# Wonderland Creek Greenways Improvement Project Foothills Parkway to Diagonal Highway

# Community and Environmental Assessment Process Report

September 2010

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## EXECUTIVE SUMMARY

The proposed Wonderland Creek Greenways Improvement Project from Foothills Parkway to the Diagonal Highway would provide flood mitigation improvements and a multi-use path connection. The project is presented in two phases. The first phase extends from Foothills Parkway to the intersection of Iris Avenue and 34th Street. The second phase extends from the intersection of Iris Avenue and 34th Street to the Diagonal Highway. In each phase of the project, two flood alternatives and three path alignment alternatives were evaluated. In addition, in Phase I of the project, three railroad crossing alternatives were considered and in Phase II, three alternatives for crossing Iris Avenue were reviewed.

A multi-use path system exists along Wonderland Creek from 30th Street and the Diagonal Highway northwest to 26th Street and from Foothills Parkway southeast to Goose Creek, connecting to Valmont City Park and the Boulder Creek Path. There is a multi-use path running north-south along Foothills Parkway on both the east and west sides. The path on the west side was constructed in 2006 to connect two UCAR facilities which are on either side of Foothills Parkway. This path parallels the Burlington Northern Railroad and terminates at Center Green Drive, but is slated to be extended south to Goose Creek (with an at-grade connection at Valmont Road) this fall. There is currently no path connection between Foothills Highway and the Diagonal Highway. Local residents and users of the path system frequently use an informal route located within the railroad right-of-way. Use of this informal route has resulted in near fatal injuries caused by train traffic. A proposed multi-use path connection is shown for this area in both the Greenways and Transportation Master Plans.

The Community and Environmental Assessment Process (CEAP) is a formal review process to consider the impacts of public development projects. The purpose of the CEAP is to assess potential impacts of conceptual project alternatives in order to inform the selection and refinement of a preferred alternative. The CEAP provides the opportunity to balance multiple community goals in the design of a capital project by assessing a project against the policies outlined in the Boulder Valley Comprehensive Plan and department master plans.

Three alternatives were evaluated for crossing of the railroad including an at-grade crossing ($624,000), an underpass option ($66,000 – bridge cost included in flood mitigation alternative) and an above-grade crossing ($1,858,000). Three trail alignment alternatives were presented for both phases - southern routes ($533,000 total both phases), northern routes ($501,000 total both phases) and an alignment along Wonderland Creek ($1,134,000 total both phases). Three options were evaluated for a trail crossing of Iris Avenue including two at-grade crossings – one at Bridger Trail ($166,000) and one at 34th Street ($168,000) and one underpass option ($63,000 – cost for culvert included in flood mitigation alternative). In addition to the three alignment alternatives, a short connector trail between Hayden Place and Spring Creek Place is recommended ($28,000).

Wonderland Creek between the Diagonal Highway and Foothills Parkway is currently undersized to convey the estimated flow resulting from the 100-year event. The floodplain extends well beyond the creek banks and includes numerous structures. A set of box culverts located under Foothills Parkway was designed to convey Wonderland Creek southeast under the

highway. The creek, however, currently discharges directly to the Boulder and Whiterock Ditch just west of Foothills Parkway. This configuration has caused the ditch to overtop east of Foothills Parkway, resulting in flooding in the Kings Ridge Subdivision.

Two flood mitigation alternatives were evaluated to separate Wonderland Creek from the Boulder and Whiterock Irrigation Ditch and connect the creek to the existing box culverts under Foothills Parkway. One alternative would separate the creek from the ditch and convey all flow to the existing box culverts under Foothills Parkway via a single new railroad bridge ($1,566,000). The second alternative would separate the creek from the ditch but convey flow to the existing Foothills box culverts in two paths ($1,541,000). Low flows would be conveyed using the existing railroad bridge and high flows using a new railroad bridge that would be slightly smaller than the one proposed in the first alternative.

Two flood mitigation alternatives were evaluated for conveyance of Wonderland Creek under Iris Avenue (currently no formal conveyance exists and the creek ends just upstream of Iris Avenue). One alternative would convey Wonderland Creek under Iris in one large set of culverts followed downstream by a segment of concrete channel ($1,705,000 for 100-year conveyance). The second alternative would convey flow in two parallel culverts, one designed to convey smaller flows to an existing open channel segment and a larger one to bypass high flows to Wonderland Creek downstream of 34th Street ($1,434,000 for 100-year conveyance). High Hazard containment and 100-year containment were considered for both sets of flood mitigation alternatives.

The following presents staff recommendations based on the draft CEAP review. The split flow alternative ($1,541,000) is recommended for flood mitigation near Foothills Parkway because it is slightly less expensive than the single flow, larger bridge alternative. The underpass option ($66,000 – bridge cost included in flood mitigation alternative) is recommended for the trail crossing of the railroad because it would take advantage of the flood mitigation bridge and the public prefers this route, and a grade separated crossing.

The alignment along Wonderland Creek ($638,000) is recommended for extension of the trail from Foothills Parkway to the intersection of 34th Street and Iris Avenue. This alignment is recommended because it is preferred by the public, it is the most direct, it would provide the best user experience, would have the least conflict with vehicles and would provide access for flood maintenance of the creek as required by the city and the Urban Drainage and Flood Control District. This alignment is, however, considerably more expensive and would have more environmental impacts than the other alignment alternatives. The trail would be located on previously disturbed areas (mowed grass) and staff believes the environmental impacts can be fully mitigated onsite and habitat enhanced.

An at-grade crossing of Iris Avenue at Bridge Trail ($166,000) is recommended as it is the least expensive crossing alternative and would have slightly less vehicle conflicts than the 34th Street at-grade crossing alternative and the public was not opposed to an at-grade crossing of Iris Avenue. The storm water bypass alternative ($1,434,000) is recommended for conveying Wonderland Creek under Iris Avenue. This alternative is recommended because it is less expensive than the single large culvert with concrete channel, would not disturb the vegetated

open channel segment located along Iris Avenue between 34th Street and Bridger Trail and would not require relocation of a sanitary sewer line.

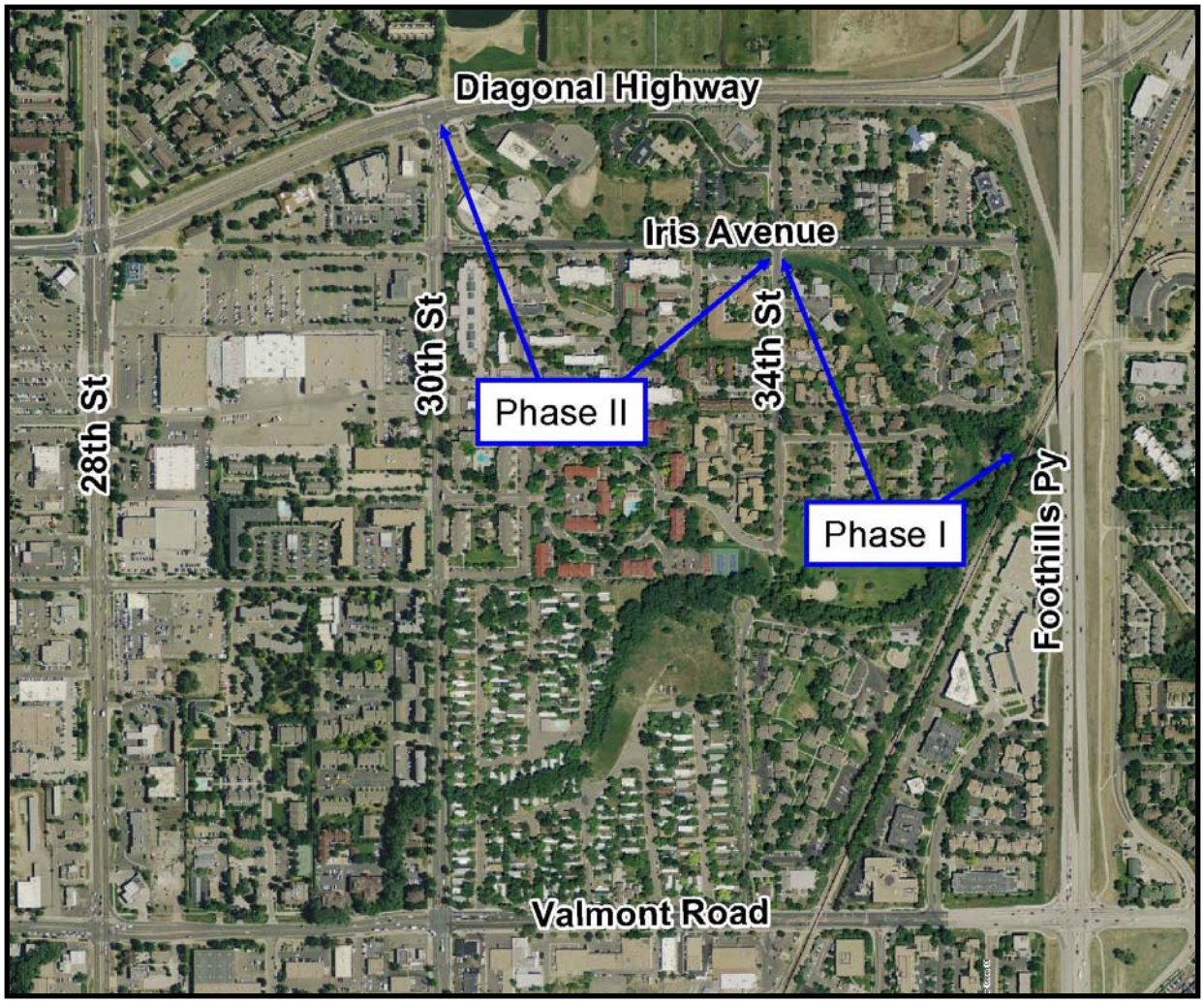
The Iris Avenue alignment ($182,000) is recommended for extension of the trail from Bridger Trail to the existing path located along 30th Street. This alignment is recommended because it is the least expensive alternative, will have little to no environmental impacts and the city has all of the rights-of-way required to construct this trail segment.

During the Fourmile/Wonderland Creek Final Plan review, Council stipulated that for this reach of Wonderland Creek, 100-year flood mitigation could only be recommended if substantial outside funding is secured. Staff recommends designing flood mitigation for 100-year conveyance capacity as the estimated cost difference is only $36,000 greater than providing only High Hazard Zone containment. The Urban Drainage and Flood Control District funding will more than provide for the cost difference between High Hazard containment and 100-year conveyance. Total estimated concept-level cost for project recommendations is $4,055,000 ($2,273,000 for Phase I and $1,782,000 for Phase II).

## 1.0 DESCRIPTION AND LOCATION OF THE PROJECT

The Wonderland Creek Greenways Improvement Project involves the construction of a multi-use path and flood mitigation improvements along Wonderland Creek from Foothills Parkway to the Diagonal Highway. The Community and Environmental Assessment Process (CEAP) is a formal review process to consider the impacts of public development projects. The purpose of the CEAP is to assess potential impacts of conceptual project alternatives in order to inform the selection and refinement of a preferred alternative. The CEAP provides the opportunity to balance multiple community goals in the design of a capital project by assessing a project against the policies outlined in the Boulder Valley Comprehensive Plan and department master plans. The flood mitigation and trail alternatives for this project are divided into two phases. Phase I extends from Foothills Parkway to the intersection of 34th Street and Iris Avenue. Phase II extends from the intersection of 34th Street and Iris Avenue to the Diagonal Highway. **Figure 1.0** presents the project location.

**Figure 1.0 Project Location**



## 2.0 BACKGROUND, PURPOSE AND NEED FOR THE PROJECT

Wonderland Creek between the Diagonal Highway and Foothills Parkway is currently undersized to convey the estimated flow resulting from the 100-year event. The existing conditions floodplain extends well beyond the creek banks and includes numerous structures, many being multi-family dwellings. In addition, structures located at 3375 34th Street, 3700 Hayden Place and 3690 Hayden Place are currently located in the High Hazard Zone (defined as the zone where depth and velocity pose a threat to life and safety). The following three critical facilities (structures containing hazardous materials or persons requiring special assistance) are located within the floodplain along this reach of Wonderland Creek:

- AMOCO gas station at 2990 Diagonal Highway (500 year floodplain)
- The Atrium Brookside Senior Living Center at 3350 30th Street (500 year floodplain)
- Wynwood Senior Living Center at 3375 34th Street (100 year floodplain, also located within the High Hazard Zone)

A set of box culverts located under Foothills Parkway were designed to convey Wonderland Creek southeast under the highway. The creek, however, currently discharges directly to the Boulder and Whiterock Ditch just west of Foothills Parkway. This configuration has caused the ditch to overtop east of Foothills Parkway, resulting in flooding in the Kings Ridge Subdivision. **Figure 2.0** presents existing floodplain conditions along Wonderland Creek between Foothills Parkway and the Diagonal Highway.

Flood improvements along Wonderland Creek have been recommended in the City of Boulder Comprehensive Flood and Stormwater Utility Master Plan (October 2004) and the Fourmile Canyon Creek and Wonderland Creek Major Drainageway Planning Phase A Report Alternatives Analysis (May 2007). The public process resulted in several changes to the Phase A Report recommendations. City Council unanimously approved the modified plan in November 2009 with the understanding that funding for flood mitigation improvements for each stream reach will be evaluated as part of the city's CEAP and CIP processes. For this particular reach of Wonderland Creek, the approved recommendation is for High Hazard Containment unless substantial outside funding is available for 100-year Containment improvements.

A multi-use path system exists along Wonderland Creek from 30th Street and the Diagonal Highway north to 26th Street and from Foothills Parkway south to Goose Creek, connecting to Valmont City Park and the Boulder Creek Path. **Figure 3** shows the existing path system. There is currently no path connection between Foothills Highway and the Diagonal Highway. Local residents and users of the bike system frequently use an informal route located within the railroad right-of-way. Use of this informal route has resulted in near fatal injuries caused by train traffic. A proposed multi-use path connection is shown for this area in both the Greenways and Transportation Master Plans.

**Figure 2.0 Existing Floodplain Conditions**

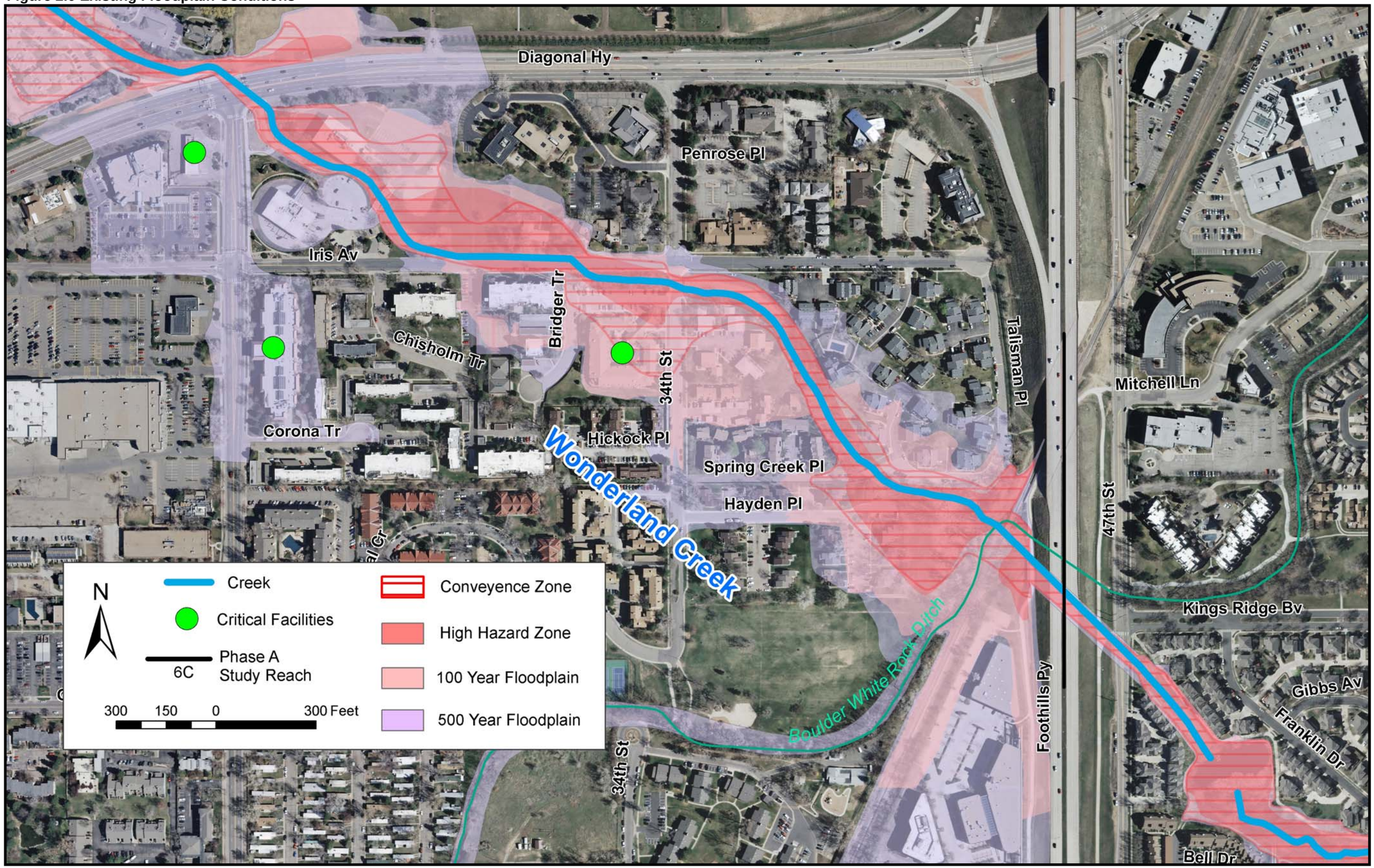
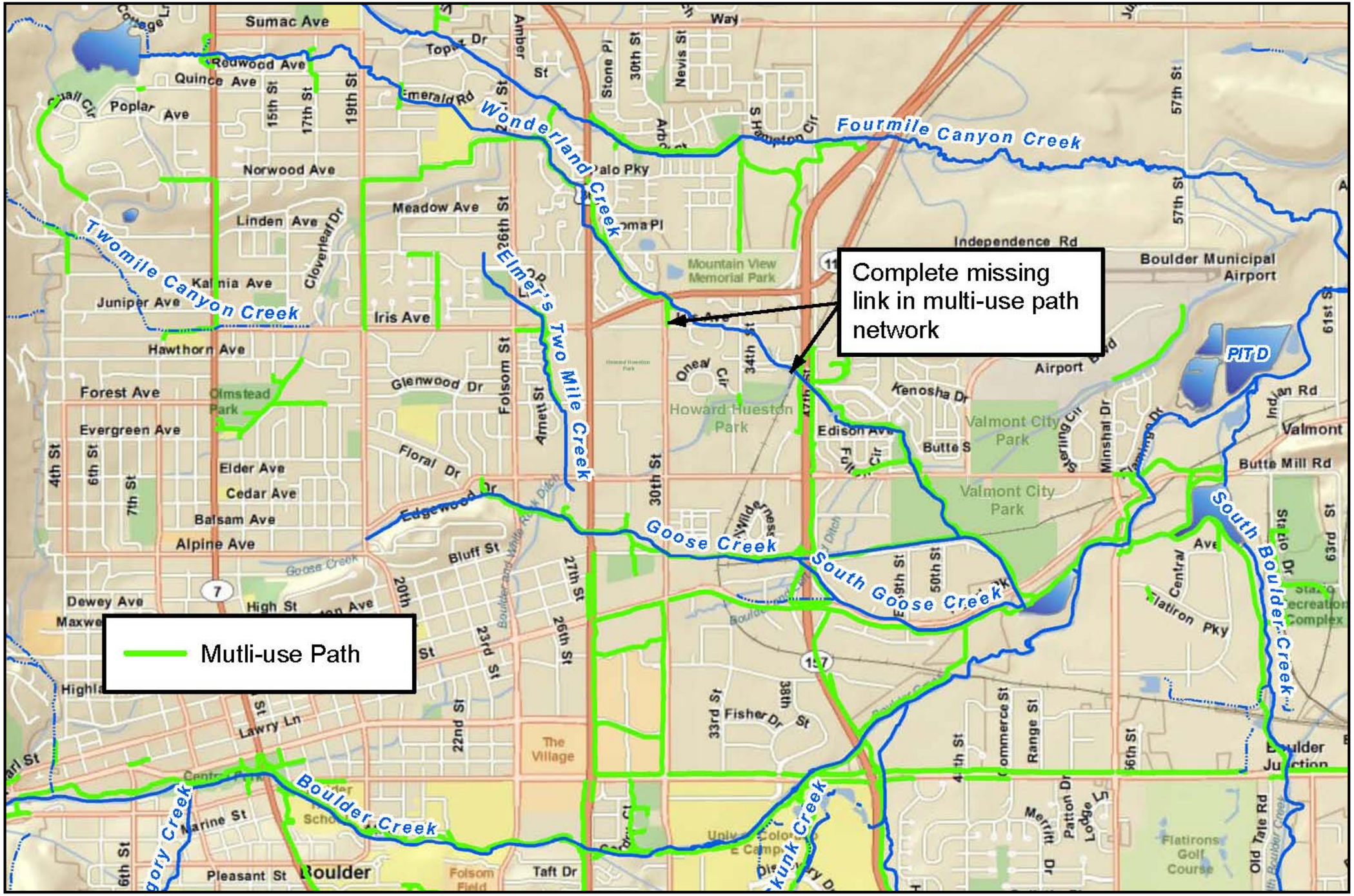


**Figure 3.0 Existing Trail Connectivity**



## 3.0 DESCRIPTION OF PROJECT ALTERNATIVES AND SUMMARY OF MAJOR ISSUES

Project alternatives include flood mitigation options, trail alignment options and trail crossing options at the Burlington Northern Santa Fe (BNSF) Railroad and at Iris Avenue. Two flood mitigation alternatives were evaluated for each phase of the project. **Figures 4.1 – 4.4** present Phase I flood mitigation alternatives. **Figures 7.1 – 7.4** present Phase II flood mitigation alternatives.

