2.0 PROJECT DESCRIPTION

Placer County Department of Public Works (Placer County) proposes to improve the quality of stormwater discharging into Lake Tahoe from the Kings Beach community by stabilizing exposed soils with vegetation and/or mulch; improving the existing drainage system with new curbs, gutters, earthen berms and underground pipes; and treating runoff with a variety of methods including fill removal, sediment traps and vaults, swales, infiltration and/or detention basins, and media filters. In addition, Placer County proposes to improve fish passage and habitat in Griff Creek by replacing culverts, constructing in-channel habitat features, excavating portions of channel, constructing new channel, and installing rock channel bed stabilization (grade control) structures. These actions are described in more detail in the following sections.

The Project emphasizes three methods: pollutant source control, runoff control (hydrologic control), and treatment of runoff through water quality treatment basins; complemented by advanced filtration to treat runoff that cannot be effectively treated with the three methods. This approach follows the preferred design approach commonly accepted to improve stormwater quality and generally follows the planning procedures developed by the Lake Tahoe Basin Storm Water Quality Improvement Committee (SWQIC)[3] (SWQIC 2004).

2.1 Watershed Improvement

As originally conceived, the watershed improvement component of the Project was a stand-alone project known as the "WIP." The following discussion focuses on the WIP component of the Project, followed by a discussion on the Griff Creek SEZ restoration component.

The main strategy for watershed improvement is to limit the amount of runoff that washes through the Kings Beach community, and to treat the runoff that originates in the community. This would be achieved with a three-pronged approach:

1. **Capture Forest runoff.** This first element of the three-pronged approach would capture runoff from the forested upper watershed — which is relatively clean (see Table 1) — before it reaches the Residential Area, and convey that clean runoff directly to Lake Tahoe.
2. **Capture and treat Residential Area runoff.** Unlike the forest runoff, the Residential Area runoff contains pollutants (though not as much as the Commercial Core runoff). This second element of the strategy would capture the Residential Area runoff before it co-mingles with Commercial Core runoff. The runoff would be treated through settling and infiltration, and then discharged directly to Lake Tahoe. Source control is also an important element of the Project's strategy to improve water quality originating from the Residential Area.
3. **Capture and treat Commercial Core runoff.** Commercial Core runoff carries the highest concentrations of pollutants. Commercial Core runoff will be collected and treated with advanced filtration systems before discharge to Lake Tahoe. As with the Residential Area, source controls would also be implemented in the Commercial Core.

Figure 4 illustrates the three main runoff source areas described above.

[3] Project planning occurred while the SWQIC guidelines were still in development, so the Project planning process did not follow the SWQIC guidelines exactly.

