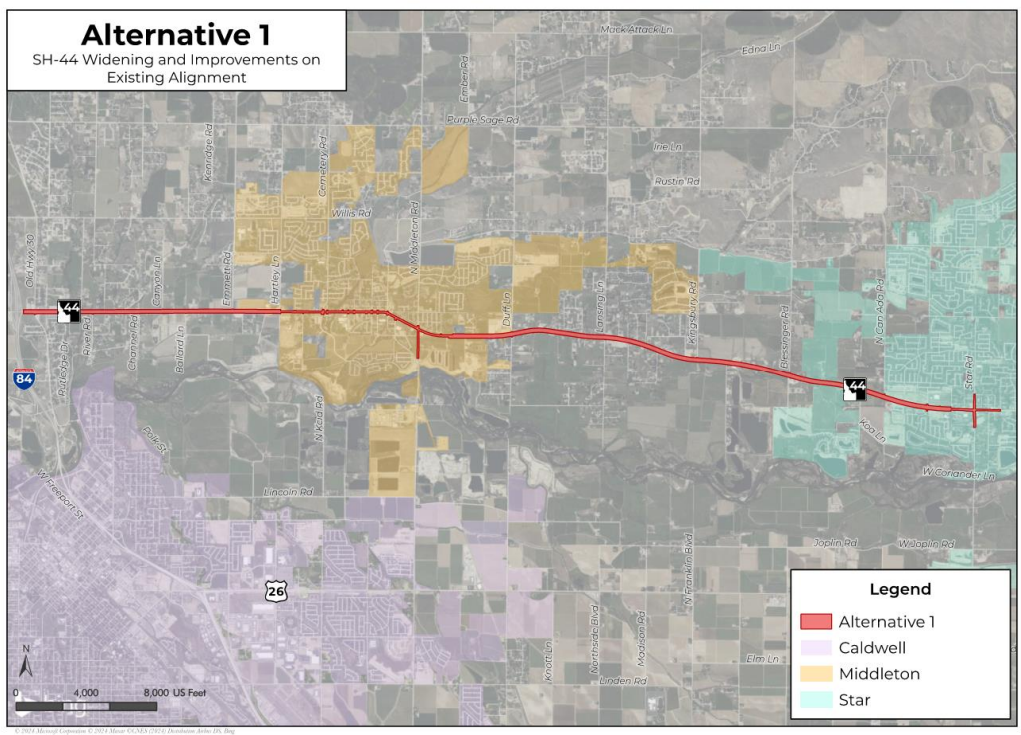


Figure 2 – Alternative 1

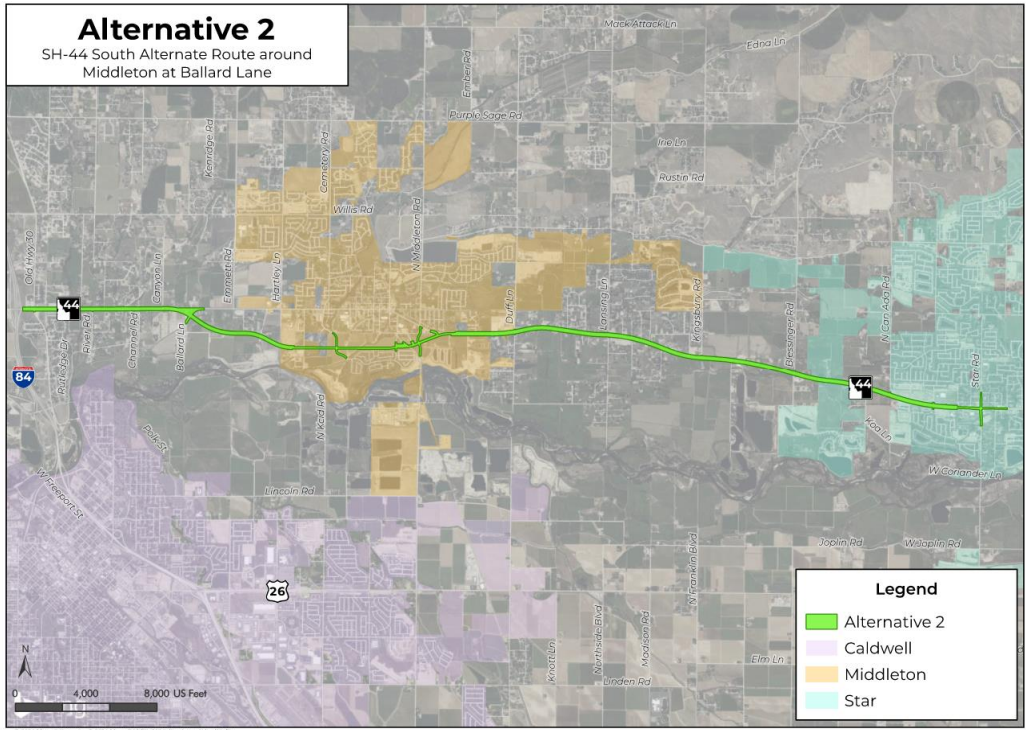


Figure 3 – Alternative 2

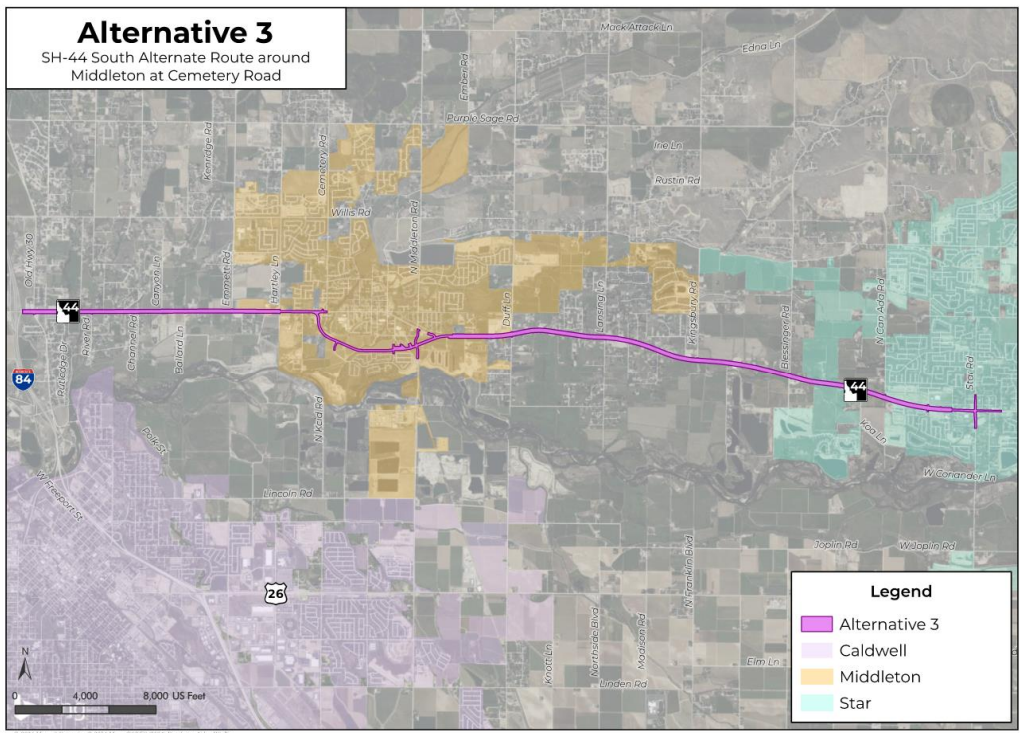


Figure 4 – Alternative 3

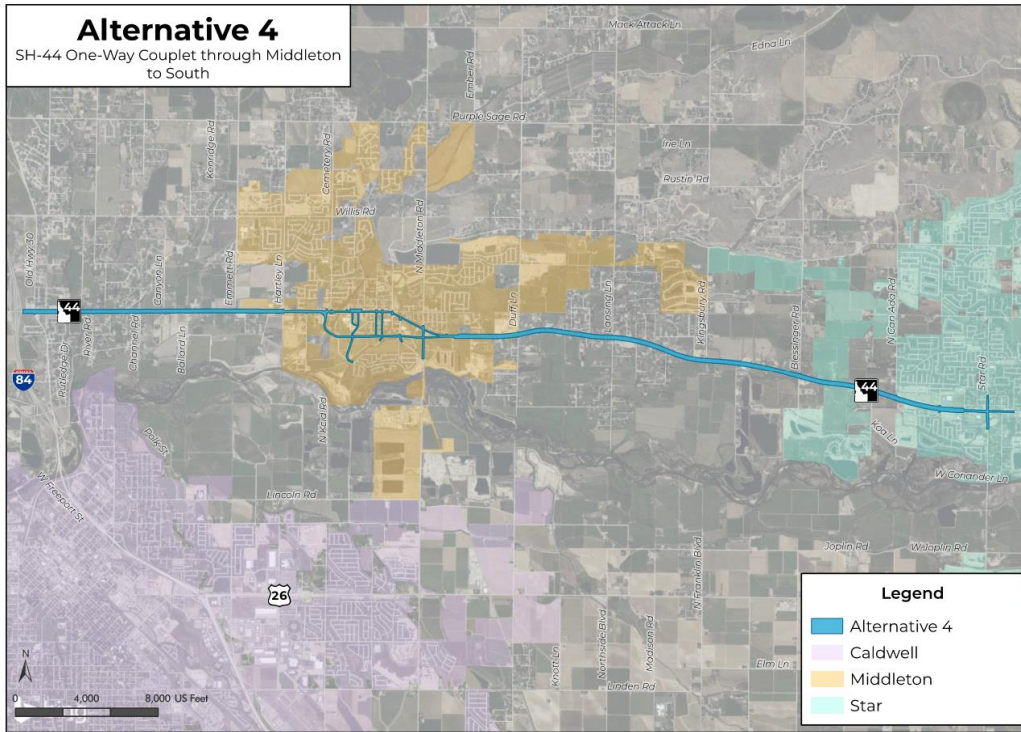


Figure 5 – Alternative 4

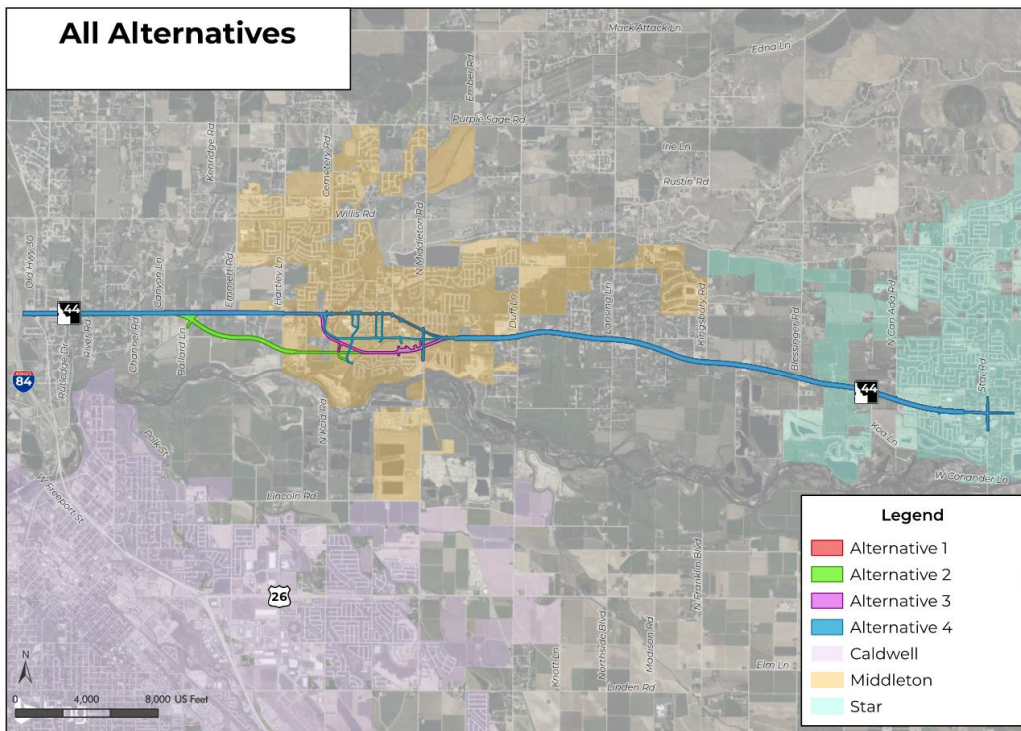


Figure 6 – All Alternatives

David Evans and Associates, Inc. (DEA) is the engineering consultant selected by ITD to lead the SH-44, I-84 to Star Road PEL and NEPA project with several subconsultants working under DEA for various tasks. As part of the PEL process, individual assessment reports were completed by the project team to evaluate the following project infrastructure:

- Utilities Assessment Report prepared by Ardurra
- Drainage Assessment Report prepared by Osborn Consulting
- Irrigation Assessment Report prepared by Ardurra
- Hydraulics Assessment Report prepared by Ardurra
- Geological Assessment Report prepared by GeoEngineers
- Structures Assessment Report prepared by DEA

The purpose of this Infrastructure Assessment Summary Report is to provide a brief summary of the individual reports, including identification of specific issues that should be considered in the evaluation of the alternatives.

## Utilities Assessment

A Utilities Assessment Report was prepared by Ardurra. The assessment included review of a previously prepared SH-44 Utility Report, which was generated under KN 07827, as well as contact and coordination with utility providers within the project limits. A total of ten (10) utility providers were identified and their infrastructure evaluated. Evaluation showed utility impacts would occur with all alternatives and many of the impacted utilities were within dedicated easements which could add significant cost to the project. Table 1 provides a list of the ten utility providers with anticipated impacts and estimated project costs for each alternative.

Table 1

Utility Company	Alternative 1 Recommendation	Alternative 2 Recommendation	Alternative 3 Recommendation	Alternative 4 Recommendation