Three trail crossing alternatives of the BNSF Railroad along with three path alignments were evaluated for Phase I of the project. **Figure 5.0** presents Phase I crossing alternatives. **Figure 6.0** presents Phase I alignment alternatives.

Three trail crossings of Iris Avenue, with three trail connections between Iris Avenue and 30th Street were evaluated as part of Phase II of the project. The trail alignments for both phases are independent of the crossing alternatives for each phase with one exception; the Phase II underpass requires the Concrete channel option. **Figure 8.0** presents Phase II crossing alternatives. **Figure 9.0** presents Phase II alignment alternatives.

**Table 3.0** presents a summary of the evaluated alternatives. Recommended alternatives are highlighted in yellow.

**Table 3.0 Project Alternatives**

| Alternatives | Concept-Level Cost Estimate[1] | Description |
|---|---|---|
| ***Phase I: Foothills Parkway to 34th Street*** | | |
| **Flood Mitigation** | | |
| ▪ Option 1: Single Groundwater Barrier Wall | $1,566,000 (HHZ and 100-yr) | Conveys all flow under new 60 ft railroad bridge, includes 140 groundwater barrier wall |
| ▪ Option 2: Split Flow with Groundwater Barrier | $1,541,000 (HHZ and 100-yr) | Splits flow between existing railroad bridge and new 40 ft bridge, includes 100 groundwater barrier wall |
| **Trail Crossings** | | |
| ▪ Option A: At Grade | $624,000 | At grade crossing at 47th Street |
| ▪ Option B: Above Grade | $1,858,000 | Overpass attached to west side of Foothills Parkway bridge |
| ▪ Option C: Below Grade | $66,000[2] | Underpass using proposed railroad bridge |
| **Trail Alignments** | | |
| ▪ Option A: Talisman/Iris | $249,000 | Follows east side of Talisman Court and south side of Iris Avenue |
| ▪ Option B: Wonderland Creek | $638,000 | Follows north side of Wonderland Creek |
| ▪ Option C: Park/34th Street | $351,000 | Follows north side of Howard Heuston Park and east side of 34th Street |
| ***Phase II: 34th Street to Diagonal Highway*** | | |
| **Flood Mitigation** | | |
| ▪ Option 1: Multi-Cell Culvert Under Iris Avenue and Concrete Channel | $1,668,000 (HHZ) $1,705,000 (100-yr) | Multi-cell culverts under Iris replaces the open channel between Bridger Trail and 34th Street |
| ▪ Option 2: Storm Sewer Bypass | $1,398,000 (HHZ) $1,434,000 (100-yr) | Small culvert conveys low flows under Iris Avenue to east side of Bridger Trail, large culvert conveys high flows to Wonderland Creek east of 34th Street |
| **Trail Crossings** | | |
| ▪ Option A: At Grade – 34th Street | $168,000 | Crosses at 34th Street, uses on-street parking along Iris |
| ▪ Option B: At Grade – Bridger Trail | $166,000 | Crosses at Bridger Trail, uses on-street parking along Iris |
| ▪ Option C: Underpass | $63,000[2] | Underpass using proposed drainage box culvert |
| **Trail Alignments** | | |
| ▪ Option A: Iris Avenue | $182,000 | Follows north side of Iris (eliminates on-street parking), connects to existing sidewalk on east side of 30th Street |
| ▪ Option B: Wonderland Creek | $496,000 | Follows north side of Wonderland Creek, connects to existing trail stub-out |
| ▪ Option C: Diagonal Highway | $252,000 | North across properties to south side of Diagonal Highway |

[1] Cost estimate includes construction, ROW ($16/SF), design and administration (15%) and contingency (25% for flood mitigation and 30% for trails)
[2] Cost for underpass/bridge structures are included in flood mitigation alternative

### *Phase I Flood Mitigation Alternatives*

Two alternatives were evaluated for flood mitigation along Wonderland Creek from Foothills Parkway to 34th Street. Option 1, Single Groundwater Barrier Wall, is estimated to cost $1,566,000 to construct. Option 2, Split Flow with Groundwater Barrier Wall, is estimated to cost $1,541,000. Both the Phase I flood mitigation alternatives are sized to convey the 100-year flood flow because the concept level cost is the same to provide 100-year containment as it is for High Hazard Zone containment. The costs are similar because all the proposed improvements are related to upgrades of structures and structures are sized to convey 100-year event flows for both 100-year containment and High Hazard Containment alternatives. **Figure 4.1 – 4.4** presents the Phase I flood mitigation alternatives.

Both alternatives would:

- Separate Wonderland Creek from the Boulder and White Rock (BWR) Irrigation Ditch,
- Replace the existing Spring Creek culverts,
- Require construction of a new railroad bridge and ground water cut-off walls to protect area wetlands,
- Have the same potential for wetland water quality enhancement, and
- Allow for provision of low flows to the BWR irrigation ditch

The single flow option would require a slightly longer bridge (60 feet versus 40 feet) compared to the split flow option and the split flow option would require two groundwater cut-off walls (100 feet and 25 feet) compared to one longer cut-off wall (140 feet) for the single flow option.

Either Phase I flood mitigation alternatives will work with any of the Phase I trail crossing and alignment alternatives. Both flood mitigation alternatives will require a drainage easement from BNSF Railroad and likely some additional drainage easement on Tract C of Meadow Wood Subdivision (**Attachment 3**). **Table 3.1** presents anticipated impacts on major issues related to Phase I flood mitigation alternatives.

**Table 3.1 Phase I Flood Mitigation Alternatives Major Issues**

| Issues | Alternatives | |
|---|---|---|
| | Option 1<br>Single Groundwater Barrier Wall | Option 2<br>Split Flow with Groundwater Barrier |
| | $1,566,000<br>(HHZ and 100-year) | $1,541,000<br>(HHZ and 100-year) |
| Wetlands | - | - |
| Habitat | - | - |
| Water Quality | + | + |
| Aesthetics | O | O |
| Flood Mitigation | + | + |
| Maintenance | O | - |
| Conceptual-Level Cost | O | O |