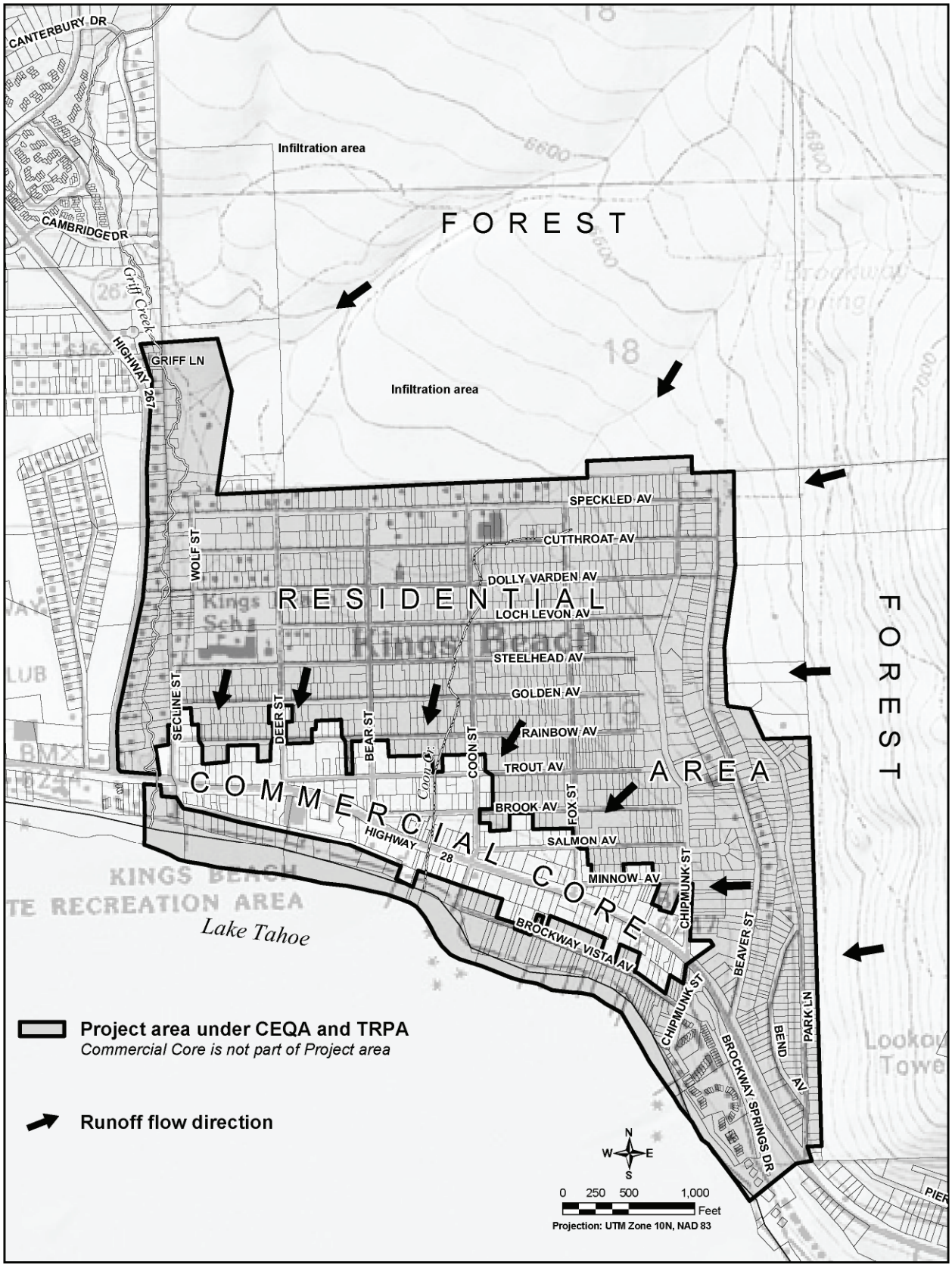


Figure 4. The three main runoff source areas of the Watershed Improvement Plan.
Forest, Residential Area, and Commercial Core.

Solids in water can be removed by physical separation, which is most easily achieved by reducing water velocities and allowing the solids to settle out of the water. This is the principle behind the settling basins and infiltration devices that comprise the majority of the runoff treatment design proposed for the Residential Area. Much of the pollution in the Commercial Core runoff, however, is not only suspended, but also dissolved in the water. These dissolved contaminants require more advanced treatment, hence the proposed filtration systems. However, filters become inefficient when there is a high rate of flow through them. Separating Forest and Residential Area runoff from the Commercial Core runoff would reduce the volume of water needing advanced treatment and would avoid overloading the filters.

The major watershed improvement actions are summarized below and shown in Figure 5.

- Design and construct drainage infrastructure to separate Forest, Residential Area, and Commercial Core runoff to reduce the amount of water that must be treated at the Commercial Core.
- Revegetate or install rock protection on eroding slopes within the Project area.
- Construct grass swales, rock-lined channels, curb-and-gutter, and underground piping to convey runoff to filtration systems (i.e., detention basins and rock bowls). The Project design emphasizes using grass and rock (instead of concrete) in open channels to reduce erosion during conveyance yet allowing water to infiltrate into the ground.
- Construct detention basins, rock bowls and infiltration galleries that collect and retain urban runoff to control the volume of runoff and to promote water infiltration and sediment filtration.
- Install filtration systems such as sediment vaults, sediment traps, and filter vaults to treat urban runoff.
- Remove some impervious surfaces (about 20,000 to 50,000 square feet).
- Improve unpaved areas that are used for parking or vehicular travel. Porous concrete, crushed rock, or mulch would be used to promote water infiltration while reducing erosion.
- Install boulders to minimize unauthorized parking or vehicular travel (i.e., surface disturbance) on unpaved surfaces.
- Work with landowners to implement backyard best management practices (BMPs) to control pollutants that originate from private parcels.

In the past, several projects have been implemented within the Project area by Placer County to improve the function and performance of storm water collection and treatment facilities. The Project would incorporate and make improvements to elements of these existing storm water facilities. The projects are shown on Figure 5a and are summarized as follows:

- Kings Beach Erosion Control Project – This project installed storm water quality improvements within the Bear, Coon, and Fox sub watersheds. The improvements included rock lined channels, sediment vaults, sediment cans, and detention basins.
- Griff Creek Stream Restoration Project – The project entailed the construction of water quality improvement facilities within the Griff Creek sub-watershed. Improvements with the Griff Creek SEZ included floodplain enhancement, stream bank protection, and revegetation of disturbed areas. Additionally, water quality treatment basins were installed.
- Beaver Street Erosion Control Project – Within the Beaver and Park sub-watersheds, several types of water quality improvements were made. The improvements included, rock lined channels, curb and gutter systems along roadways, drainage inlets, sediment cans and water quality treatment basins.