Ada County <u>Highway District</u> Fiber & Traffic Signal	Project planned traffic improvements	Project planned traffic improvements	Project planned traffic improvements	Project planned traffic improvements
Cable One <u>(Sparklight)</u> Underground & Overhead Fiber Optic	Overhead & underground relocations -	Overhead & underground relocations -	Overhead & underground relocations -	Overhead & underground relocations -
<u>City of Middleton</u> Water, Sanitary Sewer, Irrigation	Adjustments to all facilities \$2,131,312	Adjustments to all facilities \$1,830,002	Adjustments to all facilities \$2,418,850	Adjustments to all facilities \$2,815,212

<b>Utility Company</b>	<b>Alternative 1 Recommendation</b>	<b>Alternative 2 Recommendation</b>	<b>Alternative 3 Recommendation</b>	<b>Alternative 4 Recommendation</b>
<u>Fatbeam</u> Underground Fiber Optic	Adjustments to avoid irrigation improvements -	Adjustments to avoid irrigation improvements -	Adjustments to avoid irrigation improvements -	Underground vertical adjustments -
<u>Idaho Power</u> Overhead Power & Substation	Relocation of overhead power and substation impact \$26,537,000	Relocation of overhead power and substation impact \$24,317,000	Relocation of overhead power and substation impact \$25,625,000	Relocation of utility poles and substation impact \$27,035,000
<u>Intermountain Gas</u> Underground Natural Gas & Regulation Stations	Relocation of 3 regulation stations \$2,506,000	Relocation of 3 regulation stations \$2,506,000	Relocation of 3 regulation stations \$2,506,000	Relocation of 3 regulation stations \$2,506,000
<u>Lumen</u> Overhead & Underground Fiber Optic & Telephone	Overhead and underground relocations -	Overhead and underground relocations -	Overhead and underground relocations -	Overhead and underground relocations -
<u>Star Sewer and Water District</u> Water and Sanitary Sewer	Minor Relocations or Adjustments \$457,380	Minor Relocations or Adjustments \$457,380	Minor Relocations or Adjustments \$457,380	Minor Relocations or Adjustments \$457,380