- Negative Impact (- moderate -- severe)
+ Positive Impact
O No Impact/Neutral

**Figure 4.1 Phase I Flood Mitigation Alternative – Single Groundwater Barrier Wall Plan View**

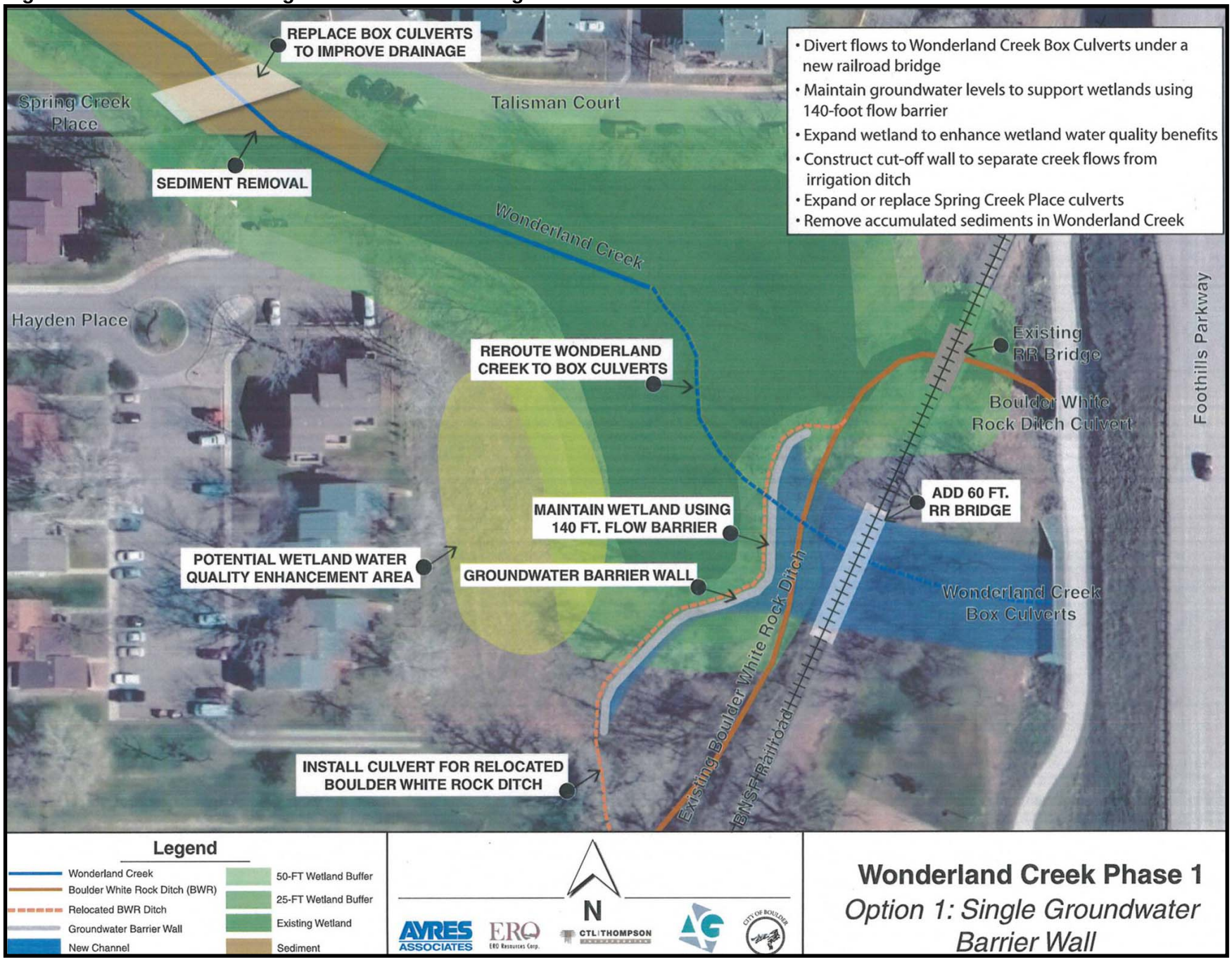


**Figure 4.2 Phase I Flood Mitigation Alternative – Single Groundwater Barrier Wall Cross Section**

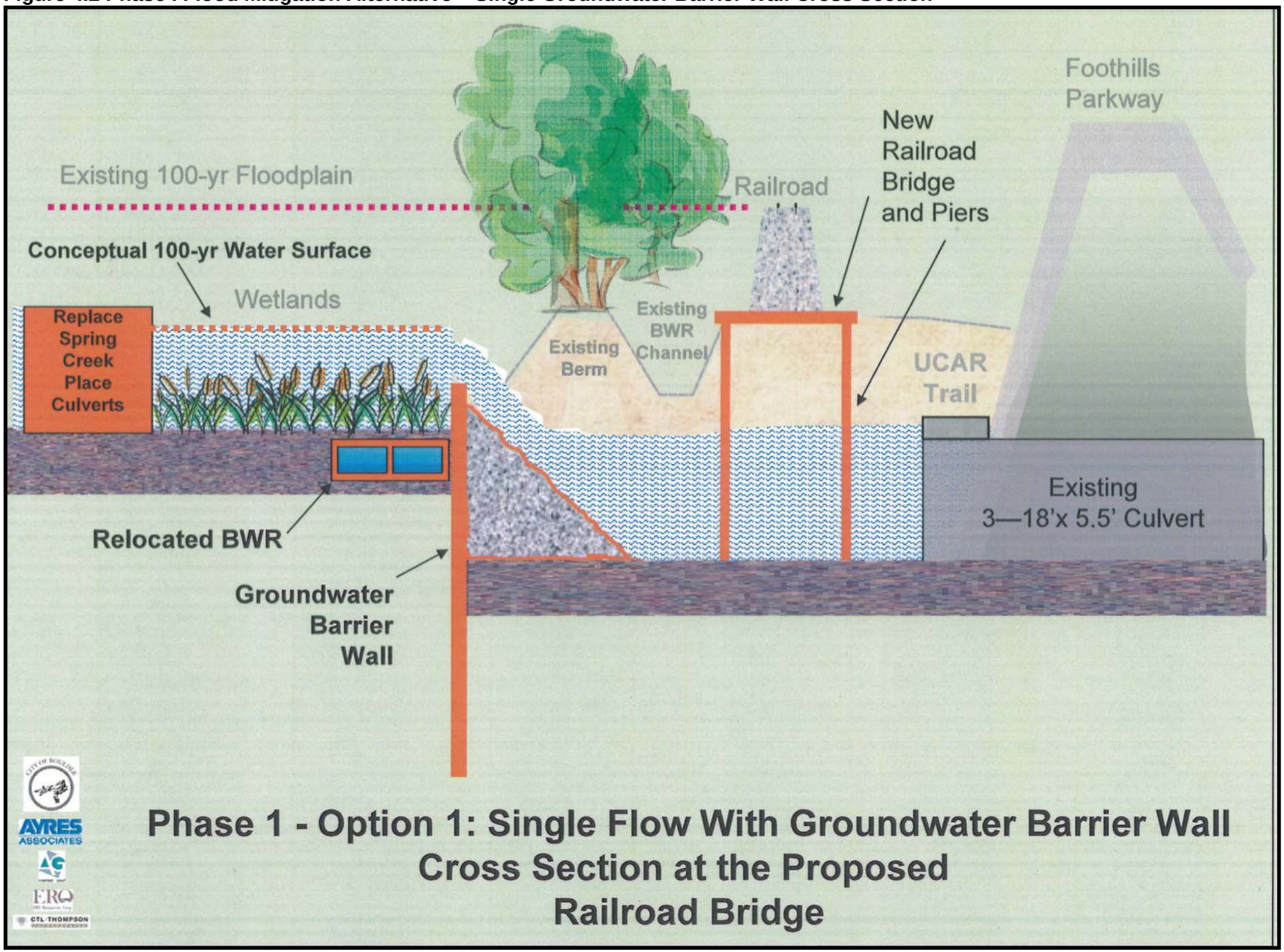


**Figure 4.3 Phase I Flood Mitigation Alternative – Split Flow with Groundwater Barrier Plan View**

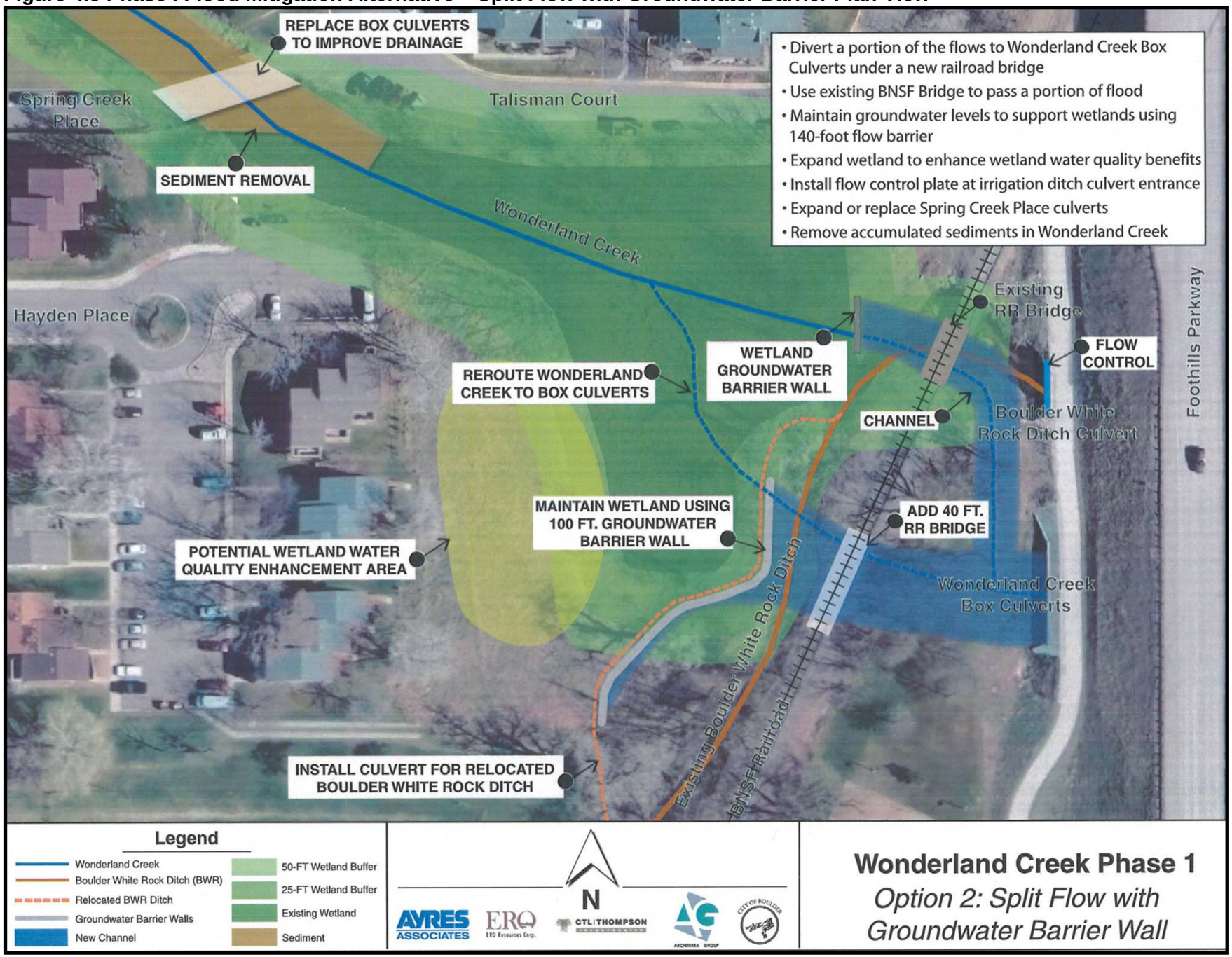
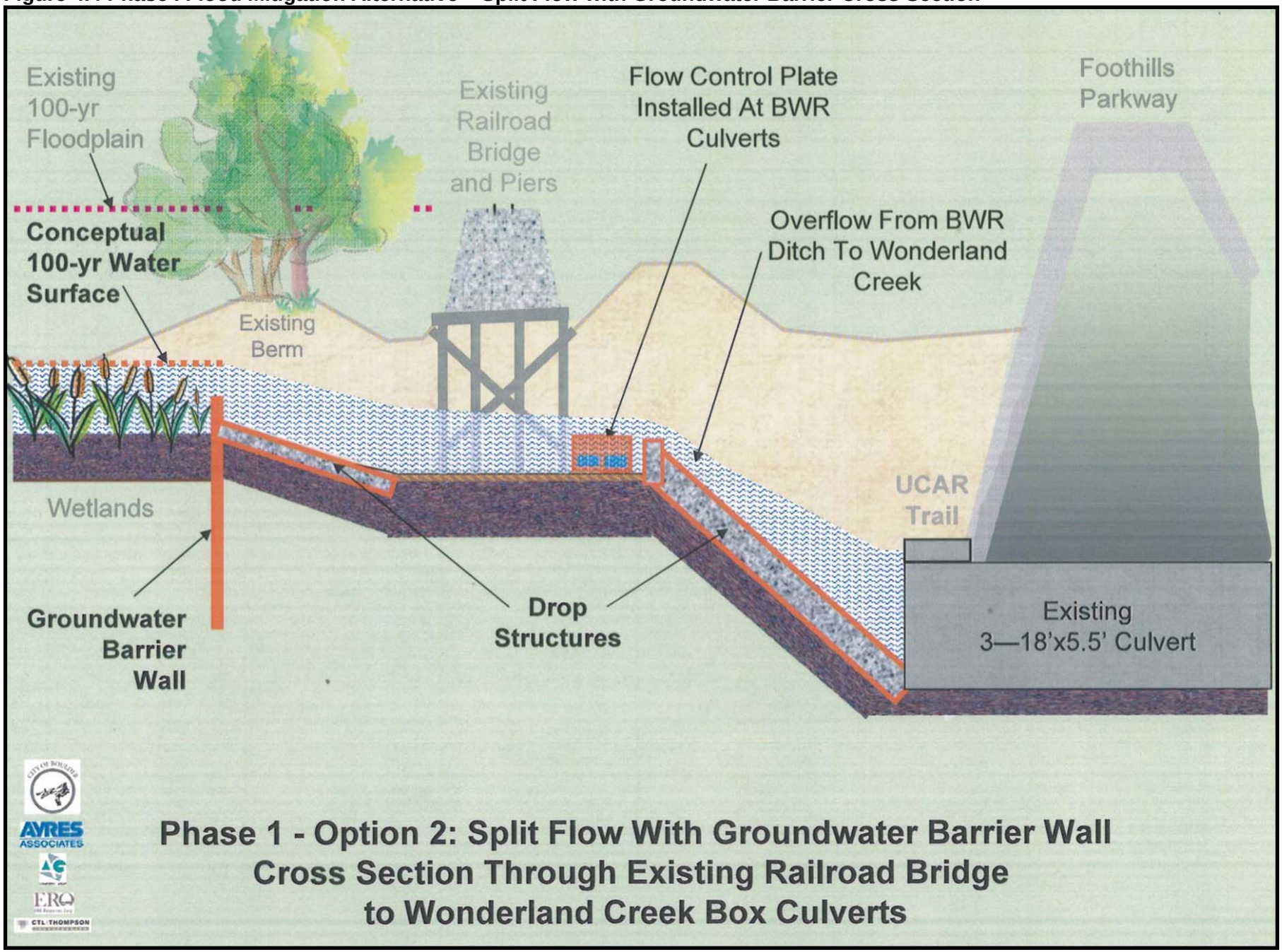


**Figure 4.4 Phase I Flood Mitigation Alternative – Split Flow with Groundwater Barrier Cross Section**



### *Phase I Trail Alternatives*

Three alternatives were evaluated for crossing of the railroad just west of Foothills Parkway. Option A would provide an at-grade crossing of 47th Street and the railroad at an estimated cost of $624,000. This alternative would construct a trail under Foothills Parkway bridge paralleling the railroad tracks on the northwest side, similar to the UCAR trail on the southeast side of the tracks. The at-grade crossing would, however, require an acute crossing angle of the rail line, posing a potential hazard to cyclists. This crossing would also need to be approved by the railroad and the Public Utilities Commission. Option A would require a trail easement from BNSF Railroad and approval for use of CDOT lands for a trail (**Attachment 3**).

Option B would provide an above-grade crossing of the railroad using the Foothills Parkway bridge at an estimated cost of $1,858,000. The above-grade alternative would require long approaches to ramp up and down to the bridge crossing from the UCAR trail and Talisman Court. Option B would require an approval for use of CDOT land for a trail.

Option C would provide a below-grade crossing of the railroad using a proposed railroad bridge at an estimated cost of $66,000 (cost of the railroad bridge is included in the flood mitigation alternatives). Option C would require a trail easement from Tract C of Meadow Wood Subdivision (**Attachment 3**). Similar to many of the bike/pedestrian underpasses constructed along riparian corridors as part of the Greenways program, the underpass would still act to convey flood flows. During major events the underpass would be closed to trail users.

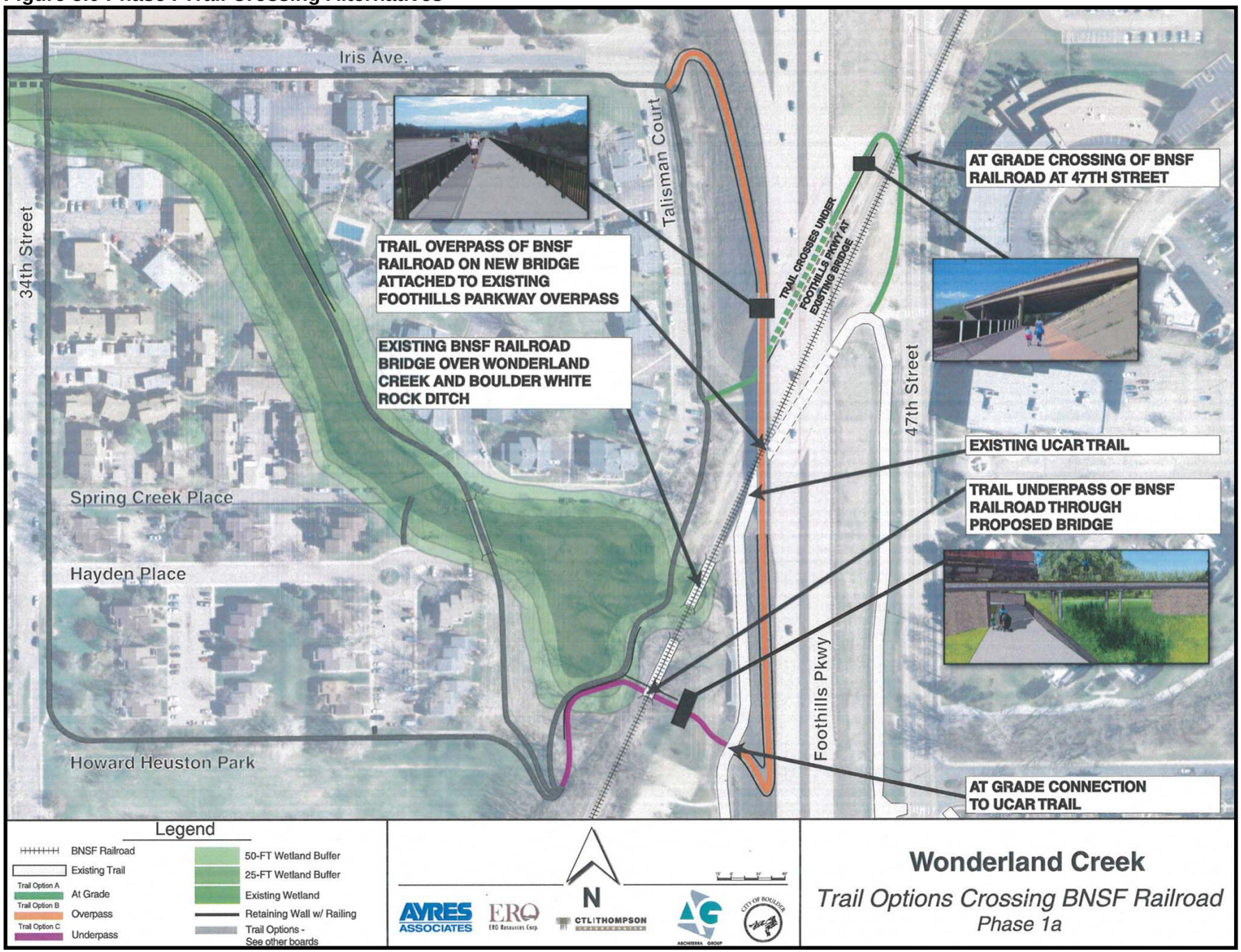
Any of the trail crossings can be constructed in combination with any of the trail alignments and flood mitigation alternatives. The above-grade crossing would, however, require longer trail alignments if used in conjunction with the Wonderland Creek or Howard Heuston Park alignment alternatives. **Figure 5.0** presents Phase I trail crossing options. **Table 3.2** presents anticipated impacts on major issues related to Phase I trail crossing alternatives.

**Table 3.2 Phase I Trail Crossing Alternatives Major Issues**

| | **Alternatives** | | |
|---|---|---|---|
| | Option A At Grade | Option B Above Grade | Option C Below Grade |
| **Issues** | $624,000 | $1,858,000 | $66,000 |
| Wetlands | O | O | -- |
| Habitat | O | O | -- |
| Water Quality | O | O | - |
| Eliminates At-Grade Crossing | -- | + | + |
| Most Direct | -- | - | + |
| Trail Flooding | + | + | - |
| Vehicle Traffic Separation | -- | - | + |
| Flood Maintenance Access | - | - | + |
| Conceptual-Level Cost | - | -- | + |
| User Experience | - | -- | + |

- Negative Impact (- moderate -- severe)
+ Positive Impact
O No Impact/Neutral

**Figure 5.0 Phase I Trail Crossing Alternatives**



Three trail alignment alternatives were evaluated to construct the trail from Foothills Parkway to 34th Street.

Option A is a trail along Talisman Court and Iris Avenue to 34th Street at an estimated cost of $249,000. This trail alignment alternative would need to be extended to the south if used in conjunction with the above-grade or below-grade crossing alternatives. Option A would require a trail easement from BNSF Railroad and Tract C of Meadow Wood Subdivision along with approval for use of CDOT lands for a trail. This option may also require a small trail easement from Boulders at Talisman near the intersection of Iris Avenue and Talisman Court depending on final trail alignment (**Attachment 3**).

Option B is a trail along the north side of Wonderland Creek to 34th Street at an estimated cost of $638,000. This alternative would require construction of a bridge crossing of Wonderland Creek. This alternative would also require construction of a trail segment north along Talisman Court if used in conjunction with the above-grade crossing alternative. Option B would require a trail easement from Tract C of Meadow Wood Subdivision and for the majority of the proposed alignment along Wonderland Creek from Spring Creek Place to 34th Street (**Attachment 3).** The city would also activate an existing sidewalk easement just east of the intersection of 34th Street.

Option C is a trail along the northern edge of Howard Hueston Park and the east side of 34th Street to the intersection of 34th Street and Iris Avenue at an estimated cost of $351,000. This alternative would require construction of a trail segment north along Talisman Court if used in conjunction with the above-grade crossing alternative. All easements exist for Option C.

In addition to the three alignment alternatives, a short connector trail between Hayden Place and Spring Creek Place is recommended. This segment of trail is estimated to cost $28,000 and will require a trail easement from Tract C of Meadow Wood Subdivision (**Attachment 3**). This connector trail is recommended regardless of the selected trail alignment option.

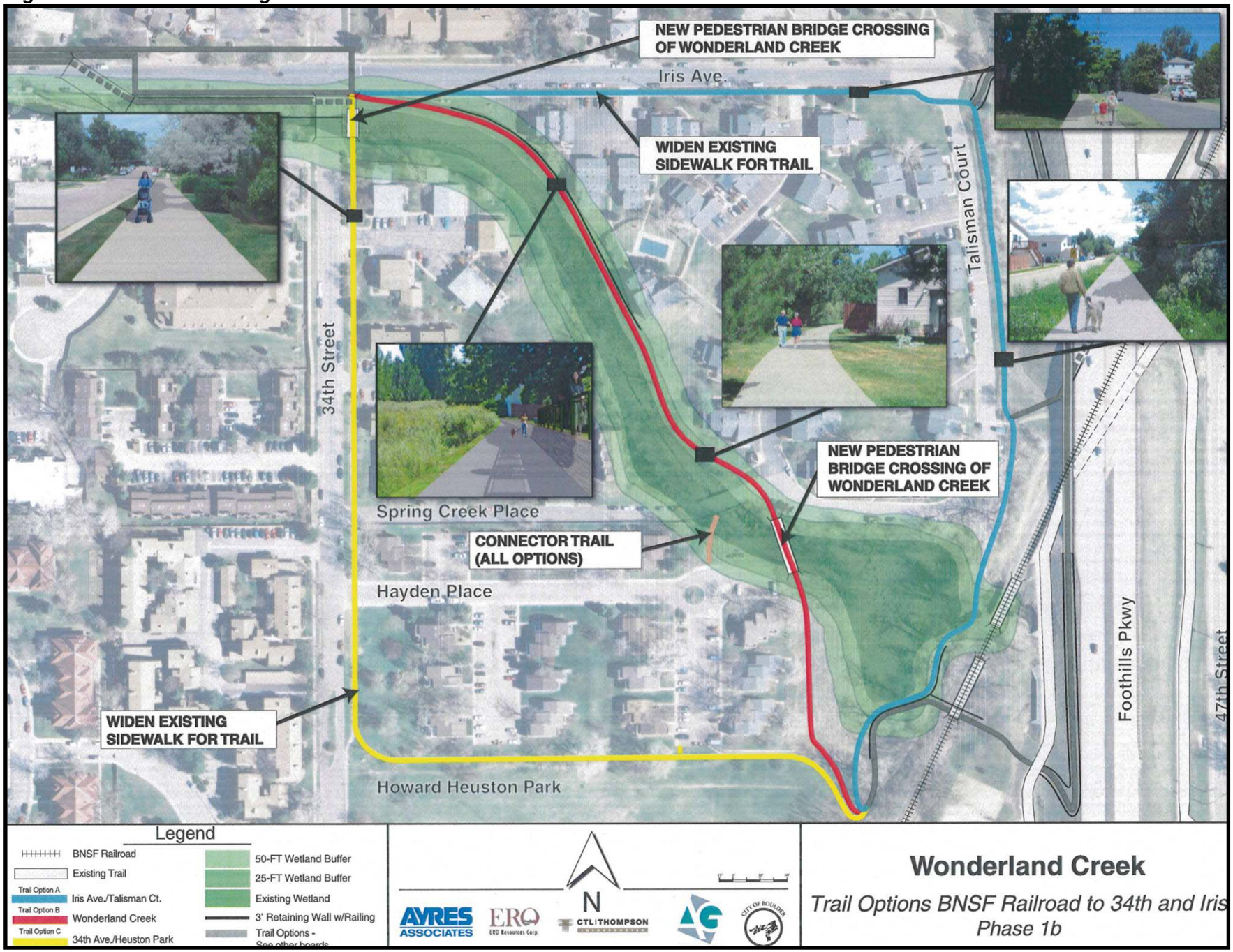
**Table 3.3** presents anticipated impacts on major issues related to Phase I trail alignment alternatives. **Figure 6.0** presents Phase I trail alignments.

**Table 3.3 Phase I Trail Alignment Alternatives Major Issues**

| Issues | Alternatives | | |
|---|---|---|---|
| | Option A Talisman/Iris | Option B Wonderland | Option C Park/34th |
| | $249,000 | $638,000 | $351,000 |
| Wetlands | - | -- | O |
| Habitat | - | -- | O |
| Water Quality | - | -- | O |
| Neighborhood Access | O | + | O |
| Most Direct | O | + | O |
| User Experience | - | + | O |
| Park Connection | O | O | + |
| Trail Flooding | + | - | + |
| Vehicle Traffic Separation | O | + | O |
| Flood Maintenance Access | - | + | - |
| Property Impacts | O | - | O |
| Conceptual-Level Cost | O | - | O |
| At-Grade Crossings | - | + | - |

- Negative Impact (- moderate -- severe)
+ Positive Impact
O No Impact/Neutral

**Figure 6.0 Phase I Trail Alignment Alternatives**



### *Phase II Flood Mitigation Alternatives*

Two alternatives were evaluated for flood mitigation along Wonderland Creek from 34th Street to the existing open channel located on the north side of Iris Avenue. No flood improvements are recommended along the existing channel north of Iris Avenue to the Diagonal Highway/30th Street because only one commercial building is located in the floodplain and the structure is elevated above the floodplain (although the building egresses are located in the floodplain).

Option 1, Multi-Cell Culvert under Iris Avenue and Concrete Channel, would convey 100-year flows under Iris Avenue in a 170 feet-long box culvert to a rectangular hard-lined channel. The box culvert and channel would be 8 feet high by 30 feet wide. The concrete channel would replace the existing open channel. This alternative would require channel work to create a transition into the box culvert at the upstream end, adding a 6 feet high by 16 feet wide box culvert under 34th Street to provide necessary conveyance capacity and re-grading of the channel downstream of 34th Street at 2:1 side slopes to increase conveyance capacity. This alternative would require relocating an existing sanitary sewer line located along 34th Street. The estimated cost for Option 1 is $1,668,000 to provide High Hazard Containment and $1,705,000 to provide 100-yr containment.