- Upper Cutthroat Erosion Control Project – This project installed rock lined channels, drainage inlets, curb and gutter, sediment cans, and water quality treatment basins primarily along Cutthroat and Dolly Varden Avenues within the Coon and Fox sub-watersheds.

2.1.1 Water Quality Improvement Elements

As described above and as shown on Figures 5a through 5g, the Project proposes numerous improvements to the existing storm water management system. The following descriptions summarize the major components of the Project. Photographic examples of typical erosion control and water treatment improvements are shown in Figure 6, and drawings of planned treatment elements are provided on Sheets D-1 through D-23 of the design plans (Appendix C).

Detention Basins

Detention basins are excavated, unlined depressions designed to provide temporary storage of storm water runoff. Additionally, the basins are designed to allow infiltration of the stored water into the ground. The detention and infiltration promotes removal of suspended sediments and nutrients, improving water quality. The basins would be constructed on open parcels and would receive water from rock lined channels and curb-and-gutter collection systems. The basins proposed by the Project would range in surface area from approximately 500 to 4,000 square feet. The largest basins would be located at the corner of Loch Levon Avenue and Deer Street and near the intersection of Secline Street and SR 28. The depth of excavation for the basins would range from one to about six feet below the existing ground surface. The maximum depth of water stored in the basins would be about three feet. The sideslopes of the basins would be gentle (between 6:1 and 3:1, horizontal:vertical) and would be vegetated with native plant species. The basins would be generally similar in appearance to existing detention basins within the Project area. However, the proposed basins would be constructed, revegetated, and maintained in accordance with the Project design and all mitigation proposed in this environmental document.

Infiltration Galleries

The Project proposes the construction of infiltration galleries to promote the percolation of collected storm water into the subsurface. The infiltration would reduce the volume of surface water transported out of the Project area. Additionally, the infiltration of water through the subsurface would provide for removal of sediments and associated pollutants. Two infiltration galleries are proposed in the ball fields south of Dolly Varden Avenue near its intersection with Wolf Street. Trenches are excavated to a depth of less than six feet. The bottom of the trench is filled with gravel on which a series of manufacture infiltration chambers are placed. The remainder of the trench is filled with granular fill.

Sediment and Filter Vaults

Sediment vaults proposed for the Project are pre-cast concrete boxes installed below the ground surface. Storm water collected by rock or grass lined channels and curb-and-gutter systems flow to drain pipes and is directed into the vaults. The vaults are designed with baffling systems to reduce the velocity of water flow and promote the settlement of suspended sediment. Filter vaults are similar to sediment vaults in that they are subsurface vaults that provide removal of sediment and nutrients from runoff. The removal is performed by passing the runoff through filters contained in the vaults. Sediment and filter vaults would be installed throughout the Project area.

Grass Lined Swales

The Project proposes the construction of grass lined swales along the margins of some streets and in open space areas for the conveyance of runoff. The swales are proposed in areas with relatively low expected runoff flow velocities. The swales are shallow linear depressions that are vegetated with grasses. The vegetation promotes the removal of sediment and nutrients suspended in the runoff. Grass lined swales would be primarily used within the Coon Creek drainage.

Rock Lined Channels and Rock Bowls

Rock lined channels are proposed along the margins of streets and along some drainage channels. The purpose of the rock lined channel is to provide stable conveyance of storm water to treatment facilities (e.g., detention basins, infiltration galleries, sediment vaults) and promote infiltration of runoff. The channels are shallow linear depressions that are lined with rock fragments (generally ranging between 8 to 16 inches in diameter). The channel design includes energy dissipation features at the transition between the channel and inlets to drainage pipes.

Rock bowls are shallow (four to five feet) circular depressions filled with coarse rock fragments. The bowls promote infiltration of the runoff flows and can be located along drainage channels or swales or at the terminus of storm drain pipes. Most of the proposed rock bowls are located along the Coon Creek drainage.

Earthen Berms

Earthen berms proposed by the Project range between 6 to 24 inches in height, and 3 to 7 feet in width. Three berms are planned in the Project area: 1) near the north end of Chipmunk Street, to augment the planned rock bowl at that location 2) at Salmon Court, to augment the planned detention basin there, and 3) in the planned secondary channel in Griff Creek near the end of Golden Avenue, to prevent channel migration and ensure water from the secondary channel flows back into the primary channel. The berms planned for this Project would be revegetated with native plant species.