<u>Syringa</u> Underground Fiber Optic	Minor Relocations or Adjustments -	Minor Relocations or Adjustments -	Minor Relocations or Adjustments -	Minor Relocations or Adjustments -
Williams Northwest <u>Pipeline</u> Underground Natural Gas & Regulation Stations	Gas Adjustments & Regulation Station Impacts \$5,000,000	Gas Adjustments & Regulation Station Impacts \$5,000,000	Gas Adjustments & Regulation Station Impacts \$5,000,000	Gas Adjustments & Regulation Station Impacts \$5,000,000
<b>Total Estimated Utility Relocation Cost*</b>	<b>\$36,631,692*</b>	<b>\$34,110,382*</b>	<b>\$36,007,230*</b>	<b>\$37,813,592*</b>

\*Does not include costs for property and easement acquisition

# Drainage Assessment

A Drainage Assessment Report was prepared by Osborn Consulting. The purpose of the report was to document and evaluate existing drainage conditions and proposed concept level drainage improvements recommended for each of the four design alternatives. The assessment was based on review of past drainage reports for SH-44, aerial imagery, and publicly available mapping such as National Wetlands inventory (NWI) and Federal Emergency Management Agency (FEMA) mapping.

## Existing Drainage Conditions

The SH-44 project runs parallel to the Boise River and is located approximately one mile to the north. The area is within the Boise River Basin and the overall drainage runoff pattern flows to the southeast towards the river through various creeks and canal systems. Within the immediate vicinity of the project, the topography is relatively flat and there is no continuous storm drain systems or ditches. The roadway runoff generally surface flows from the shoulders where the majority disperses and infiltrates.

According to the National Wetlands Inventory (NWI) map, there are only a few areas within the project limits where freshwater emergent wetlands associated with streams intersect the roadway at culvert crossings. Concept level evaluation indicates that no major wetland impacts are anticipated as part of this project.