Option 2, Storm Sewer Bypass, would convey 100-year flows under Iris Avenue in two separate box culverts. One 170 feet-long box culvert 6 feet high by 8 feet wide, would convey base flows to the existing open channel located on the south side of Iris Avenue between Bridger Trail and 34th Street. A second 450 feet-long box culvert 6 feet high by 24 feet wide would convey overflow to Wonderland Creek just east of 34th Street. The channel downstream of 34th Street would be re-graded at 2:1 side slopes to increase conveyance capacity. The estimated cost for Option 2 is $1,398,000 to provide High Hazard Containment and $1,434,000 to provide 100-yr containment.

The city is currently in the process of purchasing easements on properties owned by the Geological Society of America (GSA). The easements would allow construction of the proposed flood improvements and the city will raze a single-family home located at 3115 Iris Avenue to remove it from the High Hazard Zone. **Figure 7.1 – 7.4** presents Phase II flood mitigation alternatives. **Table 3.4** presents anticipated impacts on major issues related to Phase II flood mitigation alternatives.

**Table 3.4 Phase II Flood Mitigation Alternatives Major Issues**

| Issues | Alternatives | |
|---|---|---|
| | Option 1 Multi-Cell Culvert and Concrete Channel | Option 2 Storm Sewer Bypass |
| | $1,668,000 (HHZ) $1,705,000 (100-yr) | $1,398,000 (HHZ) $1,434,000 (100-yr) |
| Wetlands | - | O |
| Habitat | - | O |
| Water Quality | O | O |
| Aesthetics | - | O |
| Flood Mitigation | + | + |
| Maintenance | + | O |
| Conceptual-Level Cost | - | O |

- Negative Impact (- moderate -- severe)
+ Positive Impact
O No Impact/Neutral

**Figure 7.1 Phase II Flood Mitigation Alternative – Multi-Cell Culvert under Iris and Concrete Channel Plan View**

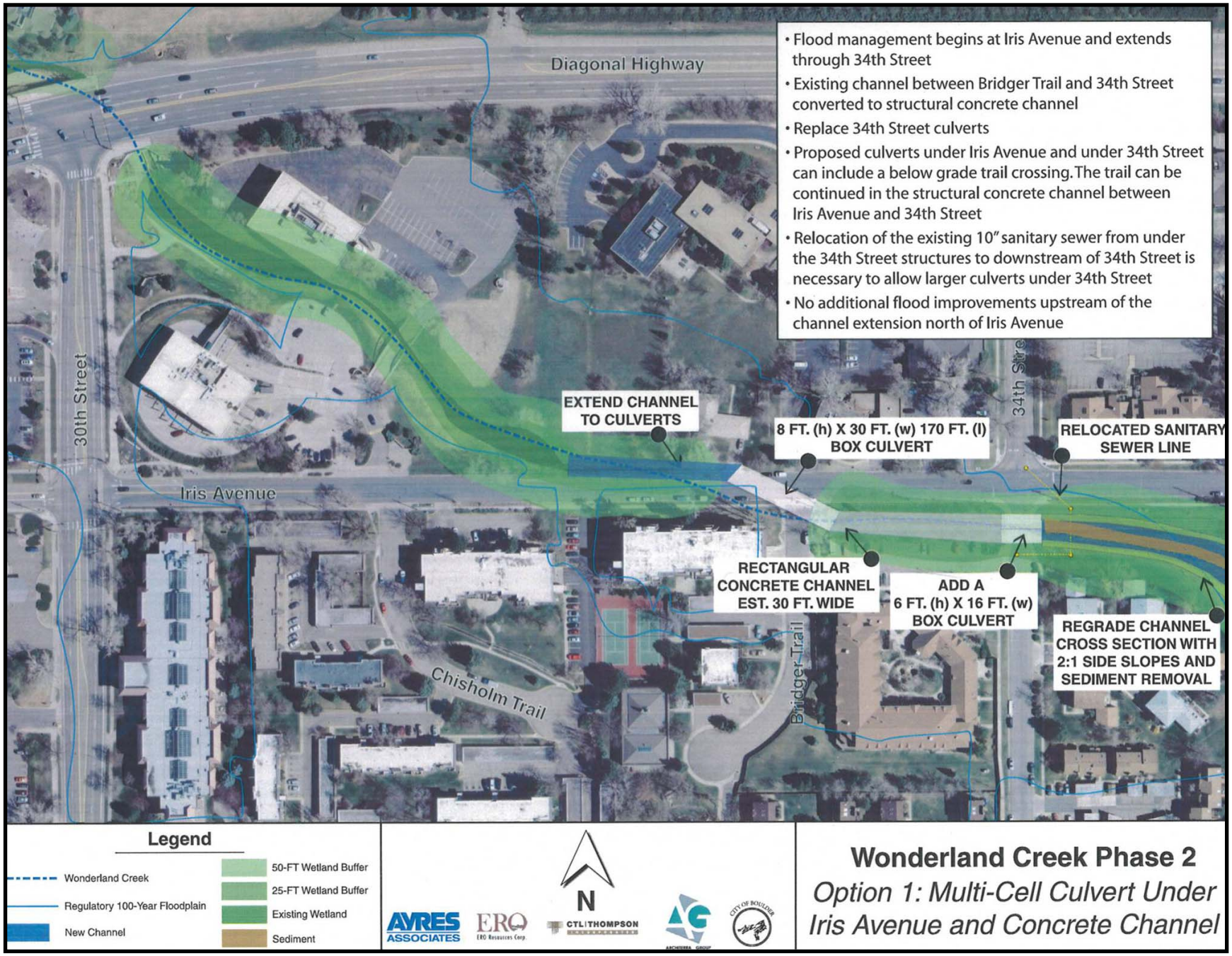


**Figure 7.2 Phase II Flood Mitigation Alternative – Multi-Cell Culvert under Iris and Concrete Channel Cross Section**

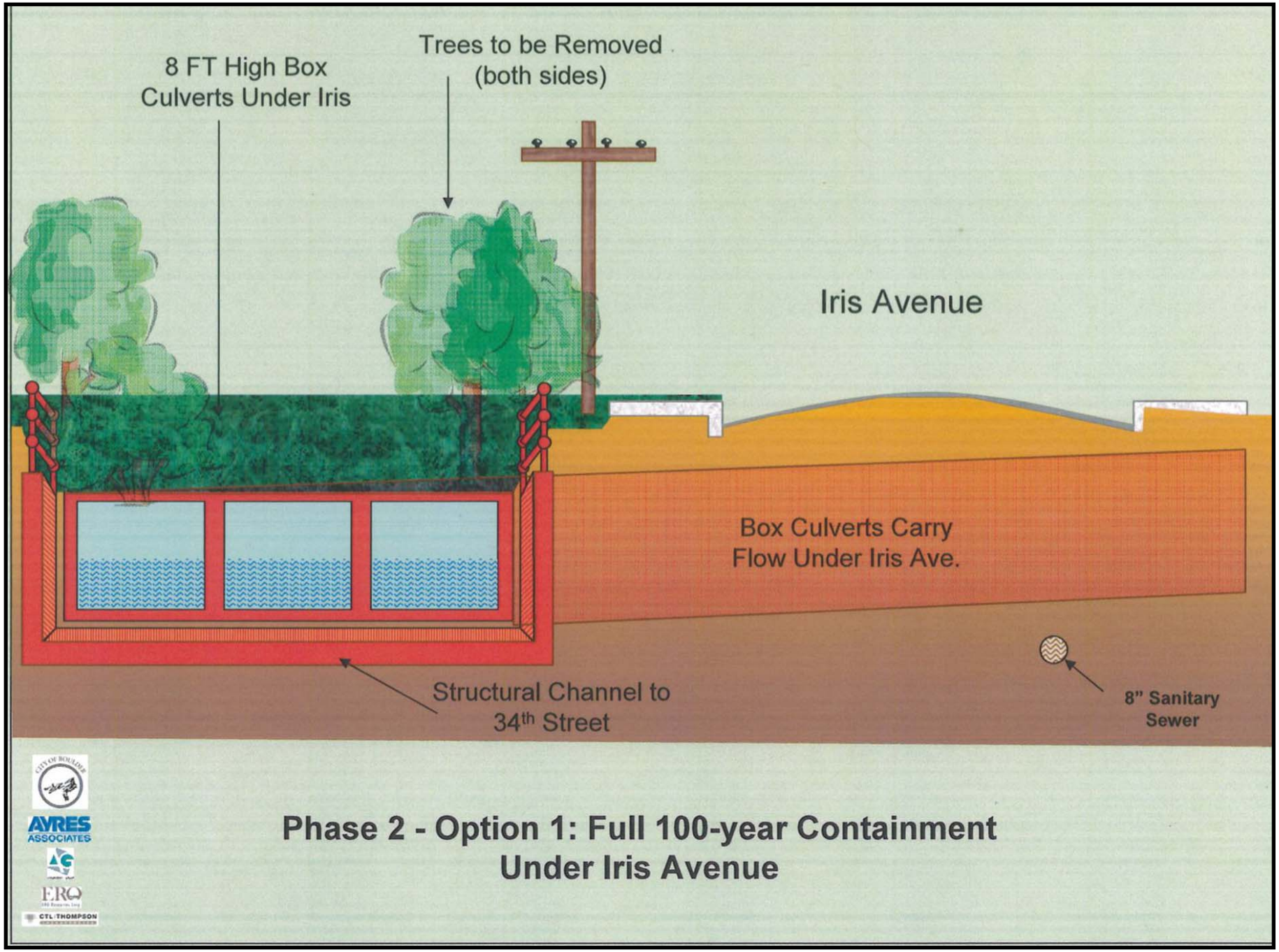


**Figure 7.3 Phase II Flood Mitigation Alternative – Storm Sewer Bypass Plan View**

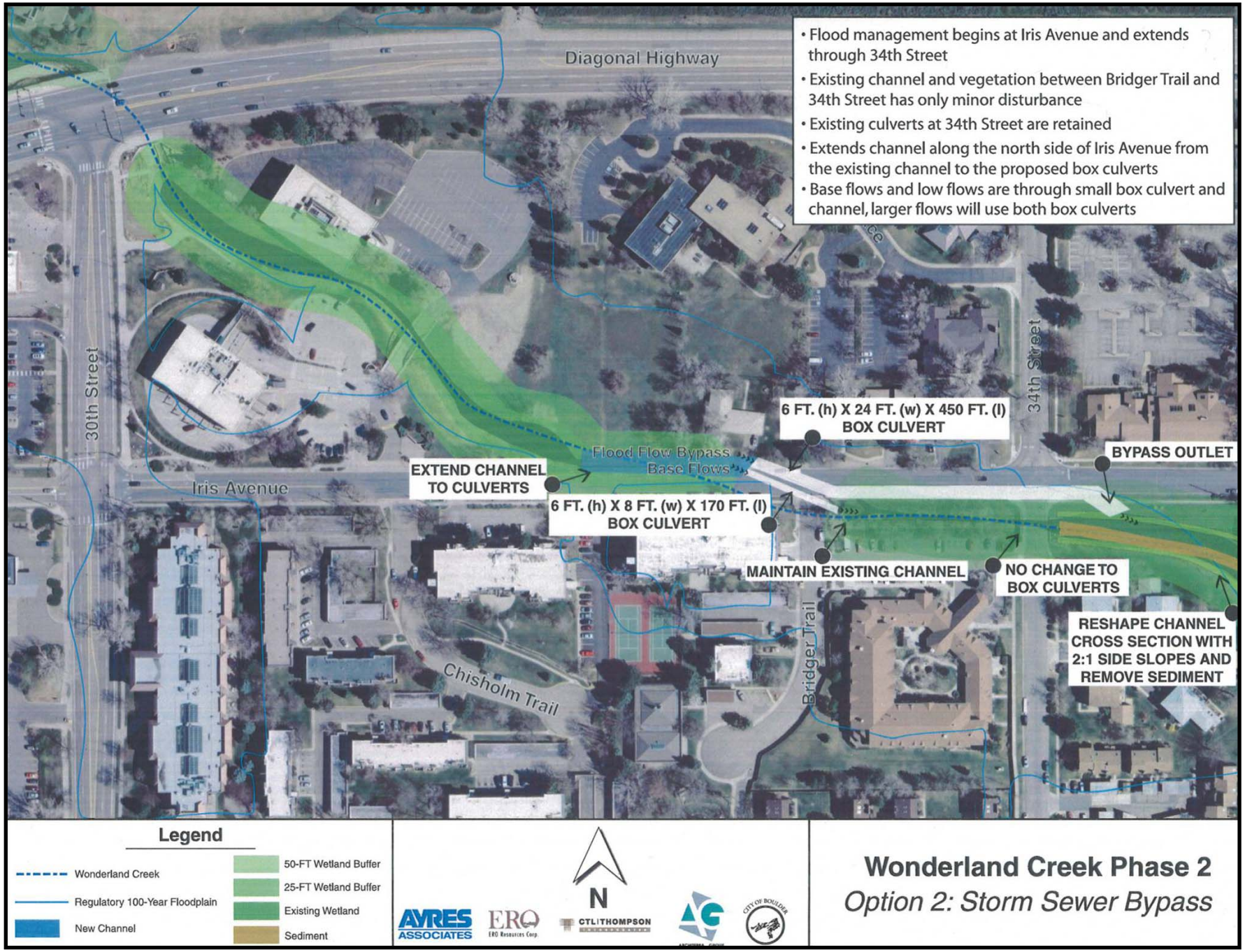
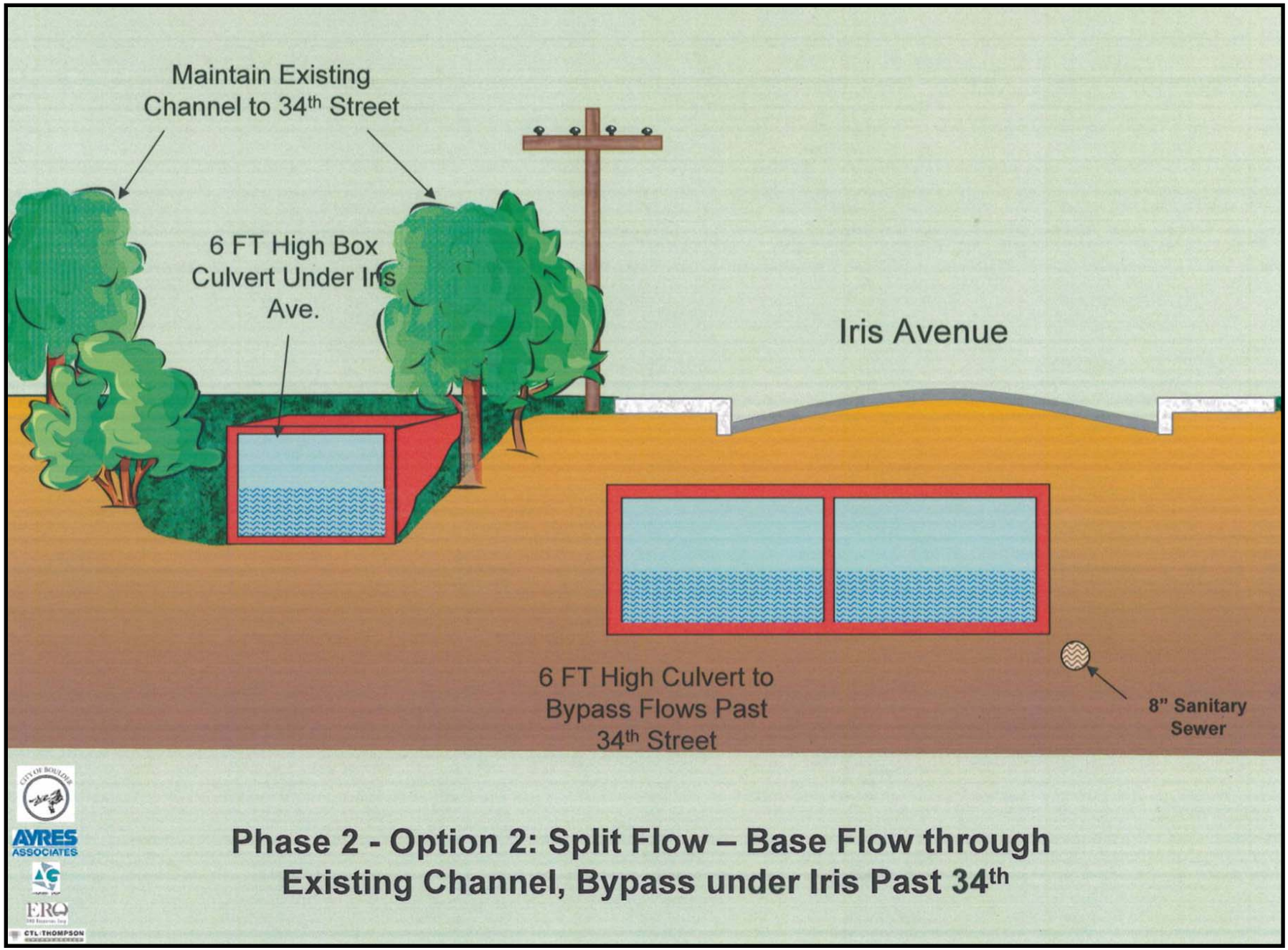


**Figure 7.4 Phase II Flood Mitigation Alternative – Storm Sewer Bypass Cross Section**



### *Phase II Trail Alternatives*

Three trail alignments were evaluated to cross Iris Avenue.

Option A would provide an at-grade crossing at 34th Street and widen the north sidewalk of Iris Avenue west of 34th Street to the open channel of Wonderland Creek. The estimated cost of this option is $168,000. This option would require trail users to cross four driveways.

Option B includes a multi-use path along the south side of Iris Avenue to Bridger Trail, an at-grade crossing of Iris Avenue at Bridger Trail and a multi-use path along the north side of Iris Avenue from Bridger Trail to the open channel of Wonderland Creek. This option requires sidewalk widening/new sidewalk but the newly constructed multi-use path would not cross any driveways. The estimated cost of Option B is $166,000.

Option C would construct a grade separated multi-use path within the Wonderland Creek channel and incorporates a bike/pedestrian underpass of Iris Avenue. This option must be constructed in conjunction with Phase II flood mitigation Option 1. The additional cost of the trail component of the underpass option is $63,000 (culverts costs are included in the flood mitigation alternative).