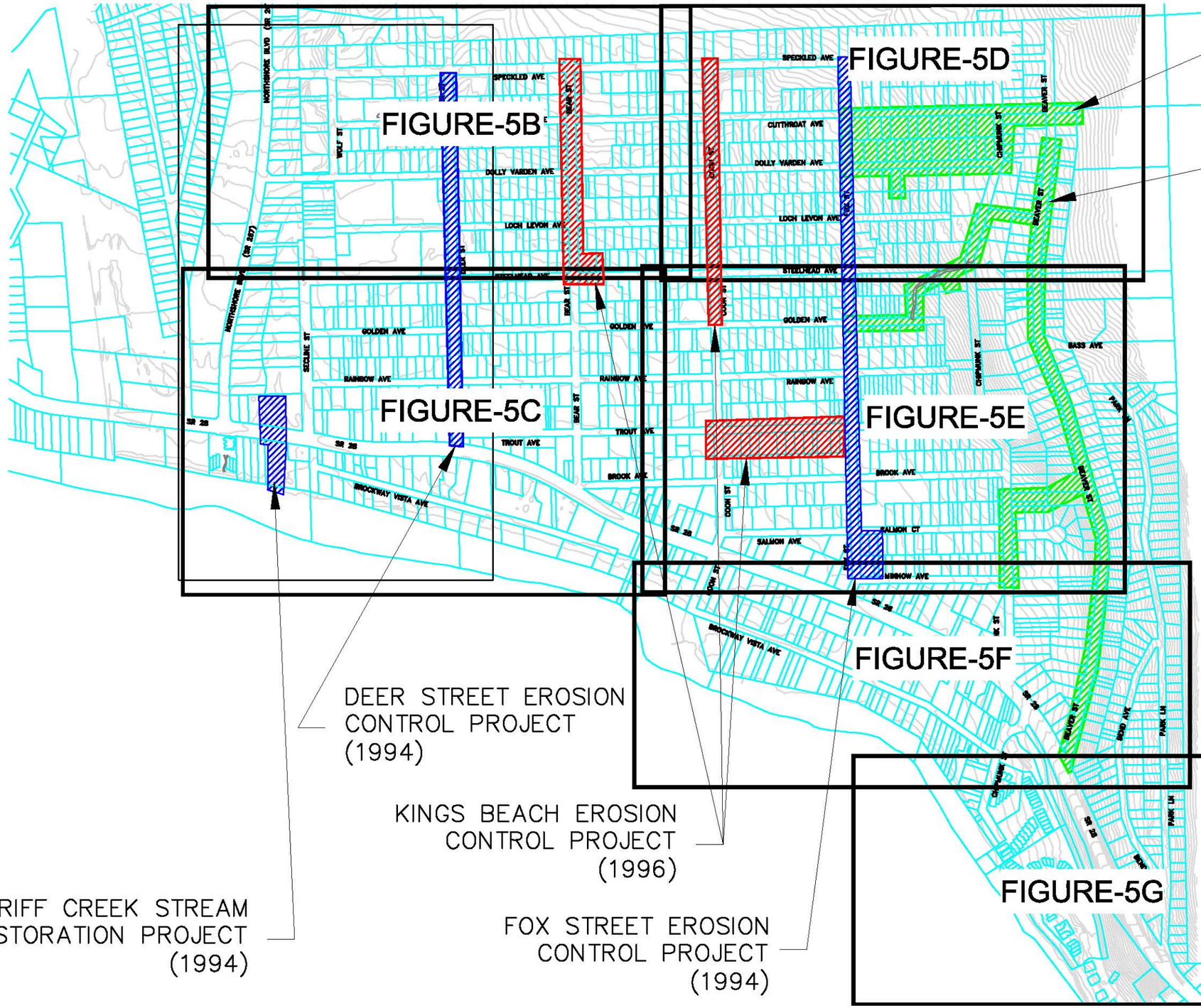
Porous Concrete Pavement

The Project proposes construction of porous concrete pavement along the shoulders of some of the streets within the Project area. Porous concrete is a permeable pavement underlain by granular fill which acts as a reservoir for water that percolates through the pavement. The appearance of porous concrete is similar to conventional concrete but porous pavement has more void spaces, allowing the movement of water through the pavement. Porous pavement would provide a stable parking surface while promoting increased infiltration of runoff into the subsurface. Increased infiltration would reduce runoff flows and provide increased water quality treatment by removing sediment and nutrients. The primary areas proposed to receive the porous pavement treatment are:

- both sides of Brockway Vista Avenue between Coon Street and Chipmunk Street;
- the west side of Park Lane north of SR 28; and
- the south side of Brook Avenue, Trout Avenue, and Golden Avenue between Coon Street and Fox Street.