Based on the Federal Emergency Management (FEMA) Flood Insurance Rate Maps (FIRM), much of the project area passes through Flood Zones A and AE, which are at high-risk for flooding, as well as Zone X which is at moderate to low risk for flooding.

## Proposed Concept Level Drainage Improvements

### Stormwater Requirements

Because the project area is within both Ada and Canyon counties and along a state highway, the following resources and manuals apply to the project:

- Idaho Transportation Department (ITD) Best Management Practices Manual
- Ada County Highway District (ACHD) Policy Manual, Section 8000 – Drainage and Stormwater Management
- Highway Standards and Development Procedures for the Association of Canyon County Highway Districts (ACCHD)
- Idaho Department of Environmental Quality (IDEQ) Catalog of Storm Water Best Management Practices.

The rational method for design of BMPs is accepted by each of these agencies and was used for developing concept level drainage facilities for each of the four alternatives.

After review of the manuals and evaluation of the project area, bioretention swales were chosen as the preferred BMP for infiltration because of their relatively small footprint, cost effectiveness, and

ability to be constructed adjacent to the road in the right-of-way. The ACCHD design standard of 0.25 inches per hour was selected as the minimum allowable infiltration rate for constructing swales. For project areas where infiltration rates are below this minimum rate, ditches are proposed to convey runoff downstream to higher infiltrating soils that allow construction of biofiltration swales.

### Stormwater Facility Design

Concept calculations show that a combination of biofiltration swales and ditches would be a feasible drainage design option for all four alternatives. At this preliminary level of evaluation, the swale and ditch design appears to be similar for all four alternatives and there is no alternative that has a clear advantage over any of the others.

For all alternatives, there are several areas along the alignment that have infiltration rates below 0.25 inches per hour and will require drainage ditches to convey runoff to downstream swales. In most locations, the ditch design depth is 1.0 foot, but some locations may require ditches with a depth of 1.5 to 2.0 feet. Construction of the ditches and swales will require 17 to 18-feet of right-of-way.

To proceed further with the stormwater analysis and refinement of the design, geotechnical boring and groundwater information will need to be gathered, including infiltration testing.

## Irrigation Assessment

An Irrigation Assessment Report was prepared by Ardurra. The report, based on field observations and correspondence with available irrigation entities, evaluated irrigation crossings along each of the four alternative alignments and provided recommendations for the existing structures.

The project area includes four (4) irrigation entities: Black Canyon Irrigation District (BCID), Canyon County Water Company (CCWC), Middleton Mill Ditch Company (MMDC), and Drainage District #2 (DD2). Only BCID has design specifications and standard details for irrigation crossings. To the best knowledge available, the other three irrigation entities do not have specific design standards. For irrigation crossings controlled by those entities, ITD design standards would apply.

In total, the four project alternatives have 25 unique irrigation crossing locations, ten of which are common crossings to all four alignments. The others are irrigation crossings found only along one, two, or three of the alignments. The crossings were given numerical identifiers based on 1) their sequential order in a west to east direction (#1 through #25) and 2) the alignment alternative that they were impacted by (i.e.: #2, #2/3, ALL).

Table 2 is a summary of existing conditions for each irrigation crossing with recommended improvements for the crossings.

Table 2

Irrigation Crossing ID & Owner/Operator	Existing Conditions and Recommendation	Alt 1	Alt 2	Alt 3	Alt 4
#1 – ALL BCID	24” CMP for unnamed irrigation supply crossing of SH-44 Irrigation box at inlet; Open channel at outlet Recommendation: Remove and replace	X	X	X	X
#2 – ALL DD2	36” CMP for West Hartley Gulch crossing of SH-44 Masonry stone at inlet; Outlet on private property FEMA Zone A Recommendation: Extend existing	X	X	X	X
#3 – ALL DD2	4’ HDPE pipe with 5’ CMP casing for East Hartley Gulch crossing of SH-44 Inlet on private property; Open outlet w/Plunge Pool FEMA Zone A Recommendation: Remove and replace/upsized	X	X	X	X
#4 – ALL CCWC	18” RCP for Canyon Canal crossing of SH-44 Open ditch at inlet; Gated control structure at outlet Recommendation: Remove and replace/upsized. Longer structure with Alt #2	X	X	X	X
#5 – ALL DD2	4’ RCP for unnamed drainage crossing of SH-44 Inlet on private property; Concrete headwall at outlet Recommendation: Remove and replace	X	X	X	X

Irrigation Crossing ID & Owner/Operator	Existing Conditions and Recommendation	Alt 1	Alt 2	Alt 3	Alt 4
#6 – 2 DD2	Two crossings for Alt 2 crossing of unnamed drainage: one new crossing and one existing 36” RCP Recommendation: New proposed structure in addition to remove & replace existing		X		
#7 – 2 DD2	Proposed crossing of Alt 2 for unnamed drainage Recommendation: Proposed new structure		X		
#8 – 2 CCWD	Proposed crossing of Alt 2 for unnamed irrigation supply Recommendation: Proposed new structure		X		
#9 – 2 DD2	Proposed crossing of Alt 2 for unnamed drainage Recommendation: Proposed new structure		X		
#10 – 2 DD2	Proposed crossing of Alt 2 for unnamed drainage Recommendation: Proposed new structure		X		
#11 – 1/3/4 CCWC	unknown pipe size/material (submerged) for Canyon Canal crossing of SH-44 Concrete headwall at inlet; heavy vegetation at outlet Recommendation: Remove and replace/upsized	X		X	X
#12 – 3/4 CCWC	54” RCP for Canyon Canal crossing of S Cemetery Road Irrigation boxes on upstream side; outlet structure submerged Recommendation: Alt 3 – Extend existing, Alt 4 – Remove and replace			X	X