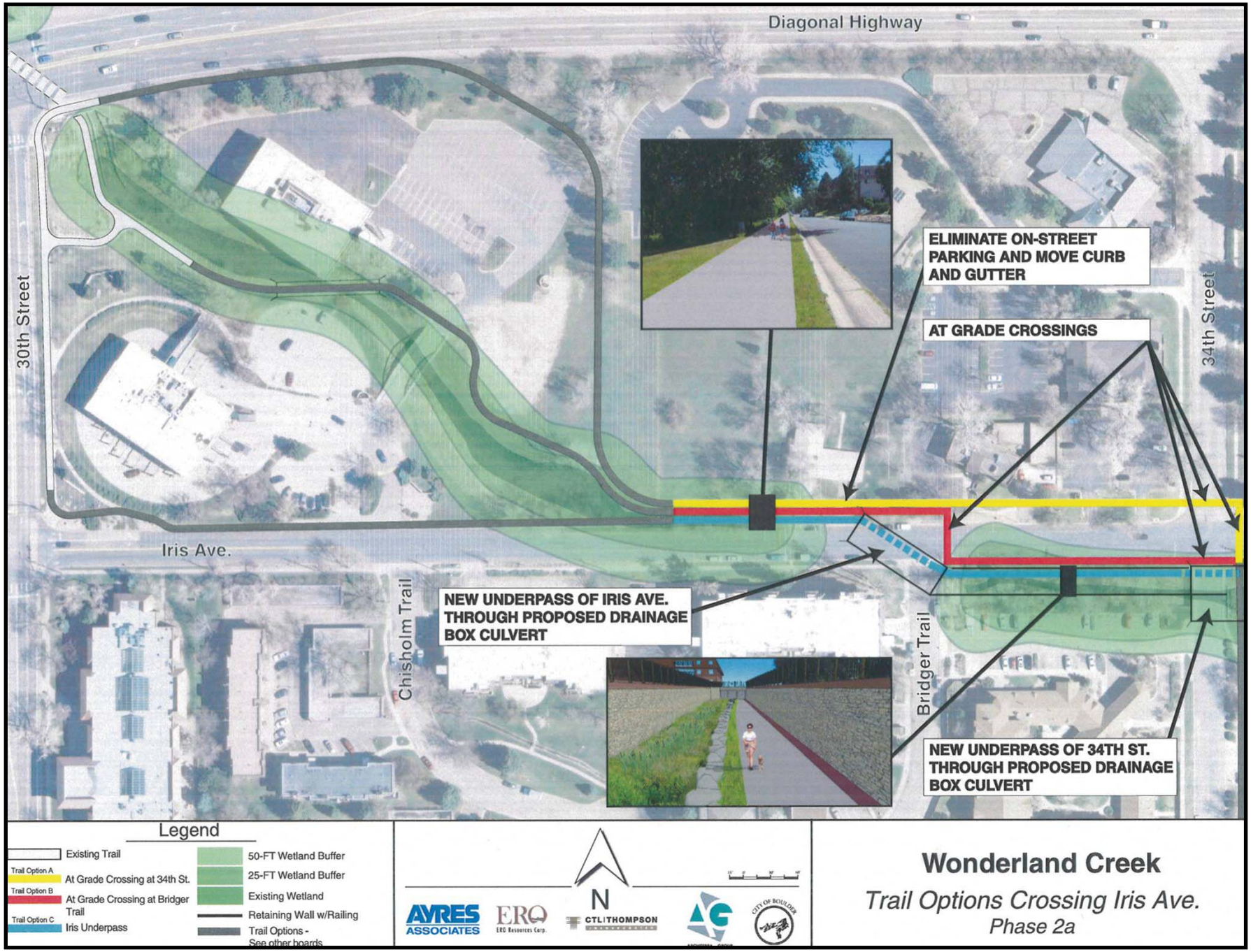
Easements exist for all three trail crossing alternatives. **Table 3.5** presents anticipated impacts on major issues related to Phase II trail crossing alternatives. **Figure 8.0** presents a map showing the Phase II trail crossing alternatives.

**Table 3.5 Phase II Trail Crossing Alternatives Major Issues**

| | **Alternatives** | | |
|---|---|---|---|
| | Option A At Grade 34th | Option B At Grade Bridger Trail | Option C Underpass |
| **Issues** | $168,000 | $166,000 | $63,000 |
| Wetlands | O | O | - |
| Habitat | O | O | - |
| Water Quality | O | O | - |
| Eliminates At-Grade Crossing | -- | -- | + |
| Most Direct | O | O | + |
| Trail Flooding | O | O | - |
| Vehicle Traffic Separation | -- | - | + |
| Flood Maintenance Access | O | O | + |
| Conceptual-Level Cost | O | O | + |

- Negative Impact (- moderate -- severe)
+ Positive Impact
O No Impact/Neutral

**Figure 8.0 Phase II Trail Options Crossing Iris Avenue**



Three trail alignments were evaluated to extend the trail from 34th Street to the Diagonal Highway.

Option A would extend a trail along the north sidewalk replacing the on street parking along Iris Avenue to the intersection of 30th Street. The trail would connect to the existing Wonderland Creek underpass at the Diagonal Highway via the east sidewalk of 30th Street that is already designated as a multi-use path. The stub-out trail segment along Wonderland Creek from the Diagonal Highway underpass would likely be removed. The estimated cost of this option is $182,000. Easements exist for this trail alignment option.

Option B would extend a trail along Wonderland Creek south from the Diagonal Highway underpass to Iris Avenue. The estimated cost of this option is $496,000. This alternative would require construction of a new pedestrian bridge crossing of Wonderland Creek and purchase of a trail easement from the Geological Society of America (GSA) and or the Bank Property (**Attachment 3**).

Option C would construct a trail north from the intersection of 34th Street at Iris Avenue to the Diagonal Highway between the GSA parcel and the Bank of Boulder parcel. The trail would then run west along the south side of the Diagonal Highway to connect with the existing Wonderland Creek underpass at the intersection of the Diagonal Highway and 30th Street. This option is estimated to cost $252,000 and would require trail easements from CDOT, Bank of Boulder Park Subdivision and GSA (**Attachment 3**).

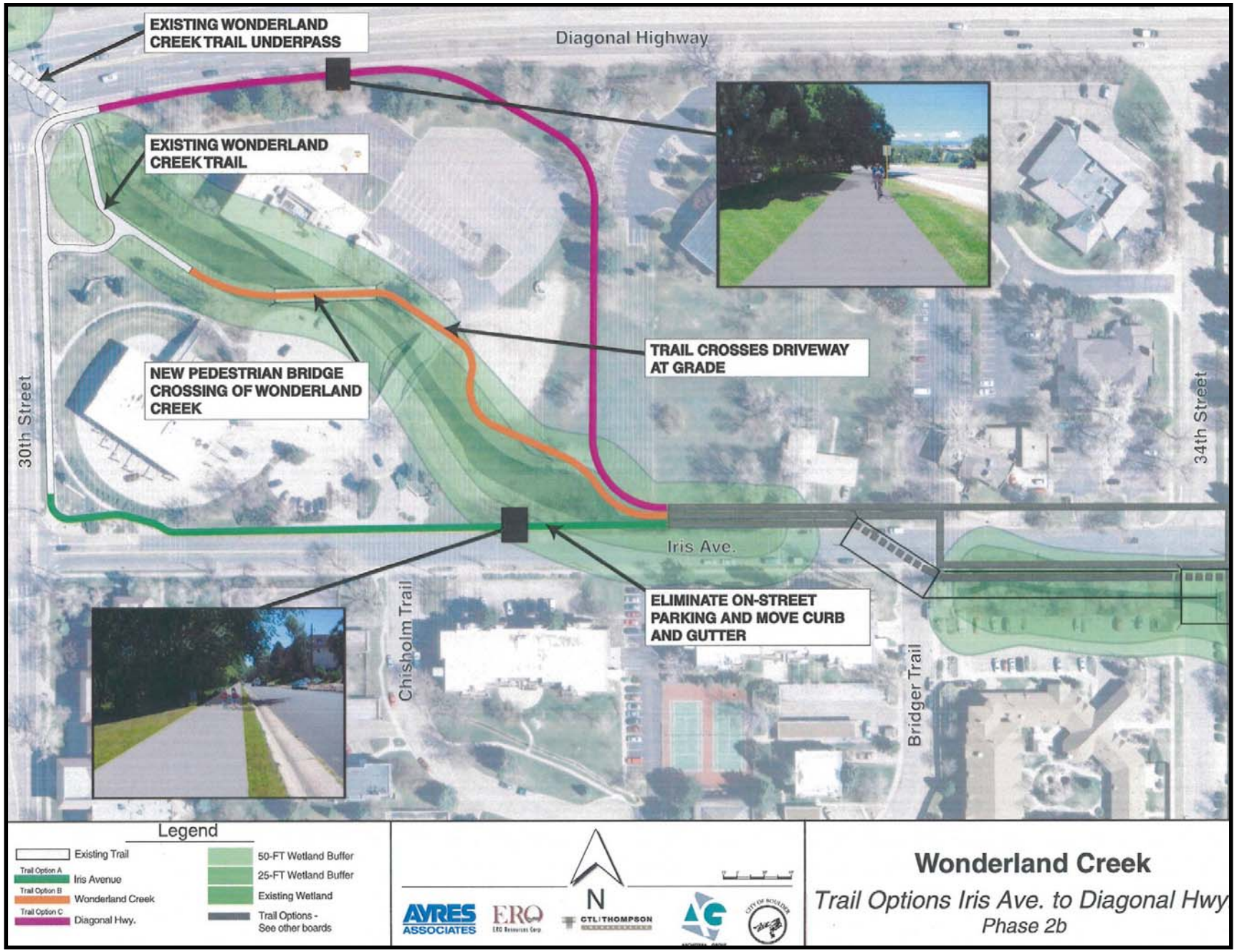
Any of the trail alignments can be used by any of the trail crossings and flood mitigation alternatives. **Table 3.6** presents anticipated impacts on major issues related to Phase II trail alignment alternatives. **Attachment 9.0** presents Phase II trail alignment alternatives.

**Table 3.6 Phase II Trail Alignment Alternatives Major Issues**

| | **Alternatives** | | |
|---|---|---|---|
| | Option A Iris Avenue | Option B Wonderland Creek | Option C Diagonal Highway |
| **Issues** | $182,000 | $496,000 | $252,000 |
| Wetlands | O | - | O |
| Habitat | O | - | O |
| Water Quality | O | - | O |
| Most Direct | O | + | O |
| User Experience | - | + | -- |
| Trail Flooding | + | O | + |
| Vehicle Traffic Separation | O | + | O |
| Flood Maintenance Access | - | + | - |
| Conceptual-Level Cost | O | -- | - |

- Negative Impact (- moderate -- severe)
+ Positive Impact
O No Impact/Neutral

**Figure 9.0 Phase II Trail Alignment Alternatives**



## 4.0 PERMITS, WETLANDS PROTECTION AND HABITAT ENHANCEMENT

Construction of the project, even if done in two phases, will disturb more than 1 acre of land. In addition, components of the project are located within the existing floodplain and within the creek channel. As a result, the project will likely require the following permits:

- Colorado Department of Public Health and Environment Colorado Stormwater Discharge Permit (Construction Activity General Permit and Stormwater Management Plan)
- City of Boulder Floodplain Development Permit
- City of Boulder Wetlands Permit
- United States Army Corps of Engineers 404 Wetlands Permit
- Colorado Department of Public Health and Environment Colorado Construction Dewatering Permit
- City of Boulder construction dewatering discharge agreement

The project is located entirely within the City of Boulder and will therefore not require a County Areas and Activities of State Interest 1041 Review Application.

The following provides a summary of findings from a site visit conducted by ERO Resources, Corp. on July 28 (**Attachment 4**). No significant natural resources were noted in the project area. No suitable habitat for Preble's meadow jumping mouse or Ute ladies'-tresses orchid was found because of urbanization and habitat fragmentation in the case of Preble's and the presence of wetland communities and soils that are not typically associated with the orchid. Although there is suitable nesting substrate, no raptor nests were observed in the large trees along the berm. It is unlikely, but possible, that a nest was present but obscured from view by leaves. The wetlands in the project area are typical of those found in urban areas and are dominated by cattail, sandbar willow, reed canarygrass, and other common species. The lateral extent of riparian trees and shrubs is limited due to encroachment. As currently planned, the proposed project would not affect any unique or significant natural resources, but there would be impacts to regulated wetlands and riparian areas and a number of large trees may be removed.

The concept designs were developed to minimize impacts to existing wetlands by locating project features outside of the wetland limits and buffers to the extent possible. Portions of the Phase I recommended trail alignment are located within wetland buffers but on land that has been previously disturbed (mowed lawn). The project will mitigate buffer impacts by replacing to the extent possible, non-native species with native species. In addition, the flood mitigation measures include a cut-off wall to ensure groundwater levels remain stable in the wetland area located west of Foothills Parkway. A water quality feature is proposed for construction on the west side of the existing wetlands located just west of Foothills Parkway.

## 5.0 PREFERRED PROJECT ALTERNATIVE

The following presents staff recommendations based on the draft CEAP review.

Option 2, the split flow alternative ($1,541,000) is recommended for flood mitigation near Foothills Parkway because it is slightly less expensive than the single flow, larger bridge alternative.

Option C, Below Grade alternative ($66,000 – cost of bridge is included in flood mitigation measure) is recommended for the trail crossing of the railroad because it would take advantage of the flood mitigation bridge and the public prefers an underpass.

Option B, the Wonderland Creek alignment ($638,000) is recommended for extension of the trail from Foothills Parkway to the intersection of 34th Street and Iris Avenue. This alignment is recommended because it is preferred by the public, it would provide the best user experience, would have the least conflict with vehicles and would provide access to maintain the creek as required by the city and the Urban Drainage and Flood Control District. This alignment is, however, considerably more expensive and would have more environmental impacts than the other alignment alternatives. The trail would be located on previously disturbed areas (mowed grass) and staff believes the environmental impacts can be fully mitigated onsite and habitat enhanced.

Option B, an at-grade crossing of Iris Avenue at Bridge Trail ($166,000) is recommended because it is the least expensive crossing alternative and would have slightly less vehicle conflicts than the 34th Street at-grade crossing alternative and the public was not opposed to an at-grade crossing of Iris Avenue.

Option 2, the storm water bypass alternative ($1,434,000) is recommended for conveying Wonderland Creek under Iris Avenue. This alternative is recommended because it is less expensive than the single large culvert with concrete channel, would not disturb the vegetated open channel segment located along Iris Avenue between 34th Street and Bridger Trail and would not require relocation of a sanitary sewer line.

The Iris Avenue alignment ($182,000) is recommended for extension of the trail from Bridger Trail to the existing path located along 30th Street. This alignment is recommended because it is the least expensive alternative, will have little to no environmental impacts and the city has all of the rights-of-way required to construct this trail segment.

Council stipulated that for this reach of Wonderland Creek, 100-year flood mitigation could only be recommended if substantial outside funding is secured. Staff recommends designing flood mitigation for 100-year conveyance capacity as the estimated cost difference is only $36,000 greater than providing only High Hazard Zone containment. The Urban Drainage and Flood Control District funding will more than provide for the cost difference between High Hazard containment and 100-year conveyance. Total estimated concept-level cost for project recommendations is $4,055,000 ($2,273,000 for Phase I and $1,782,000 for Phase II).

## 6.0 PUBLIC INPUT TO DATE

Staff conducted an open house on January 14, 2010. Twenty seven people attended the meeting and 24 completed comment sheets were submitted. The preferred options based on the completed comment sheets include an underpasses of the BNSF railroad and Iris Avenue, trail aligned along Wonderland Creek and single flow flood mitigation at Foothills Parkway. The public did not have a preference for the flood mitigation option for crossing of Iris Avenue. **Attachment 1** presents a summary of the comment sheets from the open house.

Staff also conducted a meeting for the Boulders at Talisman HOA on February 16, 2010. Seven people attended the meeting, four from the HOA board and three homeowners. The HOA represents 104 units. The Board's preferred options include underpasses of the BNSF railroad and Iris Avenue, trail aligned along Howard Heuston Park/34th Street and along Wonderland Creek from 34th Street to the Diagonal Highway, split flow flood mitigation option at Foothills Parkway and the box culvert/channel option for flood mitigation crossing of Iris Avenue. The three homeowners also prefer underpass crossings but prefer a trail alignment along Wonderland Creek. They generally had no preference for the flood mitigation alternatives. **Attachment 2** presents a summary of the comment sheets from the HOA meeting.

In addition to the open house and HOA meeting, staff has coordinated with the BNSF Railroad and the Boulder and Whiterock Ditch Company. The railroad prefers a bridge to culverts for any new crossing. The ditch company prefers the split flow flood mitigation option at Foothills Parkway. They believe the split flow option would provide them with more flexibility to regulate flows in the ditch. They will also require adequate maintenance access along the ditch.

## 7.0 STAFF PROJECT MANAGER

The project is managed by Kurt Bauer with oversight from Annie Noble.

## 8.0 OTHER CONSULTANTS OR RELEVANT CONTACTS

The project consultant team lead is the civil engineering firm of Ayres & Associates, Inc. Additional consultants on the team include the Architerra Group for landscape architectural expertise, CTL Thompson for geotechnical expertise and ERO Resources Corporation for environmental support.

## 9.0 GOALS ASSESSMENT

1) Using the Boulder Valley Comprehensive Plan and department master plans, describe the primary city goals and benefits that the project will help to achieve:

    a) Community Sustainability Goals – How does the project improve the quality of economic, environmental and social health with future generations in mind?
    *The project will help to achieve multiple objectives and city goals by combining transportation, recreation, flood control, water quality and aesthetic improvements to the Wonderland Creek Greenways corridor in the project area. Flood improvements will eliminate the need for property owners to purchase flood insurance and reduce flood*

*hazard risks. Completing a missing link in the city's bikeway network will enable and encourage more people to commute by bike and walking, reducing vehicle miles traveled and associated greenhouse gas emissions. Replacing non-native and invasive species with native species as part of the project plan and mitigation measures will enhance both habit and area aesthetics.*

b) BVCP Goals related to:

- Community Design
  *The Greenways system is an example of a positive community design feature. This project contributes to the Greenways program and meets multiple objectives for stream management.*

- Facilities and Services
  *The proposed project includes transportation, flood improvements and environmental facilities. These facilities further the BVCP Utility and Parks and Trails policy goals.*

- Environment
  *The project will enhance the environment of the Wonderland Creek corridor by providing water quality and habitat enhancement improvements. These improvements include replacing non-native and invasive species with native species and construction of a water quality enhancement feature on the west side of the wetland area located just west of Foothills Parkway. In addition, the trail connection will facilitate alternative modes of transportation and shift single occupant trips to biking and walking thereby reducing vehicle miles traveled and associated greenhouse gases. This project will further the BVCP policy goals presented in the Preservation and Enhance Biodiversity and Native Ecosystems, Protect and Enhance the Quality of the Urban Environment, Protect Geologic Resources and Manage Natural Hazards, and Protect and Improve Water and Air Quality sections.*

- Economy
  *Property damage and transportation disruption from flooding can cause substantial economic costs. This project will provide flood mitigation along Wonderland Creek from Foothills Parkway to just upstream of Iris Avenue. The project will provide 100-year conveyance under Iris Avenue, helping to ensure safe access to numerous residences and businesses during flood events. In addition, the trail will help facilitate use of alternative transportation for commuters and therefore help to reduce dependency on foreign oil.*

- Transportation
  *This project will complete the trail connection between the recently completed Diagonal Highway underpass and the UCAR trail near 47$^{th}$ Street. This connection will provide an important connection for trail users traveling east-west along Wonderland Creek from the Boulder Creek trail system. This project will further the BVCP multi-modal transportation goals.*

- Housing
  *The trail will be along several high density residential areas and will facilitate alternative transportation to these areas as well as areas east and west of the project.*

- Social Concerns and Human Services
  *Trail users currently cross the BNSF railroad on a social trail. This informal trail crossing is dangerous and has resulted in serious injuries in the recent past. This project would provide a safe railroad crossing for trail users. In addition, the section of Wonderland Creek near the rail line appears to be a dumping ground for trash and refuse. A formalized path system will provide access for maintenance and trash removal. Flood mitigation improvements will greatly reduce the flood risk along the project reach including at the at-risk population critical facilities.*

c) Describe any regional goals (potential benefits or impacts to regional systems or plans?)
*This project will make an important connection to the city's multi-use trail system that is connected to regional trail systems. Flood and water quality improvements will have a regional impact on downstream systems.*

2) Is this project referenced in a master plan, subcommunity or area plan? If so, what is the context in terms of goals, objectives, larger system plans, etc.? If not, why not?
*Flood and trail components of this project are identified in three regional plans. The flood components are identified as a priority in the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan and the trail segment is identified in the Greenways Master Plan, BVCP trail map, and in the Transportation Master Plan. Completion of this project will fulfill these important plan components.*

3) Will this project be in conflict with the goals or policies in any departmental master plan and what are the tradeoffs among city policies and goals in the proposed project alternative? (e.g. higher financial investment to gain better long-term services or fewer environmental impacts)
*Project alternatives will require removal of some trees and have some impacts to wetlands. Every attempt will be made during the design phase to preserve as many trees as is feasible along with complying with the recently adopted wetlands ordinance.*

4) List other city projects in the project area that are listed in a departmental master plan or the CIP.
*Stream segments located upstream of the project area are identified for flood mitigation in the Fourmile Creek and Wonderland Creek Flood Mitigation Final Plan. An underpass and multi-use trail segment at 28th Street, just upstream of the project area, is identified in the Greenways Master Plan and the Transportation Plan. The city will be constructing a multi-use trail along the west side of Foothills Parkway from the UCAR trail south to Goose Creek in 2011.*

*5)* What are the major city, state and federal standards that will apply to the proposed project? How will the project exceed city, state or federal standards and regulations (e.g. environmental, health, safety or transportation standards)?