2.1.2 Other Notable Water Quality Improvement Elements

- Three different roadway options exist for the installation of curb-and-gutter along Speckled Avenue: 1) no parking, 2) parking on one side and 3) parking on both sides. All three options will allow for a reduction of impervious coverage relative to existing conditions.
- Removal of earthen fill (dirt pile) at northwest corner of Dolly Varden Avenue and Wolf Street.
- Installation of curb-and-gutter at the crossing of the Coon Street SEZ. This would provide separation of road runoff from SEZ runoff. In addition, each crossing is proposing to have four double-sediment traps (eight sediment traps, 4-foot diameter each) to pre-treat the runoff before discharging into the SEZ for final treatment.



CUTTHROAT EROSION CONTROL PROJECT (2004)

BEAVER ST. EROSION CONTROL PROJECT (2003 & 2007)

DEER STREET EROSION CONTROL PROJECT (1994)

KINGS BEACH EROSION CONTROL PROJECT (1996)

GRIFF CREEK STREAM RESTORATION PROJECT (1994)

FOX STREET EROSION CONTROL PROJECT (1994)

NOTE:
ALL PROJECTS SHOWN ARE EXISTING PROJECTS WITH CONSTRUCTION COMPLETION DATES

0 600 1200
SCALE: 1" = 600'

REVISION			
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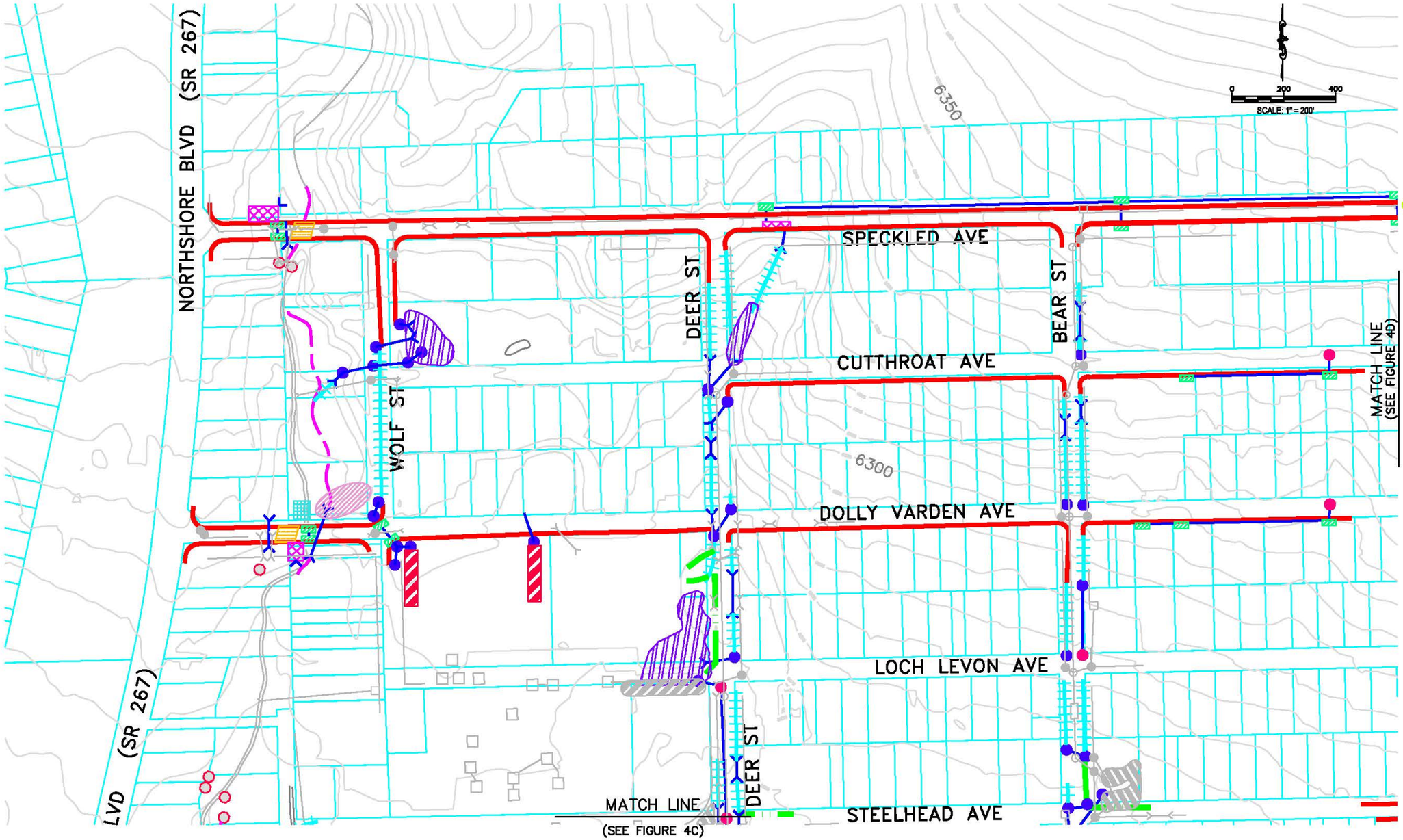
KINGS BEACH WATERSHED & SEZ IMPROVEMENT PROJECT
GRIFF CREEK WATERSHED
PLACER COUNTY, CALIFORNIA