Irrigation Crossing ID & Owner/Operator	Existing Conditions and Recommendation	Alt 1	Alt 2	Alt 3	Alt 4
#13 – 1/3/4 DD2	24" PVC storm pipe for unnamed drainage crossing of Cemetery Rd near SH-44 Open ditch at inlet; Catch basin/pipe at outlet Within floodplain Recommendation: Extend existing	X		X	X
#14 – 4 CCWC	Proposed crossing of Alt 4 for Canyon Canal Recommendation: Proposed new structure				X
#15 – 4 DD2	Proposed crossing of Alt 4 for unnamed drainage Recommendation: Proposed new structure				X
#16 – 4 CCWC / MMDC	66" CMP for Canyon Canal Crossing of Hawthorne Avenue Concrete encasement & riprap armoring at inlet & outlet Recommendation: Remove and replace				X
#17 – 4 CCWC / MMDC	8.5' concrete box culvert for Canyon Canal crossing of S Paradise Avenue No wingwalls at inlet or outlet Recommendation: Remove and replace				X
#18 – 1/4 CCWD	10' wide concrete box culvert for Canyon Canal crossing under SH-44 Concrete wingwalls at inlet & outlet Recommendation: Extend existing	X			X
#19 – 2/3 CCWD	36" CMP for Watkins Ditch crossing of Middleton Road Irrigation boxes on inlet Recommendation: Extend existing		X	X	

Irrigation Crossing ID & Owner/Operator	Existing Conditions and Recommendation	Alt 1	Alt 2	Alt 3	Alt 4
#20 – 1/4 CCWC	Proposed crossing for Watkins Ditch under Middleton Road (no existing crossing) 10' wide ditch on upstream side Recommendation: Proposed new structure	X			X
#21 – ALL CCWC	3' slide gate/flume for Front Ditch crossing of SH-44 Open channel at inlet; flume with gate/weir at outlet Recommendation: Remove and replace	X	X	X	X
#22 – ALL CCWC	24" RCP for unnamed drainage crossing of SH-44 Cobble armoring at inlet; outlet is on private property Recommendation: Extend existing	X	X	X	X
#23 – ALL CCWC	12" RCP for unnamed irrigation supply crossing of SH-44 Headgate at inlet; outlet is on private property Recommendation: Remove and replace	X	X	X	X
#24 – ALL MMDC	24" CMP for unnamed irrigation supply crossing of SH-44 Concrete headwall at inlet; Two headgates for diversion at outlet Recommendation: Extend existing	X	X	X	X
#25 – ALL DD2	48" RCP piped into a manhole then piped through 48" CMP for unnamed drainage crossing of SH-44 Concrete headwall at inlet; open outlet Recommendation: Extend existing	X	X	X	X
<b>Total # of Irrigation Crossings</b>		14	16	14	19

# Hydraulic Assessment

Hydraulic Assessment Reports were prepared by Ardurra to assess the following existing bridges under SH-44 and evaluate the hydraulic risk:

- Willow Creek Bridge
- Mill Slough Bridge
- Canyon Creek Bridge

The assessment evaluations were based on field reconnaissance of the existing structures and review of existing bridge plans, ITD bridge inspection reports, and previous hydraulic studies and FIRM panel(s). The assessments documented the existing bridge hydraulic conditions and potential risks associated with the project.

## **Willow Creek Hydraulic Assessment**

The existing Willow Creek Bridge under SH-44 is located near milepost 3.502 and is a stiff-leg concrete structure that is 50 feet wide out-to-out with a 24-foot clear span between abutments. Willow Creek is a tributary to the Boise River and the drainage area contributing to the flow through the SH-44 structure is approximately 84.7 square miles.

According to the U.S. Fish and Wildlife Service, there are two endangered species, seventeen species of migratory birds, and two eagle species within the area of impact expected by the project. There is also a presence of riverine wetlands around the existing bridge.

Willow Creek appears laterally stable and there is a low potential for channel migration and bank erosion. The stream generally appears vertically stable.

The bridge sits in a FEMA Zone AE 100-year flood plain and the FEMA 100-year peak discharge is listed at 2,963 cfs. The 100-year stream elevation is higher than the existing bridge low chord elevation and, therefore, the structure is assumed to not meet freeboard requirements and requires replacement.

The following are permits and variances that likely would be required with all project alternatives:

- Floodplain Development Permit
- No-Rise Certificate
- Joint Application Permit
- 404 Permit

## **Alternative 1**

Alternative 1 would reconstruct the bridge at its existing condition. The low chord elevation of the existing bridge is below the base flood elevation and therefore, the existing crossing is assumed to have insufficient freeboard. To meet minimum freeboard requirements, the roadway may need to be raised.

Floodplain mapping shows a floodway boundary wider than the existing bridge span, indicating potential for moderate scour risk. If riprap is used to mitigate scour, a variance would be required.

#### Alternative 2

Alternative 2 proposed to reroute SH-44 and would require a new crossing of Willow Creek approximately 0.45 miles downstream from the existing Willow Creek bridge. The proposed structure would need to have a minimum freeboard of 2 feet for the 50-year design flood and the 100-year flow is required to pass without touching the low chord.

Alternative 2 is a new alignment with a new structure and the risk of offsite impacts is high.

FIRM mapping shows the floodplain and floodway width at the proposed crossing are approximately 1,580 feet and 271 feet wide, respectively. Scour risk will be moderate if the floodplain width is wider than the proposed structure span but may be lowered by increasing the hydraulic opening.

#### Alternative 3

Alternative 3 proposes to reroute SH-44 and would require a new crossing of Willow Creek approximately 0.25 miles downstream from the existing Willow Creek bridge. The proposed structure would need to have a minimum freeboard of 2 feet for the 50-year design flood and the 100-year flow is required to pass without touching the low chord.

Alternative 3 is a new alignment with a new structure and the risk of offsite impacts is high.

FIRM mapping shows the floodplain and floodway width at the proposed crossing are approximately 220 feet and 200 feet wide, respectively. Scour risk will be moderate if the floodplain width is wider than the proposed structure span but may be lowered by increasing the hydraulic opening.

#### Alternative 4

Alternative 4 proposes to add a one-way couplet through Middleton and to widen SH-44 along the existing alignment. This results in impacts to two bridges over Willow Creek: one at the existing SH-44 crossing structure and the second at S Cemetery Road Bridge which is approximately 0.25 miles downstream of the SH-44 crossing.