*The project's trail system will be designed to meet or exceed ADA requirements, meet or exceed city and national standards for the development of bikeway facilities, meet or exceed the city's wetland ordinance requirements, include water quality and habitat enhancements, meet or exceed Urban Drainage and Flood Control District standards and comply with all required city, state and federal permits.*

6) Are there cumulative impacts to any resources from this and other projects that need to be recognized and mitigated?
*The project will result in temporary impacts to wetlands and habitat during construction that will be fully mitigated based on compliance with the city's wetland ordinance.*

## 10.0 IMPACT ASSESSMENT

The following checklists table identifies potential short and long-term impacts from the project alternatives. The first checklist presents Phase 1 alternatives from Foothills Parkway to 34th Street. The second checklist presents Phase 2 alternative from 34th Street to the Diagonal Highway.

+ indicates a positive effect or improved condition
- indicates a negative effect or impact
O indicates no effect

Checklist questions are answered following each table for all categories identified as having a potential + or - impact. The preferred alternative components are high lighted in yellow.

| **Project Title: Wonderland Creek Greenways Improvement Project Phase 1: Foothills Parkway to 34th Street** | **Alternatives** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Mitigation | | Trail Crossings | | | Trail Alignments | | |
| | Option 1 (single flow) | Option 2 (split flow) | Option A (At Grade) | Option B (Above Grade) | Option C (Below Grade) | Option A (Talisman/Iris) | Option B (Wonderland) | Option C (Park/34th) |
| **A. Natural Areas or Features** | | | | | | | | |
| 1. Disturbances to species, communities, habitat or ecosystems due to: | | | | | | | | |
| a. Construction activities | - | - | O | O | - | - | - | O |
| b. Native vegetation removal | - | - | O | O | - | - | - | O |
| c. Human or domestic animal encroachment | O | O | O | O | O | O | O | O |
| d. Chemicals (including petroleum products, fertilizers, pesticides, herbicides) | O | O | O | O | O | O | O | O |
| e. Behavioral displacement of wildlife species (due to noise from use activities) | - | - | O | O | - | - | - | O |
| f. Habitat removal | - | - | O | O | - | - | - | O |
| g. Introduction of non-native plant species in the site landscaping | + | + | O | O | O | + | + | O |
| h. Changes to groundwater or surface runoff | O | O | O | O | O | O | O | O |
| i. Wind erosion | O | O | O | O | O | O | O | O |
| 2. Loss of mature trees or significant plants? | - | - | O | O | - | O | O | O |
| **B. Riparian Areas / Floodplain** | | | | | | | | |
| 1. Encroachment upon the 100-year, conveyance or high hazard flood zones? | O | O | O | O | O | O | O | O |
| 2. Disturbance to or fragmentation of a riparian corridor? | - | - | O | O | - | - | - | O |
| **C. Wetlands** | | | | | | | | |
| 1. Disturbance to or loss of a wetland on site? | - | - | O | O | - | - | - | O |
| **D. Geology and Soils** | | | | | | | | |
| 1. a. Impacts to unique geological or physical features? | O | O | O | O | O | O | O | O |
| b. Geological development constraints? | O | O | O | O | O | O | O | O |
| c. Substantial changes in topography? | + | + | O | O | O | O | O | O |
| d. Changes in soil or fill materials on the site? | O | O | - | - | - | - | - | - |

| Project Title: Wonderland Creek Greenways Improvement Project Phase 1: Foothills Parkway to 34th Street | Alternatives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Mitigation | | Trail Crossings | | | Trail Alignments | | |
| | Option 1 (single flow) | Option 2 (split flow) | Option A (At Grade) | Option B (Above Grade) | Option C (Below Grade) | Option A (Talisman/Iris) | Option B (Wonderland) | Option C (Park/34th) |
| e. Phasing of earth work? | O | O | O | O | O | O | O | O |
| **E. Water Quality** | | | | | | | | |
| 1. Impacts to water quality from any of the following? | | | | | | | | |
| a. Clearing, excavation, grading or other construction activities | - | - | O | O | - | - | - | O |
| b. Change in hardscape | O | O | - | - | - | - | - | - |
| c. Change in site ground features | + | + | O | O | O | O | O | O |
| d. change in storm drainage | O | O | O | O | O | O | O | O |
| e. change in vegetation | + | + | O | O | - | - | - | - |
| f. change in pedestrian and vehicle traffic | O | O | + | + | + | + | + | + |
| g. pollutants | - | - | O | O | - | - | - | O |
| 2. Exposure of groundwater contamination from excavation or pumping? | - | - | O | O | O | O | O | O |
| **F. Air Quality** | | | | | | | | |
| 1. Short or long-term impacts to air quality (CO2 emissions, pollutants)? | | | | | | | | |
| a. From mobile sources? | O | O | + | + | + | + | + | + |
| b. From stationary sources? | O | O | O | O | O | O | O | O |
| **G. Resource Conservation** | | | | | | | | |
| 1. Changes in water use? | O | O | O | O | O | O | O | O |
| 2. Increases or decreases in energy use? | O | O | + | + | + | + | + | + |
| 3. Generation of excess waste? | O | O | O | O | O | O | O | O |
| **H. Cultural / Historic Resources** | | | | | | | | |
| 1. a. Impacts to a prehistoric or archaeological site? | O | O | O | O | O | O | O | O |
| b. Impacts to a building or structure over fifty years of age? | O | O | O | O | O | O | O | O |
| c. impacts to a historic feature of the site? | O | O | O | O | O | O | O | O |
| d. Impacts to significant agricultural land? | O | O | O | O | O | O | O | O |
| **I. Visual Quality** | | | | | | | | |
| 1. a. Effects on scenic vistas or public views? | O | O | O | O | O | O | O | O |
| b. Effects on the aesthetics of a site open to public view? | O | O | O | O | O | O | O | O |
| c. Effects on views to unique geological or physical features? | O | O | O | O | O | O | O | O |
| D. Changes in lighting? | O | O | O | O | O | O | O | O |
| **J. Safety** | | | | | | | | |
| 1. Health hazards, odors or radon? | O | O | O | O | O | O | O | O |
| 2. Disposal of hazardous materials? | O | O | O | O | O | O | O | O |
| 3. Site hazards? | + | + | + | + | + | O | O | O |
| **K. Physiological Well-being** | | | | | | | | |
| 1. Exposure to excessive noise? | O | O | O | O | O | - | - | - |
| 2. Excessive light or glare? | O | O | O | O | O | O | O | O |

| Project Title: Wonderland Creek Greenways Improvement Project Phase 1: Foothills Parkway to 34th Street | Alternatives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Mitigation | | Trail Crossings | | | Trail Alignments | | |
| | Option 1 (single flow) | Option 2 (split flow) | Option A (At Grade) | Option B (Above Grade) | Option C (Below Grade) | Option A (Talisman/Iris) | Option B (Wonderland) | Option C (Park/34th) |
| 3. Increase in vibrations? | O | O | O | O | O | - | - | - |
| **L. Services** | | | | | | | | |
| 1. Additional need for: | | | | | | | | |
| a. Water or sanitary sewer services? | O | O | O | O | O | O | O | O |
| b. Storm sewer / flood control features? | + | + | O | O | O | O | O | O |
| c. Maintenance of pipes, culverts and manholes? | - | - | O | O | O | O | O | O |
| d. Police services? | O | O | O | O | O | O | O | O |
| e. Fire protection services? | O | O | O | O | O | O | O | O |
| f. Recreation or parks facilities? | O | O | + | + | + | + | + | + |
| g. Library services? | O | O | O | O | O | O | O | O |
| h. Transportation improvements / traffic mitigation? | O | O | + | + | + | + | + | + |
| i. Parking | O | O | O | O | O | O | O | O |
| j. Affordable housing? | O | O | O | O | O | O | O | O |
| k. Open space / urban open land? | O | O | O | O | O | O | O | O |
| l. Power or energy use? | O | O | + | + | + | + | + | + |
| m. Telecommunications? | O | O | O | O | O | O | O | O |
| n. Health care / social services? | O | O | O | O | O | O | O | O |
| o. Trash removal or recycling services? | + | + | O | O | + | + | + | + |
| **M. Special Populations** | | | | | | | | |
| 1. Effects on: | | | | | | | | |
| a. Persons with disabilities? | + | + | + | + | + | + | + | + |
| b. Senior population? | + | + | + | + | + | + | + | + |
| c. Children or youth? | O | O | + | + | + | + | + | + |
| d. Restricted income persons | O | O | + | + | + | + | + | + |
| e. People of diverse backgrounds (including Latino and other immigrants)? | O | O | O | O | O | O | O | O |
| f. Neighborhoods | + | + | + | + | + | + | + | + |
| g. Sensitive populations located near the project (e.g. schools, hospitals and nursing homes)? | + | + | + | + | + | + | + | + |
| **N. Economy** | | | | | | | | |
| 1. Utilization of existing infrastructure? | + | + | O | O | O | O | O | O |
| 2. Effect on operating expenses? | - | - | - | - | - | - | - | - |
| 3. Effect on economic activity? | O | O | O | O | O | O | O | O |
| 4. Impacts to businesses, employment, retail sales or city revenue? | O | O | O | O | O | O | O | O |

| Project Title: Wonderland Creek Greenways Improvement Project Phase 2: 34th Street to Diagonal Highway | Alternatives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Mitigation | | Trail Crossings | | | Trail Alignments | | |
| | Option 1 (Multi-cell) | Option 2 (bypass) | Option A (At Grade 34th) | Option B (At Grade Bridge) | Option C (Underpass) | Option A (Iris) | Option B (Wonderland) | Option C (Diagonal Hiwy) |
| **A. Natural Areas or Features** | | | | | | | | |
| 1. Disturbances to species, communities, habitat or ecosystems due to: | | | | | | | | |
| a. Construction activities | - | - | O | O | - | O | - | O |
| b. Native vegetation removal | - | O | O | O | - | O | - | O |
| c. Human or domestic animal encroachment | O | O | O | O | O | O | O | O |
| d. Chemicals (including petroleum products, fertilizers, pesticides, herbicides) | O | O | O | O | O | O | O | O |
| e. Behavioral displacement of wildlife species (due to noise from use activities) | - | O | O | O | - | O | O | O |
| f. Habitat removal | - | O | O | O | - | O | - | O |
| g. Introduction of non-native plant species in the site landscaping | O | O | O | O | O | O | + | O |
| h. Changes to groundwater or surface runoff | O | O | O | O | O | O | - | - |
| i. Wind erosion | O | O | O | O | O | O | O | O |
| 2. Loss of mature trees or significant plants? | - | O | O | O | - | O | O | O |
| **B. Riparian Areas / Floodplain** | | | | | | | | |
| 1. Encroachment upon the 100-year, conveyance or high hazard flood zones? | O | O | O | O | O | O | O | O |
| 2. Disturbance to or fragmentation of a riparian corridor? | O | O | O | O | O | O | O | O |
| **C. Wetlands** | | | | | | | | |
| 1. Disturbance to or loss of a wetland on site? | - | O | O | O | - | O | - | - |
| **D. Geology and Soils** | | | | | | | | |
| 1. a. Impacts to unique geological or physical features? | O | O | O | O | O | O | O | O |
| b. Geological development constraints? | O | O | O | O | O | O | O | O |
| c. Substantial changes in topography? | O | O | O | O | O | O | O | O |
| d. Changes in soil or fill materials on the site? | - | O | - | - | - | - | - | - |
| e. Phasing of earth work? | O | O | O | O | O | O | O | O |
| **E. Water Quality** | | | | | | | | |
| 1. Impacts to water quality from any of the following? | | | | | | | | |
| a. Clearing, excavation, grading or other construction activities | - | - | O | O | - | O | O | O |
| b. Change in hardscape | - | O | O | - | - | O | - | - |
| c. Change in site ground features | - | O | O | O | - | O | O | O |
| d. change in storm drainage | O | O | O | O | O | O | O | O |
| e. change in vegetation | - | O | O | O | - | O | - | - |
| f. change in pedestrian and vehicle traffic | O | O | + | + | + | + | + | + |
| g. pollutants | - | O | O | O | - | O | - | - |
| 2. Exposure of groundwater contamination from excavation or pumping? | - | - | O | O | - | O | O | O |

| Project Title: Wonderland Creek Greenways Improvement Project Phase 2: 34th Street to Diagonal Highway | Alternatives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Mitigation | | Trail Crossings | | | Trail Alignments | | |
| | Option 1 (Multi-cell) | Option 2 (bypass) | Option A (At Grade 34th) | Option B (At Grade Bridger) | Option C (Underpass) | Option A (Iris) | Option B (Wonderland) | Option C (Diagonal Hiwy) |
| **F. Air Quality** | | | | | | | | |
| 1. Short or long-term impacts to air quality (CO2 emissions, pollutants)? | | | | | | | | |
| a. From mobile sources? | O | O | + | + | + | + | + | + |
| b. From stationary sources? | O | O | O | O | O | O | O | O |
| **G. Resource Conservation** | | | | | | | | |
| 1. Changes in water use? | O | O | O | O | O | O | O | O |
| 2. Increases or decreases in energy use? | O | O | + | + | + | + | + | + |
| 3. Generation of excess waste? | O | O | O | O | O | O | O | O |
| **H. Cultural / Historic Resources** | | | | | | | | |
| 1. a. Impacts to a prehistoric or archaeological site? | O | O | O | O | O | O | O | O |
| b. Impacts to a building or structure over fifty years of age? | O | O | O | O | O | O | O | O |
| c. impacts to a historic feature of the site? | O | O | O | O | O | O | O | O |
| d. Impacts to significant agricultural land? | O | O | O | O | O | O | O | O |
| **I. Visual Quality** | | | | | | | | |
| 1. a. Effects on scenic vistas or public views? | O | O | O | O | O | O | O | O |
| b. Effects on the aesthetics of a site open to public view? | O | O | O | O | O | O | O | O |
| c. Effects on views to unique geological or physical features? | O | O | O | O | O | O | O | O |
| D. Changes in lighting? | O | O | O | O | O | O | O | O |
| **J. Safety** | | | | | | | | |
| 1. Health hazards, odors or radon? | O | O | O | O | O | O | O | O |
| 2. Disposal of hazardous materials? | O | O | O | O | O | O | O | O |
| 3. Site hazards? | O | O | O | O | O | O | O | O |
| **K. Physiological Well-being** | | | | | | | | |
| 1. Exposure to excessive noise? | - | - | O | O | O | O | O | O |
| 2. Excessive light or glare? | O | O | O | O | O | O | O | O |
| 3. Increase in vibrations? | - | - | O | O | O | O | O | O |
| **L. Services** | | | | | | | | |
| 1. Additional need for: | | | | | | | | |
| a. Water or sanitary sewer services? | - | O | O | O | O | O | O | O |
| b. Storm sewer / flood control features? | + | + | O | O | O | O | O | O |
| c. Maintenance of pipes, culverts and manholes? | - | - | O | O | O | O | O | O |
| d. Police services? | O | O | O | O | O | O | O | O |
| e. Fire protection services? | O | O | O | O | O | O | O | O |
| f. Recreation or parks facilities? | O | O | + | + | + | + | + | + |
| g. Library services? | O | O | O | O | O | O | O | O |
| h. Transportation improvements / traffic mitigation? | O | O | + | + | + | + | + | + |

| Project Title: Wonderland Creek Greenways Improvement Project Phase 2: 34th Street to Diagonal Highway | Alternatives | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Mitigation | | Trail Crossings | | | Trail Alignments | | |
| | Option 1 (Multi-cell) | Option 2 (bypass) | Option A (At Grade 34th) | Option B (At Grade Bridger) | Option C (Underpass) | Option A (Iris) | Option B (Wonderland) | Option C (Diagonal Hiwy) |
| i. Parking | O | O | O | O | O | - | O | O |
| j. Affordable housing? | O | O | O | O | O | O | O | O |
| k. Open space / urban open land? | O | O | O | O | O | O | O | O |
| l. Power or energy use? | O | O | + | + | + | + | + | + |
| m. Telecommunications? | O | O | O | O | O | O | O | O |
| n. Health care / social services? | O | O | O | O | O | O | O | O |
| o. Trash removal or recycling services? | + | + | O | O | O | O | + | O |
| **M. Special Populations** | | | | | | | | |
| 1. Effects on: | | | | | | | | |
| a. Persons with disabilities? | O | O | + | + | + | + | + | + |
| b. Senior population? | + | + | + | + | + | + | + | + |
| c. Children or youth? | O | O | + | + | + | + | + | + |
| d. Restricted income persons | O | O | + | + | + | + | + | + |
| e. People of diverse backgrounds (including Latino and other immigrants)? | O | O | O | O | O | O | O | O |
| f. Neighborhoods | + | + | + | + | + | + | + | + |
| g. Sensitive populations located near the project (e.g. schools, hospitals and nursing homes)? | + | + | + | + | + | + | + | + |
| **N. Economy** | | | | | | | | |
| 1. Utilization of existing infrastructure? | + | + | O | O | O | O | O | O |
| 2. Effect on operating expenses? | - | - | - | - | - | - | - | - |
| 3. Effect on economic activity? | O | O | O | O | O | O | O | O |
| 4. Impacts to businesses, employment, retail sales or city revenue? | O | O | O | O | O | O | O | O |

## 11.0 CHECK LIST QUESTIONS

*Note: The following questions are a supplement to the CEAP checklist. Only checklist items having a – or + anticipated impact have questions answered in full.*

The following checklist items reflect both project phases.