SHEET
INDEX - 5A

W.O. No. 3128703

LEGEND (EXISTING FEATURES)

- EXISTING SWALE
- EXISTING AC CURB
- EXISTING RIPRAP
- EXISTING STORM DRAIN
- EXISTING STORM DRAIN MANHOLE
- EXISTING SEDIMENT TRAP
- EXISTING STORM DRAIN DROP INLET
- EXISTING STORM DRAIN INTERCEPTOR
- EXISTING CULVERT
- EXISTING HEADWALL
- STREAM CHANNEL
- EXISTING EARTHEN BERM
- EXISTING INFILTRATION BED
- EXISTING BASIN



LEGEND (PROPOSED FEATURES)

- DETENTION BASIN
- SEDIMENT VAULT
- GATE
- SEDIMENT TRAP
- MANHOLE
- BOULDER
- DRAINAGE INLET
- SD PIPE
- INFILTRATION GALLERY
- EARTHEN BERM
- GRADE CONTROL STRUCTURE
- FILTER VAULT
- ROCK BOWL
- CURB & GUTTER
- ROCK LINED CHANNEL
- INFILTRATION TRENCH
- POROUS CONCRETE SHOULDER
- GRASS LINE SWALE/CHANNEL
- SECONDARY CHANNEL
- TRAIL
- ARCH CULVERT
- PAVEMENT
- ROCK SLOPE PROTECTION
- POROUS CONCRETE
- REVEGETATION
- HEADWALL
- FILL REMOVAL

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FIGURE-5B

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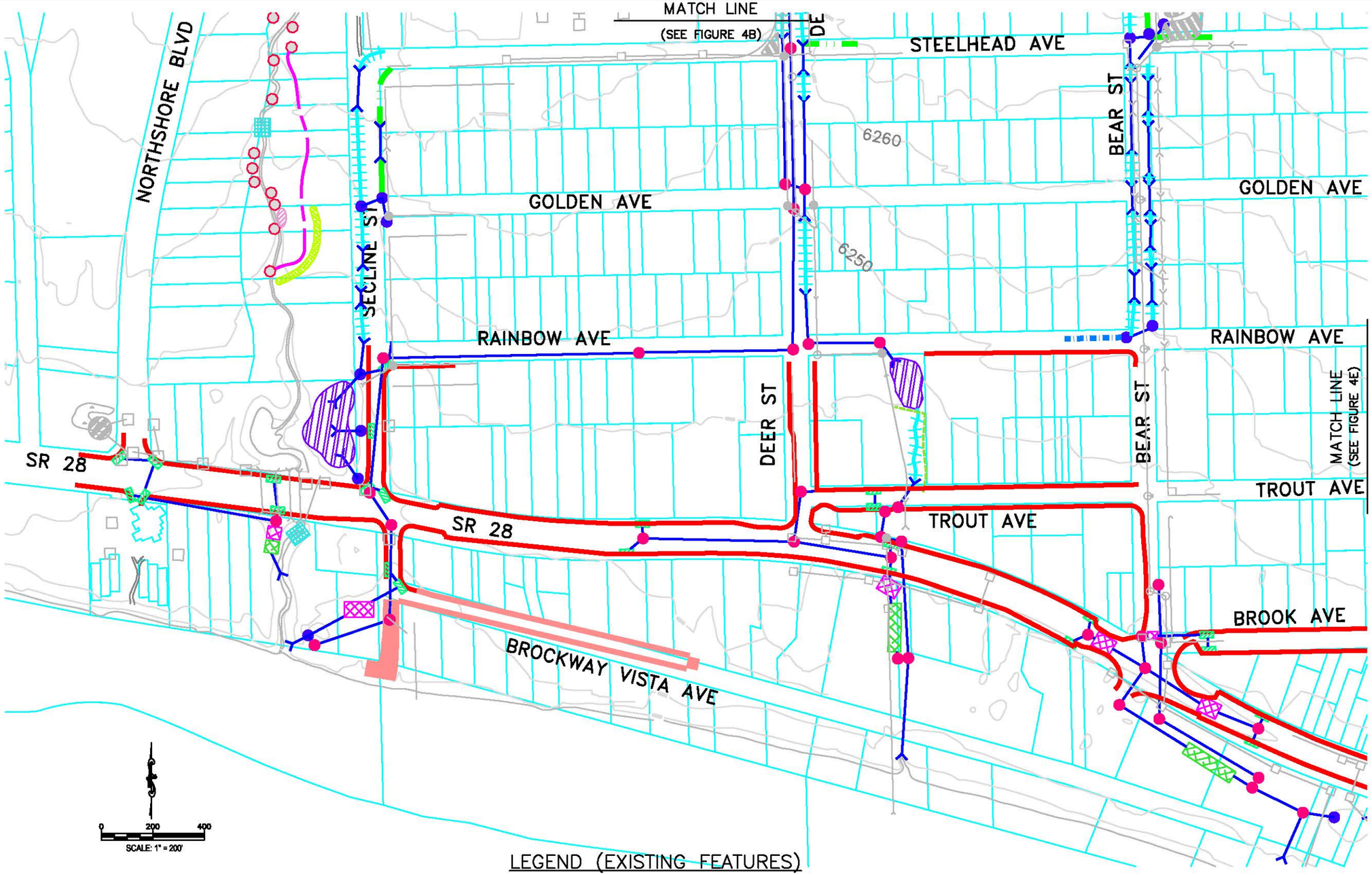