The low chord elevation of the existing SH-44 bridge is below the base flood elevation and therefore, the existing crossing is assumed to have insufficient freeboard. To meet minimum freeboard requirements, the roadway may need to be raised.

The existing S Cemetery Road Bridge is a stiff-leg concrete structure that is 55.5 feet long out-to-out in the direction of flow with a 118 feet clear span between abutments. The base flood elevation of this bridge is below the low chord elevation. Therefore, the existing crossing is assumed to have sufficient freeboard.

Both the SH-44 and S Cemetery Road crossings of Willow Creek are not expected to deviate from the current alignments and will just replace existing structures. Therefore, the risk of offsite impacts is low for both structures.

FIRM mapping shows the floodplain and floodway widths at the existing SH-44 crossing are approximately 963 feet and 256 feet wide, respectively. Scour risk at this crossing will be low to moderate if the design hydraulic opening matches the existing structure but may be lowered by increasing the hydraulic opening.

FIRM mapping shows the floodplain and floodway widths at the existing S Cemetery Road crossing are approximately 220 feet and 200 feet wide, respectively. Scour risk at this crossing will be low to moderate if the design hydraulic opening matches that of the existing structure but may be lowered by increasing the hydraulic opening.

### **Canyon Creek Hydraulic Assessment**

The existing Canyon Creek Bridge under SH-44 is located near milepost 5.74 and is a stiff-leg concrete structure that is 57 feet long out-to-out with a 24-foot clear span between abutments. Canyon Creek is a tributary to the Mill Sough, which ultimately flows into the Boise River. The drainage area contributing to the flow through the SH-44 Canyon Creek structure is approximately 0.29 square miles.

According to the U.S. Fish and Wildlife Service, there are one potentially endangered species, one species listed as threatened, sixteen species of migratory birds, and one eagle species within the area of impact expected by the project. There is also a presence of riverine wetlands around the existing bridge.

The bridge sits in FEMA Zone X, which is an area of minimal flood hazard. However, the downstream face of the existing bridge is approximately 37 feet upstream of the edge of a Zone AE 100-year floodplain which will likely be impacted by construction.

Canyon Creek appears laterally stable and there is a low potential for channel migration and bank erosion. The stream generally appears vertically stable.

Although the existing structure is in good condition, it was constructed in 1956 and is recommended to be replaced due to its age.

The following are permits and variances that likely would be required with all alternatives:

- Floodplain Development Permit
- Joint Application Permit
- 404 Permit
- Canyon County Water Company License Agreement

### **Alternatives 1 & 4**

Alternatives 1 & 4 would reconstruct the existing SH-44 bridge crossing of Canyon Creek at its current location. They would also construct a new bridge crossing of Canyon Creek approximately

600 feet south of the SH-44 bridge to provide connection between Murphy Street to the north and Middleton Road to the south.

For the proposed replacement structure at SH-44, although there are no reports of previous events overtopping the roadway, the risk of overtopping is unknown because of uncertainty of flood flows. The new structure south of Murphy Street would need to have a minimum freeboard of 2 feet for the 50-year design flood and the 100-year flow is required to pass without touching the low chord.

The SH-44 crossing will replace an existing structure and offsite impacts are low. The proposed crossing south of Murphy Street will be a new alignment and the risk is high for offsite flood impacts.

Floodplain widths were not available for Canyon Creek and scour risk cannot be determined. However, contraction scour and abutment scour risk will be similar to the existing conditions at the SH-44 crossing if the proposed bridge spans match that of the existing bridge.

### Alternatives 2 & 3

Alternatives 2 and 3 propose to reroute SH-44 and both would require two new structure crossings of Canyon Creek in addition to replacement of the existing SH-44 Canyon Creek Bridge at the current location. The first new structure would be located approximately 700 feet south of the existing SH-44 crossing and the second would be located approximately 900 feet to the southeast.

For the proposed replacement structure at SH-44, although there are no reports of previous events overtopping the roadway, the risk of overtopping is unknown because of uncertainty of flood flows. The two new structures south of SH-44 would need to have a minimum freeboard of 2 feet for the 50-year design flood and the 100-year flow is required to pass without touching the low chord.

Alternatives 2 and 3 are new alignments with two new structures each and risks of offsite impacts are high.

Floodplain widths were not available for Canyon Creek and scour risk cannot be determined. However, contraction scour and abutment scour risk will be similar to the existing conditions at the SH-44 crossing if the proposed bridge spans match that of the existing bridge.

### **Mill Slough Hydraulic Assessment**

The existing SH-44 Mill Slough culvert is located near milepost 4.144 and is a stiff-leg concrete culvert that is 70.2 feet long out-to-out with a 17.1-foot clear span between abutments. Mill Slough is a natural waterway and a tributary to the Boise River. The drainage area contributing to the flow through Mill Slough is approximately 62.7 square miles.

According to the U.S. Fish and Wildlife Service, there is one species that is candidate for listing, sixteen species of migratory birds, and one eagle species within the area of impact expected by the project. There is also a presence of riverine wetlands around the existing bridge.

The existing structure is within a FEMA Zone AE 100-year flood plain and the FEMA 100-year peak discharge is listed at 804 cfs. The 100-year stream elevation is higher than the existing structure low chord elevation and, therefore, the structure is assumed to not meet freeboard requirements. Although the structure is in good condition, it does not provide sufficient vertical clearance to meet minimum freeboard requirements and is therefore recommended to be replaced.

Mill Slough appears laterally stable and there is a low potential for channel migration and bank erosion. Vertical stability was estimated using previous bridge inspection reports, and it appears that that aggradation is present. The inspection reports also note that abutment scour is present.

The following are permits and variances that likely would be required with all alternatives:

- Floodplain Development Permit
- No-Rise Certificate
- Joint Application Permit
- 404 Permit

#### Alternative 1

Alternative 1 would reconstruct the existing Mill Slough crossing at its current location. The low chord elevation of the existing structure is below the base flood elevation and therefore, the existing crossing is assumed to have insufficient freeboard. To meet minimum freeboard requirements, the roadway may need to be raised, or a variance would be required.