A. Natural Areas

1. Describe the potential for disturbance to or loss of significant: species, plant communities, wildlife habitats, or ecosystems via any of the activities listed below (significant species include any species listed or proposed to be listed as rare, threatened or endangered on federal, state or county lists) – See Below
a. Construction activities
b. Native vegetation removal
c. Human or domestic animal encroachment
d. Chemicals to be stored or used on the site (including petroleum products, fertilizers, pesticides, herbicides)
e. Behavioral displacement of wildlife species (due to noise from use activities)
f. Introduction of non-native plant species in the site landscaping
g. Changes to groundwater (including installation of sump pumps) or surface runoff (storm drainage, natural stream) on the site
h. Potential for discharge of sediment to any body of water either in the short term (construction-related) or long term
i. Potential for wind erosion and transport of dust and sediment from the site

2. Describe the potential for disturbance to or loss of mature trees or significant plants. – See Below

**If the potential impacts have been identified, please provide any of the following information that is relevant to the project:**

- A description of how the proposed project would avoid, minimize or mitigate identified impacts
- A habitat assessment of the site, including: 1) a list of plant and animal species and plant communities of special concern found on the site; 2) a wildlife habitat evaluation of the site
- Map of the site showing the location of any Boulder Valley Natural Ecosystem, Boulder County Environmental Conservation Area, or critical wildlife habitat – Not Applicable

A comprehensive Greenways Riparian Habitat Assessment was completed in 1999 as part of the Greenways Master Plan. The riparian habitat was evaluated based on the quality of vegetation (native or non-native), the vegetative structure and the quality of the habitat based on the presence of bird species. Each stream reach was rated for each of these criteria, with a rating of very poor to excellent. Wonderland Creek along the proposed project reach received the following ratings:

- Vegetative Structure: Poor to Very Good (mostly good)
- Native Plant Habitat: Poor to Excellent

- Bird Habitat: Very Poor to Poor

The aquatic habitat within the Greenways system was evaluated in a separate study and was rated on a scale of poor to excellent. Wonderland Creek along the proposed project reach rated Poor to Fair.

The Greenways Master Plan also ranked each of the six Greenways objectives for each stream reach for the purpose of balancing conflicting interests at the time a project is being undertaken. Each objective was given a low to high rank based on specific criteria outlined in the Master Plan. Wonderland Creek along the proposed project reach received the following rankings:

- Habitat: High
- Water Quality: Medium
- Transportation: Medium
- Recreation: Low
- Flood: High

With a potential conflict noted as habitat / transportation.

The inventory further calls for underpasses at Iris and 34th Street for flood management and trail connection and states that the trail alignment is undetermined but to be located outside of the wetland area (a wetland classified by the city as High Functional is located along Wonderland Creek just upstream (west) of Foothills Parkway). The inventory states a trail connection to Howard Heuston Park as an opportunity.

There are no known species listed or proposed to be listed as rare, threatened or endangered on federal, state or county lists along the proposed project reach. The following provides a summary of findings from a site visit conducted by ERO Resources, Corp. on July 28 (**Attachment 4**). No significant natural resources were noted in the project area. No suitable habitat for Preble's meadow jumping mouse or Ute ladies'-tresses orchid was found because of urbanization and habitat fragmentation in the case of Preble's and the presence of wetland communities and soils that are not typically associated with the orchid. Although there is suitable nesting substrate, no raptor nests were observed in the large trees along the berm. It is unlikely, but possible, that a nest was present but obscured from view by leaves. The wetlands in the project area are typical of those found in urban areas and are dominated by cattail, sandbar willow, reed canarygrass, and other common species. The lateral extent of riparian trees and shrubs is limited due to encroachment. As currently planned, the proposed project would not affect any unique or significant natural resources, but there would be impacts to regulated wetlands and riparian areas and a number of large trees may be removed.

a. Construction Activities

The project involves construction activities in and around Wonderland Creek. The construction crew will be required to implement Construction Best Management Practices that will be defined in a Storm Water Management Plan in accordance with a Colorado Department of Public Health and Environment Colorado Stormwater Discharge Permit. Some impacts during construction, however, will be unavoidable.

b. Native Vegetation

Flood mitigation measures will require removing native vegetation but care was taken to develop conceptual design that avoids cutting the least amount of mature trees as much as possible. Only native vegetation will be used in site landscaping and revegetation.

c. Human or domestic animal encroachment

The project is located in a highly urbanized area. Increased use by humans or domestic animals is not anticipated to impact the wildlife that currently inhabits the area.

d. Chemicals
Neither project phases include the use of chemicals beyond those used during construction. A Stormwater Management plan is required for construction permitting and will include measures to control chemical spills. Future habitat maintenance will not include the use of chemical treatments.

e. Wildlife Displacement
Construction activities will likely limit the use of the area by species. It is anticipated that these species will return to the area following the construction period.

f. Habitat Removal
The project will temporarily remove habitat during construction. Hardscape features such as the concrete trail will permanently eliminate some habitat. Native vegetation will be used for site landscaping and it is anticipated that overall, habitat will be therefore be enhanced by the project.

g. Introduction on Non-Native Species
The project will landscape with native species. The project will facilitate increased Greenways Habitat maintenance to remove noxious and weed species and foster healthy native species.

h. Changes in Groundwater or Surface Water
The Phase I flood mitigation components include a groundwater cut off wall to prevent groundwater impacts to the wetland. The project is designed to mitigate flooding and disconnect Wonderland Creek from the irrigation ditch. Mitigation/control of temporary changes to groundwater and surface water during construction will be developed as required by the construction discharge permits.

i. Wind Erosion
No anticipated impacts.

2. Loss of Mature Trees or Significant Plants
Flood mitigation measures will require removing native vegetation but care was taken to develop conceptual design that avoids cutting the least amount of mature trees as much as possible. Only native vegetation will be used in site landscaping. There are no known sensitive species in the project corridor.

B. Riparian Areas / Floodplains
1. Describe the extent to which the project will encroach upon the 100-year, conveyance or high hazard flood zones – See Below

2. Describe the extent to which the project will encroach upon, disturb, or fragment a riparian corridor (this includes impacts to the existing channel of flow, stream banks, adjacent riparian zone extending 50 feet out from each bank, and any existing drainage from the site to a creek or stream) – See Below

**If potential impacts have been identified, please provide any of the following information that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts to habitat, vegetation, aquatic life or water quality
- A map showing the location of any streams, ditches and other water bodies on or near the project site
- A map showing the location of the 100-year flood, conveyance, and high hazard flood zones relative to the project site

Figure 2.0 presents the existing floodplain conditions along the project reach. The project will provide 100-year flood conveyance and disconnect Wonderland Creek from the irrigation ditch, greatly reducing the flood hazard along and downstream of the project reach. The project will disturb the riparian corridor during construction. It is anticipated that the completed project will, however, enhance the riparian corridor and water quality enhancement features will improve water quality.

C. Wetlands

1. Describe any disturbance to or loss of a wetland on site that may result from the project. – See Below

**If potential impacts have been identified, please provide any of the following information that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.
- A map showing the location of any wetlands on or near the site. Identify both those wetlands and buffer areas which are jurisdictional under city code (on the wetlands map in our ordinance) and other wetlands pursuant to federal criteria (definitional).

Attachments 1 through 6 present the proposed project features in relationship to the wetland bounds and the 25 and 50 feet wide wetland buffer zones. The components of the preferred alternative would impact wetlands as follows:

- A portion of the relocated Boulder and White Rock irrigation ditch, groundwater cut-off wall and the Iris Avenue culvert outfalls would be located within the 25 foot and 50 foot wetlands buffer zones
- A large portion of the multi-use trail alignment along Wonderland Creek would be located within the 25 foot and 50 foot wetlands buffer zones

Work and corresponding mitigation would be done in compliance with the city's wetland permit requirements.

D. Geology and Soils

1. Describe any:

a. impacts to unique geologic or physical features – No Impacts

b. geologic development constraints or effects to earth conditions or landslide, erosion or subsidence – No Impacts

c. substantial changes in topography or – See Below

d. changes in soil or fill material on the site that may result from the project – See Below

**If potential impacts have been identified, please provide any of the following information that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.
- A map showing the location of any unique geologic or physical features, or hazardous soil or geologic conditions on the site.

Wonderland Creek currently discharges directly into the Boulder and White Rock irrigation ditch causing upstream and downstream flood hazard conditions. The project would reconfigure existing topographic conditions to disconnect the creek from the ditch. The project would also include a groundwater cut-off wall to keep groundwater levels adequate in the existing wetlands. Attachment 1 shows these features.

E. Water Quality

1. Describe any impacts to water quality that may result from any of the following:

a. Clearing, excavation, grading or other construction activities that will be involved with the project – Construction of the proposed project features will require clearing, excavation and grading. This work will be done in accordance with construction site best management practices developed specifically for the project and documented in a storm water management plan as required for a Colorado Department of Public Health and Environment Colorado Stormwater Discharge Permit.

b. Changes in the amount of hardscape (paving, concrete, brick, or buildings) in the project area – The project includes construction of a concrete multi-use path. This feature will increase the impervious surface area along the project reach. Runoff from the trail will be routed to pervious surfaces prior to discharge to Wonderland Creek.

c. Permanent changes in site ground features such as paved areas or changes in topography – See comment above regarding the concrete trail. In addition, the project will modify existing topography to disconnect Wonderland Creek from the Boulder and White Rock irrigation ditch. Disconnection will help to greatly reduce flood hazards along and downstream of the project reach. The conceptual design includes a wetland water quality enhancement feature (see Attachment 1).

d. Changes in the storm drainage from the site after project completion – No impact

e. Change in vegetation – The project will disrupt / remove vegetation during construction. The project landscaping will use native plantings.

f. Change in pedestrian and vehicle traffic – The project includes extension of a multi-use path that will facilitate alternative modes of transportation and therefore help to decrease vehicle traffic.

g. Potential pollution sources during and after construction (may include temporary or permanent use or storage of petroleum products, fertilizers, pesticides or herbicides) – Construction of the project features will require heavy equipment with associated petro-chemicals. Source control of these chemicals will be included in the project storm water management plan construction site best management practices. There will be no use of chemicals following project completion (Greenways habitat maintenance is done without the use of chemicals).

2. Describe any pumping of groundwater that may be anticipated either during construction or as a result of the project. If excavation or pumping is planned, what is known about groundwater contamination in the surrounding area (1/4 mile radius of the project) and the direction of groundwater flow? – See Below

**If any potential impacts have been identified, please provide any of the following that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate impacts to water quality
- Information from city water quality files and other sources (state oil inspector or the CDPHE) on sites with soil and groundwater impacts within 1.4 mile radius of the project
- Groundwater levels from borings or temporary peizometers prior to proposed dewatering or installation of drainage structures

Construction of the flood mitigation measures will require excavation and groundwater will likely be encountered. It is therefore likely that the work will be conducted based on requirements of a Colorado Department of Public Health and Environment Colorado Construction Dewatering Permit and a City of Boulder construction dewatering discharge agreement. In addition, the high functional wetlands will require existing groundwater levels to be maintained. A cut-off wall is included in the conceptual flood mitigation design to prevent impacts to groundwater levels in the wetland. There are no known groundwater contaminant sources within a ¼ mile of the project locations where excavation will be required.

F. Air Quality

1. Describe potential short or long term impacts to air quality resulting from this project. Distinguish between impacts from mobile sources (VMT/trips) and stationary sources (APEN, HAPS).

Construction of the project will result in temporary increases in emissions. The trail components of the project will, however, facilitate use of alternative transportation modes and therefore help to reduce overall city emissions. The project will not result in any stationary air quality impacts.

G. Resource Conservation

1. Describe potential changes in water use that may result from the project.

a. Estimate the indoor, outdoor (irrigation) and total daily water use for the facility – No Impacts

b. Describe plans for minimizing water use on the site (Xeriscape landscaping, efficient irrigation system) – No Impacts

2. Describe potential increases or decreases in energy use that may result from the project.

a. Describe plans for minimizing energy use on the project or how energy conservation measures will be incorporated into the building design

The trail components of the project will facilitate use of alternative transportation modes and therefore help to reduce overall city emissions. The project will not result in any stationary air quality impacts.

b. Describe plans for using renewable energy sources on the project or how renewable energy sources will be incorporated into the building design – No Impacts

c. Describe how the project will be built to LEED standards – No Impacts

3. Describe the potential for excess waste generation resulting from the project. If potential impacts to waste generation have been identified, please describe plans for recycling and waste minimization (deconstruction, reuse, recycling, green points). – No Impacts

H. Cultural / Historic Resources

1. Describe any impacts to:
    a. a prehistoric or historic archaeological site – No Impacts (see below)
    b. a building or structure over fifty years of age – No Impacts
    c. a historic feature of the site such as an irrigation ditch – See Below
    d. significant agricultural lands that may result from the project – No Impacts

**If any potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.

The Greenways Master Plan included a cultural resources survey along stream reaches. No cultural resources were identified along the Wonderland Creek project reach. The project does, however, include disconnecting Wonderland Creek from the Boulder and White Rock ditch. The flood mitigation measures also require putting a segment of the ditch in a pipe. Staff have been coordinating with the ditch company on design features.

I. Visual Quality

1. Describe the effects on:
    a. scenic vistas or views open to the public – No Impacts
    b. the aesthetics of a site open to public view – No Impacts
    c. view corridors from the site to unique geologic or physical features that may result from the project – No Impacts

J. Safety

1. Describe any additional health hazards, odors or exposure of people to radon that may result from the project – No Impacts
2. Describe measures for the disposal of hazardous materials – No Impacts
3. Describe any additional hazards that may result from the project (including risk of explosion or the release of hazardous substances such as oil, pesticides, chemicals or radiation) – See Below

**If potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts during or after site construction through management of hazardous materials or application of safety precautions.

The multi-use path currently ends just west of Foothills Parkway at the UCAR facility. Trail users have created an informal trail that continues west that includes crossing of the BNSF railroad line. A near fatality occurred in the recent past as a result of this informal crossing of the rail line. This project would provide a safe crossing of the railroad, eliminating a substantial hazard to trail users.

K. Physiological Well-being

1. Describe the potential for exposure of people to excessive noise, light or glare caused by any phase of the project (construction or operations) – See Below

2. Describe any increase in vibrations or odor that may result from the project – See Below

**If potential impacts have been identified, please provide the following:**

- A description of how the project would avoid, minimize or mitigate identified impacts

The project will result in increased vibrations and noise during construction. This disruption will be minimized by conducting construction only during weekdays during normal business hours. The completed trail will result in potential increased noise from trail users.

L. Services

1. Describe any increased need for the following services as a result of the project:

a. Water or sanitary sewer services – No Impacts

b. Storm sewer / flood control features

The project flood mitigation measures would greatly reduce the flood risks in the project area.

c. Maintenance of pipes, culverts and manholes

The project flood mitigation infrastructure will require period maintenance. This maintenance cost is shared with the Urban Drainage and Flood Control District.

d. Police services – No Impacts

e. Fire protection – No Impacts

f. Recreation or parks facilities – Extension of the multi-use path will provide recreational opportunities

g. Libraries – No Impacts

h. Transportation improvements / traffic mitigation – Extension of the multi-use path may increase the amount of alternative transportation miles and therefore decrease the maintenance requirements on existing roadways.

i. Parking – No Impacts

j. Affordable housing – No Impacts

k. Open space / urban open land – No Impacts

l. Power or energy use – Extension of the multi-use path may increase the amount of alternative transportation miles and therefore decrease the use of oil and gas.

m. Telecommunications – No Impacts

n. Health care / social services – No Impacts

o. Trash removal or recycling services

A large amount of trash and debris accumulates near the confluence of Wonderland Creek and the Boulder and White Rock irrigation ditch. The flood mitigation measures and trail system will facilitate easier trash and debris removal.

2. Describe any impacts to any of the above existing or planned city services or department master plans as a result of this project (e.g. budget, available parking, planned use of the site, public access, automobile / pedestrian conflicts, views) – No Impacts

M. Special Populations

1. Describe any effects the project may have on the following special populations:

a. Persons with disabilities – See Below

b. Senior populations – See Below
c. Children or youth – See Below
d. Restricted income persons – See Below
e. People of diverse backgrounds – No Impacts
f. Sensitive populations located near the project (e.g. adjacent neighborhoods or property owners, schools, hospitals, nursing homes) – See Below

**If potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impact
- A description of how the proposed project would benefit special populations

Wonderland Creek between the Diagonal Highway and Foothills Parkway is currently undersized to convey the estimated flows resulting from the 100-year event. The existing conditions floodplain extends well beyond the creek banks and includes numerous structures. Structures located at 3375 34th Street, 3700 Hayden Place and 3690 Hayden Place are currently located in the High Hazard Zone (defined as the zone where depth and velocity pose a threat to life and safety). In addition, the Wynwood Senior Living Center (3375 34th Street), a critical facility, is located within the High Hazard Zone. This project would provide flood mitigation from upstream of Iris to Foothills Parkway, greatly reducing the flood risk for senior populations and persons, persons with disabilities and all other people currently living in the flood zone. In addition, the proposed trail extension would be designed to ADA standards, providing a safe alternative mode of transportation for persons with disabilities, children and all other trail users (see previous note regarding current unsafe informal trail crossing of the BNSF railroad). Restricted income people could use the trail to commute via biking or walking instead of needing to rely on more expensive modes of transportation.

N. Economic Vitality

1. Describe how the project will enhance economic activity in the city or region or generate economic opportunities. – See Below

2. Describe any potential impacts to:
   a. businesses in the vicinity of the project (ROW, access or parking) – See Below
   b. employment – See Below
   c. retail sales or city revenue and how they might be mitigated – See Below

This project would provide flood mitigation that would reduce the risk of road closures to businesses and residences in and around the project reach during a flood event. This would in turn reduce the costs associated with lost revenue from employment and businesses that would be caused by lack of access during a flood event. The project flood mitigation infrastructure will, however, require period maintenance. This maintenance cost is shared with the Urban Drainage and Flood Control District.