LEGEND (PROPOSED FEATURES)

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- EXISTING INFILTRATION BED
- EXISTING BASIN

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FIGURE-5C

W.O. No. 3128703

LEGEND (EXISTING FEATURES)

- EXISTING SWALE
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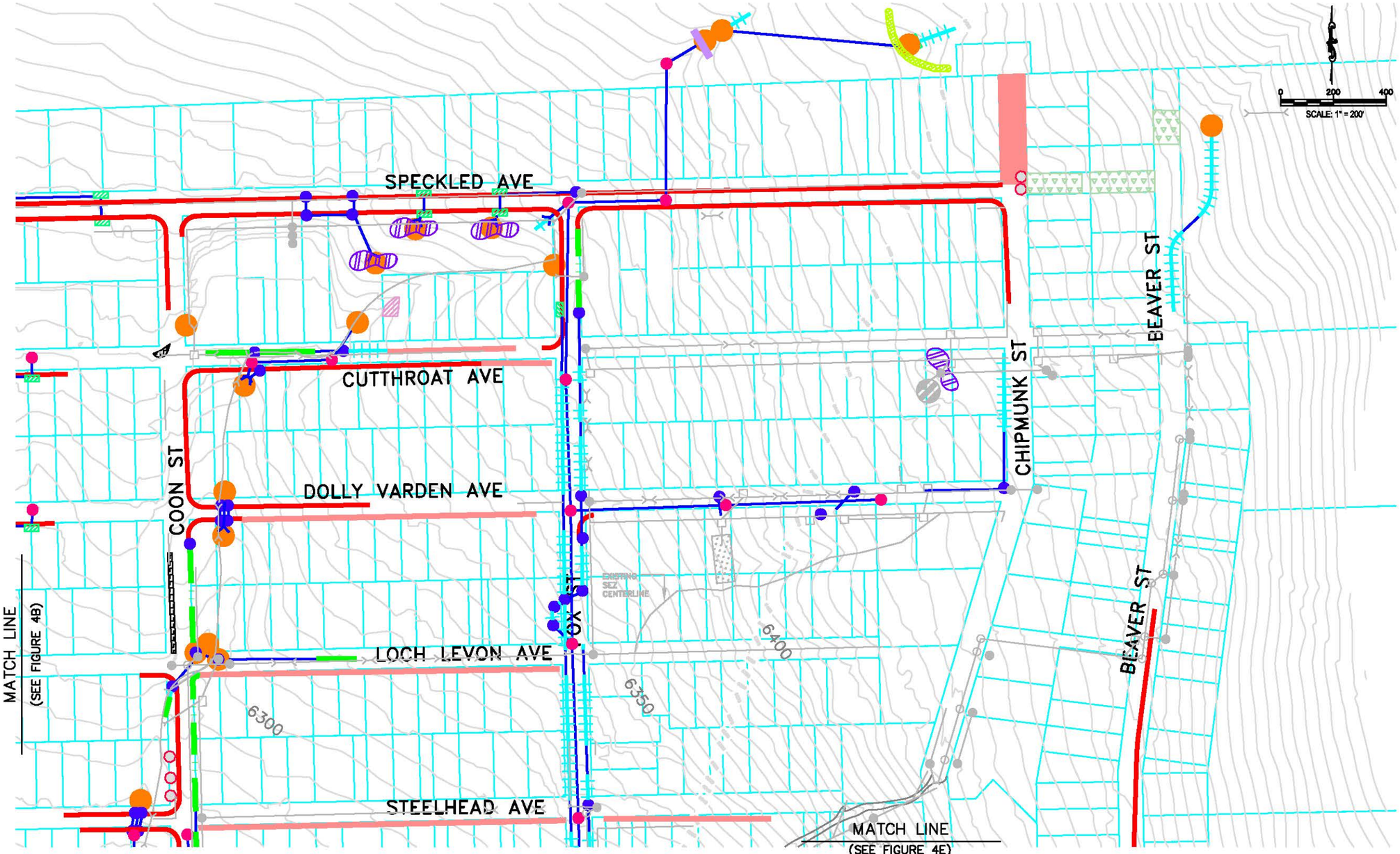