Floodplain mapping shows a floodway boundary wider than the existing bridge span, indicating potential for moderate scour risk. If riprap is used to mitigate scour, a variance would be required.

#### Alternatives 2 & 3

Alternatives 2 and 3 propose to reroute SH-44 and would require a new crossing of Mill Slough approximately 0.55 miles downstream from the existing Mill Slough culvert. The proposed structure would need to have a minimum freeboard of 2 feet for the 50-year design flood and the 100-year flow is required to pass without touching the low chord.

Alternatives 2 and 3 are new alignments that require new crossing structures and the risk of offsite impacts is high.

FIRM mapping shows the floodplain and floodway width at the proposed crossing are approximately 200 feet and 72 feet wide, respectively. Scour risk will be moderate if the floodplain width is wider than the proposed structure span but may be lowered by increasing the hydraulic opening.

#### Alternative 4

Alternative 4 proposes to add a one-way couplet through Middleton and to widen SH-44 along the existing alignment. This alignment crosses Mill Slough in three locations: at the existing SH-44 culvert structure, at the existing Boise Street bridge structure, and at the existing S Cemetery Road culvert structure. The Boise Street Bridge crossing of Mill Slough is a single span concrete bridge

that is 40 feet long out-to-out in the direction of flow with a 24-foot span between the abutments. The S Cemetery Road structure is a double barrel concrete box culvert, with each culvert being 16-foot by 7-foot and 76 feet long.

The low chord elevation of all three of the existing Mill Slough crossing structures is below the base flood elevation and therefore, the existing crossings are assumed to have insufficient freeboard. To meet minimum freeboard requirements, the roadway may need to be raised.

All three of the Mill Slough crossings are not expected to deviate from the current alignments and will just replace existing structures. Therefore, the risk of offsite impacts is low for all structures.

FIRM mapping shows the floodplain and floodway widths at the existing SH-44 crossing are approximately 254 feet and 60 feet wide, respectively. Widths at the Boise Street crossing are approximately 45 feet wide, and at the S Cemetery Road crossing, they are approximately 260 feet and 70 feet wide, respectively. Scour risk at these crossings will be moderate to high due to the predicted contraction of flow during the 100-year event.

## Geological Assessment

A Geological Assessment Report has been prepared by GeoEngineers which includes two separate assessment memorandums. The first is the Geological Existing Conditions Technical Memorandum which provides general information on existing subsurface conditions. The second assessment report is the Geologic Alternatives Review Technical Memorandum which specifically addresses the four SH-44 route alternatives with regard to geologic conditions. Onsite geological exploration was not performed as part of this PEL phase. Evaluation and preparation of the geological memorandums was instead based on publicly available data, professional experience, and review of the following previously prepared documents pertaining to subsurface conditions specific to the project area and alignment:

- R. Lewis, et al., *Geologic Map of Idaho (M-9)*, Idaho Geologic Survey, 2012.
- K Othberg and L Stanford, *Geologic Map of the Boise Valley and Adjoining Area, Western Snake River Plain, Idaho*, Idaho Geologic Survey, 1992.
- Terracon, *Phase I(G) Geologic Reconnaissance Report, SH-44 Corridor Preservation Study*, Key No. 07827, March 19, 2008.
- Terracon, *Addendum to Phase I(G) Geologic Report, SH-44 Corridor Preservation*, Key No. 07827, January 28, 2020.

Onsite testing was not conducted as part of the PEL phase Geological Assessment, however geotechnical borings, test pits, and laboratory testing were completed as part of the Phase 1(G) Geological Reconnaissance Report prepared for the SH-44 Corridor Preservation project (Key No. 07827).

## Existing Geologic Conditions and Challenges

The existing conditions and potential challenges described below are generally applicable to each of the four identified alternatives unless specifically stated otherwise.

### Anticipated Soil Conditions

Based on the previously drilled boring and test pit logs and the referenced geologic maps, the soils along the various alternatives are expected to consist of a relatively thin veneer of silt, clay, and/or silty to clayey sand overlying gravel and sand deposits. However, some of the previous borings encountered zones of very soft/very loose soils within the native silt, clay, and sand layers. These soils may pose the following challenges during design and construction:

- 1) Soft/loose soils are susceptible to liquefaction due to seismic shaking. A liquefaction analysis should be completed for each structure of the selected alternative. The design of structures within the project is expected to follow Seismic Site Class D for the majority of each alternative's alignment, but Class E is expected when layers of soft/loose soil is present.
- 2) Embankment settlement is expected to require more time to complete in areas with soft/loose soils.
- 3) Deep foundations might be required for alternate structures that would have soft/loose soils below the elevation of spread foundations.

### Anticipated Groundwater Conditions

Groundwater observations within the previously drilled borings and test pits indicate relatively high groundwater at depths of 4 to 10 feet below existing ground surface. At the west end of the project, groundwater may be deeper where SH-44 rises in elevation. But in the vicinity of the City of Middleton, the depth to groundwater ranged from 4 to 8 feet. Groundwater levels will also be influenced at alignment locations that are near the Boise River and irrigation facilities.

### Anticipated Infiltration Conditions

The following infiltration rates were obtained from the Ada County Highway District (ACHD) Policy Manual, Section 8000, 2017:

Soil Type	Preliminary Field Infiltration Rate (in/hr)
Silt to Sandy Silt	1
Silty Sand	2
Sand to Sand with Silt	8
Gravel with Sand to Gravel with Silt and Sand	10

These estimated infiltration rates represent field test results, and a minimum factor of safety of two should be used when considering design rates.

### Anticipated Surface Water Conditions

In general, the existing vertical alignment of SH-44 within most of the project limits is elevated above the Boise River and would not be affected by flooding. However, some areas along the alignment are within flood hazard areas, including two areas near Middleton that are mapped as

“Regulatory Floodways”. Potential flood elevations should be considered when designing the selected route alternative, including providing elevated embankments and accommodating design flood events when sizing culverts and bridges.