**ATTACHMENT 1**
**OPEN HOUSE COMMENT SHEET SUMMARY**

# Wonderland Creek Greenways Improvement Project
# Open House Thursday January 14, 2010
# COMMENTS

*27 people attended the open house. 24 completed comment sheets were submitted. The following summarizes the comments:*

**TRAIL CROSSINGS**

1. My preference for crossing the BNSF railroad is:
   __3__ at grade (Phase 1a, Option A)
   __2__ an overpass (Phase 1a, Option B)
   __18__ an underpass (Phase 1a, Option C)

   Because:

- *Very bad option when FasTracks is done (option a)*
- *You have to build the new railroad bridge anyway – why not use it for a bike path (option c)*
- *Do something about the train noise – the noise is awful at 2 a.m.*
- *I prefer no conflict options strongly, this applies to all of my preferences listed here*
- *The social trail already exists and is a most direct path to Iris (option a)*
- *Option B is extremely circuitous, Option A doe not link effectively to neighborhoods west of the creek*
- *Trail should stay along the creek*
- *This option provides the most safety for cyclists and pedestrians. Also little climbing making it appealing to non athletes (option c).*
- *Builds on existing trail and infrastructure plus opens up to options that involve the least amount of car traffic (option C)*
- *This would take bikes into traffic if the crossing is at the light (option A)*
- *This would be traffic free and connect with existing park or proposed wetland path (option C)*
- *This is my preference (option C) if a better crossing under Foothills is added (not currently an option), otherwise I recommend option A an at grade crossing*
- *Prefer underpass to large structure of overpass*
- *I can't stand the train noise! Get rid of it! It wakes me up!*
- *Less redundant trail to avoid at-grade crossing (option C)*
- *Makes use of crossing (culvert / bridge) already being built (option C)*

2. My preference for crossing Iris Avenue is:
   __3__ at grade 34th St (Phase 2a, Option A)
   __3__ at grade Bridger Trail (Phase 2a, Option B)
   __16__ an underpass (Phase 2a, Option C)
   Because:

- *Not worth the cost – Iris has low traffic so at-grade crossing is no problem (option 2a)*
- *It's safest, and if culverts are to be built anyway, seems a good multi-use of the resource (option c)*
- *Minimizes car/bike conflict, most continuous route for bikers (option c)*
- *It's a good tie-in and fits with traffic flow from 34th street (option A)*
- *Avoids traffic and makes a seamless connection to Wonderland Trail (option C)*
- *Traffic free – we work at 34th and Iris and there is constant traffic at the 34th / Iris intersection (option C)*
- *Prefer underpass*
- *Prefer to avoid at-grade crossings*

**TRAIL ALIGNMENTS**

3. My preference for a trail alignment from the BNSF railroad to Iris Avenue is:
   __3__ Talisman/Iris (Phase 1b, Option A)
   __18__ Wonderland Creek (Phase 1b, Option B)
   __2__ Howard Heuston Park/34th St. (Phase 1b, Option C)
   Because:

- *Much prettier route – like you have done on the floodplains all over Boulder*
- *More direct path to Iris (option A)*
- *Scenic, continuous for biking (option B)*
- *This option provides the best connection for community cyclists, most direct (option B)*
- *Makes use of scenic area (option B)*
- *Only if an underground crossing of Foothills is included (option B), if not I recommend using option A*
- *Away from automobile and bus traffic (option B)*
- *Enjoy trails along waterways instead of roadways*

4. My preference for a trail alignment from Iris Ave. to Diagonal Hwy:
   __2__ Iris Avenue (Phase 2b, Option A)
   __20__ Wonderland Creek (Phase 2b, Option B)
   __0__ Diagonal Highway (Phase 2b, Option C)

   Because:

- *I prefer the 'urban' style as well i.e. culvert versus natural state*
- *It'll hook up more naturally with existing trail behind the bank and is more direct (option b)*
- *Most continuous route for biking (option B)*
- *Best connection. This will facilitate more bike commuting (option B)*
- *Makes use of existing bike path that goes under the Diagonal (option B)*
- *Away from automobile and bus traffic (option B)*
- *Enjoy trails along waterways instead of roadways*
- *It's what was envisioned when the original culvert under Diagonal Highway was built. It has a logical traffic flow (option B)*

**FLOOD MITIGATION**

5. My preference for flood mitigation from Foothills Parkway to 34th is:
   __7__ single flow (Phase 1, Option 1)
   __2__ split flow (Phase 1, Option 2)
   __7__ no preference

   Because:

- *Water engineers should do what is best*
- *Seems simpler option would tend to cause less possible 'unforeseen' problems later and is simpler for ongoing maintenance*
- *Prefer single flow channel*

6. My preference for flood mitigation from 34th to 30th Streets is:
   __4__ box culvert/channel (Phase 2, Option 1)
   __4__ high flow bypass (Phase 2, Option 2)
   __9__ no preference

   Because:

- *Water engineers should do what is best*
- *Avoids at-grade crossing, single continuous flow path*

**OTHER**

7. Other comments and concerns for staff to consider:

- *Trail options 1a all have poor connections from across Foothills to Option 1b.*
- *I would like the trail to follow the creek and cross from Spring Creek bridge and follow Talisman to BNSF. I live on Talisman and would like the trail in front of my place.*
- *I appreciate understanding the potential plans and being able to comment on the options. Avoiding more flooding from the over loaded White Rock ditch is important – please don't let this drag on for years. Move ahead expeditiously.*
- *My concern is with the pond by the Kings Ridge Development / 47th – the Cattails are overgrown and prohibiting water flow – something has to be done. It is stagnant and a great place for mosquitoes to reproduce.*
- *Please make sure there is no more possibility for a severe flood because of man made changes to make more trails.*
- *Great work, good luck with 100-year mitigation funding*
- *Please clean up pond behind townhouses on Bell.*
- *Water quality is hugely important to me. I support and encourage best practices in wetland preservation. Also, I live in Kings Ridge so flood mitigation at railroad crossing is also important.*
- *Please design this to maximize the practicality of the path for bike commuting i.e. most direct path.*
- *All the options are better than what currently exists for the bike path. The Geological Society of America (current owner of 3115 iris) is eager to have the best trail option possible!*
- *The connection from Foothills to the Diagonal via bike path is crucial. Any improvement over the current situation is welcome! Currently it is dangerous to cross the tracks.*
- *I hate the train noise*
- *Thank you for considering the pond downstream of 47th Street as part of this project. We look forward to being an active neighborhood with this resource!*
- *Trail – the most important part of the project is Foothills to 34th. We <u>strongly</u> support Phase 1 option C for crossing the train tracks. We think that is by far the best option. From that, we support Phase 1b Option B from Talisman to 34th – would be our #1 choice. Second choice is option C (Heuston Park – we would like to see this connection maybe on a later project). Phase 2 – we like the Iris underpass. If we can't do this, we prefer yellow cross at 34th. For the final phase, we prefer Option B Wonderland Creek. Most important – we stress – is option C at the railroad crossing.*

8. Feedback on the format of this meeting:

- *Clarify scope of project in mailings*
- *Very informative*
- *Good format, lots of interaction*
- *Very good, informative*
- *The maps and phases were not as easy to understand – I felt as though the plan needs to be clearer for us*
- *Really good and effective – I came late and had one-on-one attention and explanations. Perhaps during busier times there could be scheduled presentations. Appointments could be ok, but may lower turnout.*
- *A brief presentation and explanation of how best to pick your preferred option. Do you want us to consider cost at this point or just ideally what we would like to see?*
- *This form does not follow the flow of the charts. Flood mitigation should have started the form, not the trail crossings.*
- *It was run well*
- *Thank you, very helpful to have a forum to discuss options*
- *Format was great. All public hearings should be this format.*

**ATTACHMENT 2**
**HOA MEETING COMMENT SHEETS**

# Wonderland Creek Greenways Improvement Project
# Talisman HOA Meeting Tuesday February 16, 2010
# COMMENTS

**TRAIL CROSSINGS**

1. My preference for crossing the BNSF railroad is:
   ____ at grade (Phase 1a, Option A)
   ____ an overpass (Phase 1a, Option B)
   X an underpass (Phase 1a, Option C)
   Because:

7 People

4 Board

3 Homeowners

Boulders HOA/Community

104 Units bordering Plan

2. My preference for crossing Iris Avenue is:
   ____ at grade 34th St (Phase 2a, Option A)
   X at grade Bridger Trail (Phase 2a, Option B)
   ____ an underpass (Phase 2a, Option C)
   Because:

**TRAIL ALIGNMENTS**

3. My preference for a trail alignment from the BNSF railroad to Iris Avenue is:
   ____ Talisman/Iris (Phase 1b, Option A)
   ____ Wonderland Creek (Phase 1b, Option B)
   X Howard Heuston Park/34th St. (Phase 1b, Option C)
   Because:

4. My preference for a trail alignment from Iris Ave. to Diagonal Hwy:
   ____ Iris Avenue (Phase 2b, Option A)
   X Wonderland Creek (Phase 2b, Option B)
   ____ Diagonal Highway (Phase 2b, Option C)
   Because:

OVER

**FLOOD MITIGATION**

5. My preference for flood mitigation from Foothills Parkway to 34th is:
   ____ single flow (Phase 1, Option 1)
   X split flow (Phase 1, Option 2)
   ____ no preference
   Because:

6. My preference for flood mitigation from 34th to 30th Streets is:
   X box culvert/channel (Phase 2, Option 1)
   ____ high flow bypass (Phase 2, Option 2)
   ____ no preference
   Because:

**OTHER**

7. Other comments and concerns for staff to consider:

# Wonderland Creek Greenways Improvement Project
## Talisman HOA Meeting Tuesday February 16, 2010
# COMMENTS

**TRAIL CROSSINGS**

1. My preference for crossing the BNSF railroad is:
   ____ at grade (Phase 1a, Option A)
   ____ an overpass (Phase 1a, Option B)
   _X_ an underpass (Phase 1a, Option C)
   Because:

2. My preference for crossing Iris Avenue is:
   ____ at grade 34th St (Phase 2a, Option A)
   ____ at grade Bridger Trail (Phase 2a, Option B)
   _X_ an underpass (Phase 2a, Option C)
   Because:

**TRAIL ALIGNMENTS**

3. My preference for a trail alignment from the BNSF railroad to Iris Avenue is:
   ____ Talisman/Iris (Phase 1b, Option A)
   ____ Wonderland Creek (Phase 1b, Option B)
   _X_ Howard Heuston Park/34th St. (Phase 1b, Option C)
   Because:

4. My preference for a trail alignment from Iris Ave. to Diagonal Hwy:
   ____ Iris Avenue (Phase 2b, Option A)
   _X_ Wonderland Creek (Phase 2b, Option B)
   ____ Diagonal Highway (Phase 2b, Option C)
   Because:

OVER

**FLOOD MITIGATION**

5. My preference for flood mitigation from Foothills Parkway to 34th is:
   ____ single flow (Phase 1, Option 1)
   ____ split flow (Phase 1, Option 2)
   X no preference
   Because:

6. My preference for flood mitigation from 34th to 30th Streets is:
   ____ box culvert/channel (Phase 2, Option 1)
   X high flow bypass (Phase 2, Option 2)
   ____ no preference
   Because:

**OTHER**

7. Other comments and concerns for staff to consider:

# Wonderland Creek Greenways Improvement Project
## Talisman HOA Meeting Tuesday February 16, 2010
# COMMENTS

**TRAIL CROSSINGS**

1. My preference for crossing the BNSF railroad is:
   ____ at grade (Phase 1a, Option A)
   ____ an overpass (Phase 1a, Option B)
   X an underpass (Phase 1a, Option C)
   Because: Safety

2. My preference for crossing Iris Avenue is:
   ____ at grade 34th St (Phase 2a, Option A)
   ____ at grade Bridger Trail (Phase 2a, Option B)
   X an underpass (Phase 2a, Option C)
   Because: Safety

**TRAIL ALIGNMENTS**

3. My preference for a trail alignment from the BNSF railroad to Iris Avenue is:
   ____ Talisman/Iris (Phase 1b, Option A)
   X Wonderland Creek (Phase 1b, Option B)
   ____ Howard Heuston Park/34th St. (Phase 1b, Option C)
   Because: Good Access, Egress, Safety

4. My preference for a trail alignment from Iris Ave. to Diagonal Hwy:
   ____ Iris Avenue (Phase 2b, Option A)
   X Wonderland Creek (Phase 2b, Option B)
   ____ Diagonal Highway (Phase 2b, Option C)
   Because: Scenic, Safety, Continuity

OVER

**FLOOD MITIGATION**

5. My preference for flood mitigation from Foothills Parkway to 34th is:
   ____ single flow (Phase 1, Option 1)
   ____ split flow (Phase 1, Option 2)
   X no preference
   Because: you are smarter

6. My preference for flood mitigation from 34th to 30th Streets is:
   ____ box culvert/channel (Phase 2, Option 1)
   ____ high flow bypass (Phase 2, Option 2)
   X no preference
   Because: you are smarter

**OTHER**

7. Other comments and concerns for staff to consider:

# Wonderland Creek Greenways Improvement Project
## Talisman HOA Meeting Tuesday February 16, 2010
# COMMENTS

**TRAIL CROSSINGS**

1. My preference for crossing the BNSF railroad is:
   ____ at grade (Phase 1a, Option A)
   ____ an overpass (Phase 1a, Option B)
   __X__ an underpass (Phase 1a, Option C)
   Because:

2. My preference for crossing Iris Avenue is:
   ____ at grade 34th St (Phase 2a, Option A)
   ____ at grade Bridger Trail (Phase 2a, Option B)
   __X__ an underpass (Phase 2a, Option C)
   Because:

**TRAIL ALIGNMENTS**

3. My preference for a trail alignment from the BNSF railroad to Iris Avenue is:
   ____ Talisman/Iris (Phase 1b, Option A)
   __X__ Wonderland Creek (Phase 1b, Option B)
   ____ Howard Heuston Park/34th St. (Phase 1b, Option C)
   Because:

4. My preference for a trail alignment from Iris Ave. to Diagonal Hwy:
   ____ Iris Avenue (Phase 2b, Option A)
   __X__ Wonderland Creek (Phase 2b, Option B)
   ____ Diagonal Highway (Phase 2b, Option C)
   Because:

OVER

**FLOOD MITIGATION**

5. My preference for flood mitigation from Foothills Parkway to 34th is:
   ____ single flow (Phase 1, Option 1)
   _X_ split flow (Phase 1, Option 2)
   _X_ no preference
   Because:

6. My preference for flood mitigation from 34th to 30th Streets is:
   ____ box culvert/channel (Phase 2, Option 1)
   ____ high flow bypass (Phase 2, Option 2)
   _X_ no preference
   Because:

**OTHER**

7. Other comments and concerns for staff to consider:

# Wonderland Creek Greenways Improvement Project
# Talisman HOA Meeting Tuesday February 16, 2010
# COMMENTS

**TRAIL CROSSINGS**

1. My preference for crossing the BNSF railroad is:
   ____ at grade (Phase 1a, Option A)
   ____ an overpass (Phase 1a, Option B)
   ✓ an underpass (Phase 1a, Option C)
   Because:

for all of these options, if we're going to invest in this, then i'd rather not be riding by cars

2. My preference for crossing Iris Avenue is:
   ____ at grade 34th St (Phase 2a, Option A)
   ____ at grade Bridger Trail (Phase 2a, Option B)
   ✓ an underpass (Phase 2a, Option C)
   Because:

**TRAIL ALIGNMENTS**

3. My preference for a trail alignment from the BNSF railroad to Iris Avenue is:
   ____ Talisman/Iris (Phase 1b, Option A)
   ✓ Wonderland Creek (Phase 1b, Option B)
   ____ Howard Heuston Park/34th St. (Phase 1b, Option C)
   Because:

4. My preference for a trail alignment from Iris Ave. to Diagonal Hwy:
   ____ Iris Avenue (Phase 2b, Option A)
   ✓ Wonderland Creek (Phase 2b, Option B)
   ____ Diagonal Highway (Phase 2b, Option C)
   Because:

OVER

**FLOOD MITIGATION**

5. My preference for flood mitigation from Foothills Parkway to 34th is:
   ____ single flow (Phase 1, Option 1)
   ✓ split flow (Phase 1, Option 2)
   ____ no preference
   Because:

6. My preference for flood mitigation from 34th to 30th Streets is:
   ✓ box culvert/channel (Phase 2, Option 1)
   ____ high flow bypass (Phase 2, Option 2)
   ____ no preference
   Because:
   Option 2 disallows for an underpass @ 34th.

**OTHER**

7. Other comments and concerns for staff to consider:

**ATTACHMENT 3**
**EASEMENT SUMMARY**

# WONDERLAND CREEK PHASE ONE Easements

IRIS AVE.

34TH ST.

FOOTHILLS PARKWAY

drainage esmt. R# 10652

ped/bike esmt. R# 10655

drainage esmt. PLAT

drainage esmt. ped & bike access PLAT

TALISMAN PLACE access & utility easement PLAT

drainage esmt. DIDN'T FIND

utility esmt. PLAT

HAYDEN PL.

access esmt. DIDN'T FIND

Tract C bike easement PLAT

# WONDERLAND CREEK PHASE ONE Subdivisions

IRIS AVE.

TALISMAN FILING NO. ONE

WONDERLAND GARDENS FILING NO. 1

WONDERLAND GARDEN PLANNED DEVELOPMENT

AMENDED PLAT SPRING CREEK TOWNHOUSES REPLAT

34TH ST.

FOOTHILLS PARKWAY

TALISMAN FILING NO. TWO

TALISMAN PLACE

HAYDEN PL.

MEADOW WOOD

# WONDERLAND CREEK PHASE ONE Ownership

IRIS AVE.

34TH ST.

BOULDERS HOA

BOULDERS HOA

CDOT

SPRING CREEK HOA

TALISMAN PLACE

HAYDEN PL.

HAYDEN PLACE OWNERS ASSOC.

BURLINGTON NORTHER RR

FOOTHILLS PARKWAY

# WONDERLAND CREEK PHASE TWO Easements

DIAGONAL HIGHWAY

UTILITY

UTILITY

PLAT

Public multi-use path easement R# 2532550

Flood control channel PLAT

emergency vehicle access

30TH ST.

34TH ST.

sidewalk esmts. R#168571

IRIS AVE.

sidewalk esmt. R#1781417

drainage esmt. R#943044

# WONDERLAND CREEK PHASE TWO Subdivisions

DIAGONAL HIGHWAY

REPLAT OF LOTS 2 & 3
BANK OF BOULDER PARK

BANK OF BOULDER PARK

30TH ST.

34TH ST.

IRIS AVE.

REMINGTON POST
REPLAT A

# WONDERLAND CREEK PHASE TWO Ownership

DIAGONAL HIGHWAY

DELLACAVA FAMILY LLC

DELLACAVA FAMILY LLC

DELLACAVA FAMILY LLC

DELLACAVA FAMILY LLC

DELLACAVA FAMILY LLC

DELLACAVA FAMILY LLC

GSA

GSA

GSA

30TH ST.

34TH ST.

IRIS AVE.

NATIONWIDE HEALTH PARTNERS

**ATTACHMENT 4**
**NATURAL RESOURCE SUMMARY**

ERO Resources Corp.
1842 Clarkson Street
Denver, CO 80218
(303) 830-1188
Fax: 830-1199
www.eroresources.com
ero@eroresources.com

July 29, 2010

**To:** Kurt Bauer, City of Boulder
Dick Smith – Ayres Associates

**From:** Mary L. Powell

**Re:** Review of Wonderland Improvements for Natural Resource "Red Flags"

ERO Resources Corp. (ERO) assessed the project area of flood control and recreation improvements along Wonderland Creek from Foothills Parkway to 30th Street for the presence of significant natural resources that could make the current project concepts difficult or infeasible to implement. Potential significant natural resources include habitat for threatened or endangered species, raptor nests, unique wetlands, and use by wildlife such as black-tailed prairie dog.

Through most of the project area, Wonderland Creek flows through areas with commercial and residential development. The creek and its floodplain have been significantly encroached upon and the creek has been channelized along most of its length. At the east end of the project area, there is a large cattail-dominated wetland that has been created by sediment deposition in an area where water backs up behind a berm that parallels the Boulder and Left Hand Ditch. A number of large, mature cottonwood trees are growing on the berm, along with other species including crack willow and box elder.

No significant natural resources were noted in the project area. There is no suitable habitat for Preble's meadow jumping mouse or Ute ladies'-tresses orchid because of urbanization and habitat fragmentation in the case of Preble's and the presence of wetland communities and soils that are not typically associated with the orchid. Although there is suitable nesting substrate, no raptor nests were observed in the large trees along the berm. It is unlikely, but possible, that a nest was present but obscured from view by leaves. The wetlands in the project area are typical of those found in urban areas and are dominated by cattail, sandbar willow, reed canarygrass, and other common species. The lateral extent of riparian trees and shrubs is limited due to encroachment.

As currently planned, the proposed project would not affect any unique or significant natural resources, but there would be impacts to regulated wetlands and riparian areas and a number of large trees may be removed.