A pond was excavated within the last two years within private property within the alignment of Alternative 2.

#### Anticipated Uncompacted Fill Conditions

Uncontrolled fill was placed by a landowner east of Rhodenbaugh Lane on the south of Canyon Canal, within the alignment of Alternative 2. The existing uncompacted fill materials will need to be investigated for potential settlement and remediation recommendations if this alternative is selected.

#### **Tentative Ballast Section**

The referenced Addendum to the Phase I(G) Report included a life-cycle-cost analysis and recommended flexible pavement section for the SH-44 improvements. Using this information, ITD provided ESAL projections, and R-Values from the prior Geological Reconnaissance Report, GeoEngineer’s used the ITD R-value method to develop the preliminary pavement section:

<b>MATERIAL</b>	<b>THICKNESS (FEET)</b>
Asphalt Cement Concrete (1/2-inch, SP-3)	0.44
Untreated Aggregate for Base (3/4-inch, Type B)	0.70
Granular Subbase	0.70
<b>Total</b>	<b>1.84</b>

As part of the design-level services for this project, additional sampling, testing, and observation should be performed to refine R-values and traffic volumes to develop the final design pavement section.

## Structures Assessment

A Structures Assessment Report has been prepared by David Evans and Associates, Inc. which evaluates the structural condition of the existing bridges along the SH-44 project and provides concepts for proposed bridges, including new bridges that are required for alternate roadway alignments and new pedestrian routes.

#### **Existing Bridges**

##### SH-44 over Willow Creek

The existing bridge is a reinforced concrete frame (RCF) structure that was built in 1953. Alternative alignments 1, 2, and 3 cross this bridge. Although the structure is in good condition, it does not provide sufficient vertical clearance to meet minimum freeboard requirements and is therefore recommended to be replaced. The concept-level proposed bridges are as follows:

- Alternative 1: 24.0’ x 90.3’ reinforced concrete frame with an estimated cost of \$980,000

- Alternative 2: 120.0' x 100.3' prestressed girder bridge with an estimated cost of \$4,090,000
- Alternative 3: 120.0' x 100.3' prestressed girder bridge with an estimated cost of \$4,090,000

#### SH-44 over Mill Slough

The existing bridge is a reinforced concrete frame (RCF) structure that was built in 1984. Alternative alignments 1, 2, and 3 cross this bridge. Although the structure is in good condition, it does not provide sufficient vertical clearance to meet minimum freeboard requirements and is therefore recommended to be replaced. The concept-level proposed bridges are as follows:

- Alternative 1: 24.0' x 90.3' reinforced concrete frame with an estimated cost of \$980,000
- Alternative 2: 80.0' x 100.3' prestressed girder bridge with an estimated cost of \$2,890,000
- Alternative 3: 80.0' x 100.3' prestressed girder bridge with an estimated cost of \$2,890,000

#### SH-44 over Canyon Creek

The existing bridge is a reinforced concrete frame (RCF) structure that was built in 1956. Alternative alignments 1, 2, 3, and 4 cross this bridge. Although the structure is in good condition, it is recommended to be replaced due to its age. The concept-level proposed bridges are as follows:

- Alternative 1: 64.0' x 101.2' prestressed girder bridge with an estimated cost of \$2,430,000
- Alternative 2: 64.0' x 101.2' prestressed girder bridge with an estimated cost of \$2,430,000
- Alternative 3: 64.0' x 101.2' prestressed girder bridge with an estimated cost of \$2,430,000
- Alternative 4: 64.0' x 101.2' prestressed girder bridge with an estimated cost of \$2,430,000

#### Boise Street over Mill Slough

The existing bridge is a prestressed tee-beam bridge with cast-in-place deck that was built in 1981. Only alternative 4 crosses this bridge. The structure is in fair condition. It was designed for H-15 truck loading and has an inventory rating of HS10.6, which does not meet today's standards. Therefore, the bridge is recommended to be replaced. The concept-level proposed bridge is as follows:

- Alternative 4: 30.0' x 56.0' prestressed voided slab bridge with an estimated cost of \$1,310,000.

### **New Bridges**

#### West River Walk Trail Pedestrian Bridge

Alternative alignments 2 and 3 may incorporate a western pedestrian crossing of SH-44 to connect the planned River Walk Trail. The proposed structures for the crossing are as follows:

- Alternative 2: 160.0' x 16.0' prefabricated steel truss bridge with an estimated cost of \$920,000
- Alternative 3: 160.0' x 16.0' prefabricated steel truss bridge with an estimated cost of \$920,000

#### East River Walk Trail Pedestrian Bridge

Alternative alignments 2 and 3 will require an eastern pedestrian crossing of SH-44 to connect the planned River Walk Trail. The proposed structures for the crossing are as follows:

- Alternative 2: 160.0' x 16.0' prefabricated steel truss bridge with an estimated cost of \$920,000
- Alternative 3: 160.0' x 16.0' prefabricated steel truss bridge with an estimated cost of \$920,000

#### South Crane Creek Way Pedestrian Bridge

Alternative alignments 2 and 3 will require a pedestrian crossing of SH-44 at S Crane Creek Way. The proposed structures for the crossing are as follows:

- Alternative 2: 160.0' x 16.0' prefabricated steel truss bridge with an estimated cost of \$920,000
- Alternative 3: 160.0' x 16.0' prefabricated steel truss bridge with an estimated cost of \$920,000

#### Middleton Middle School Pedestrian Bridge

Alternative alignment 4 will require a pedestrian bridge crossing near Middleton Middle School. The proposed structure for the crossing is as follows:

- 120.0' x 16.0' single span prefabricated steel truss bridge with an estimated cost of \$670,000

#### Main Street over Willow Creek

Alternative alignment 4 will require a roadway crossing for Main Street over Willow Creek. The proposed structure is as follows:

- 50.0' x 56.0' prestressed voided slab bridge with an estimated cost of \$1,850,000