LEGEND (PROPOSED FEATURES)

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KINGS BEACH WATERSHED & SEZ IMPROVEMENT PROJECT
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PLACER COUNTY, CALIFORNIA

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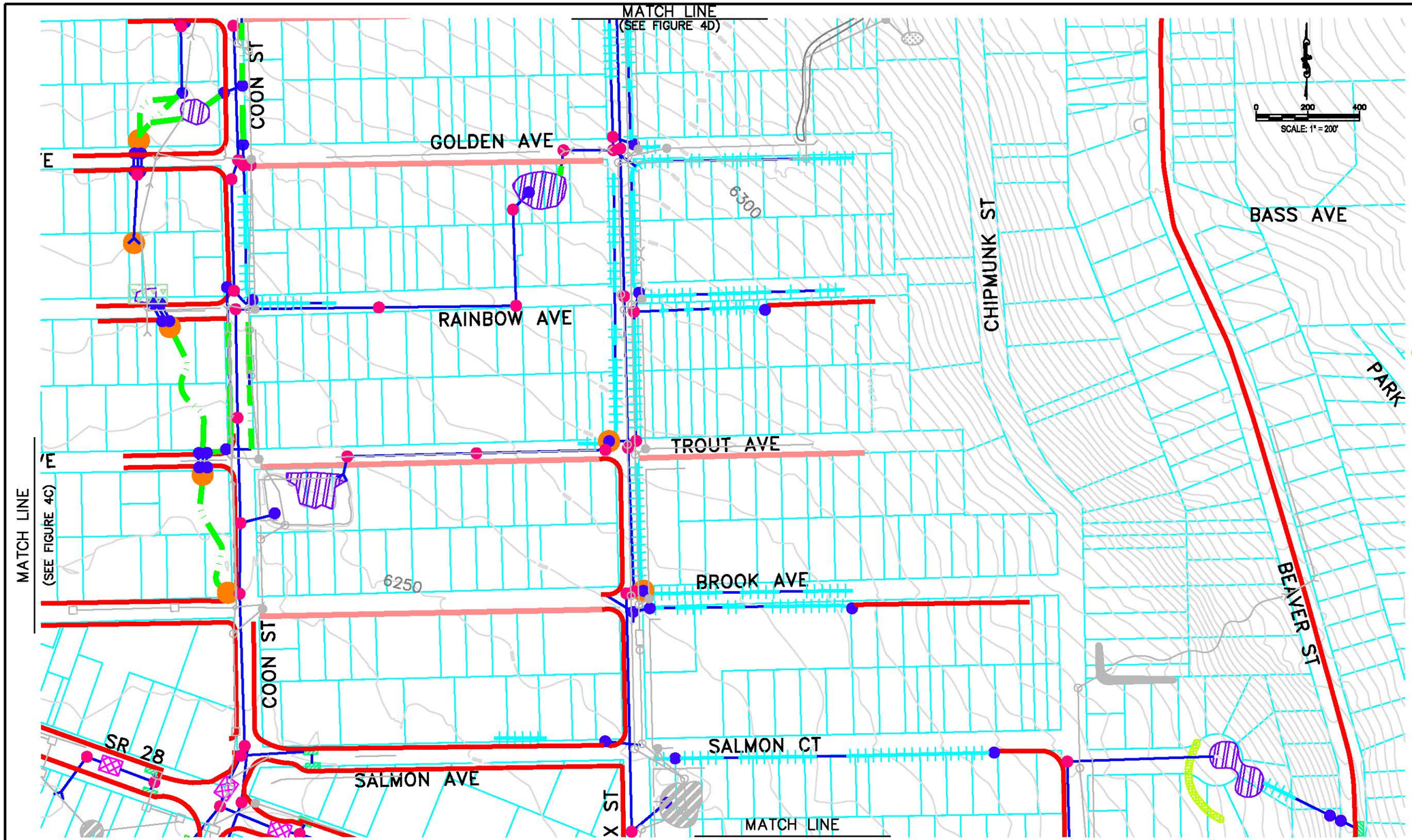

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- EXISTING BASIN

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FIGURE-5E

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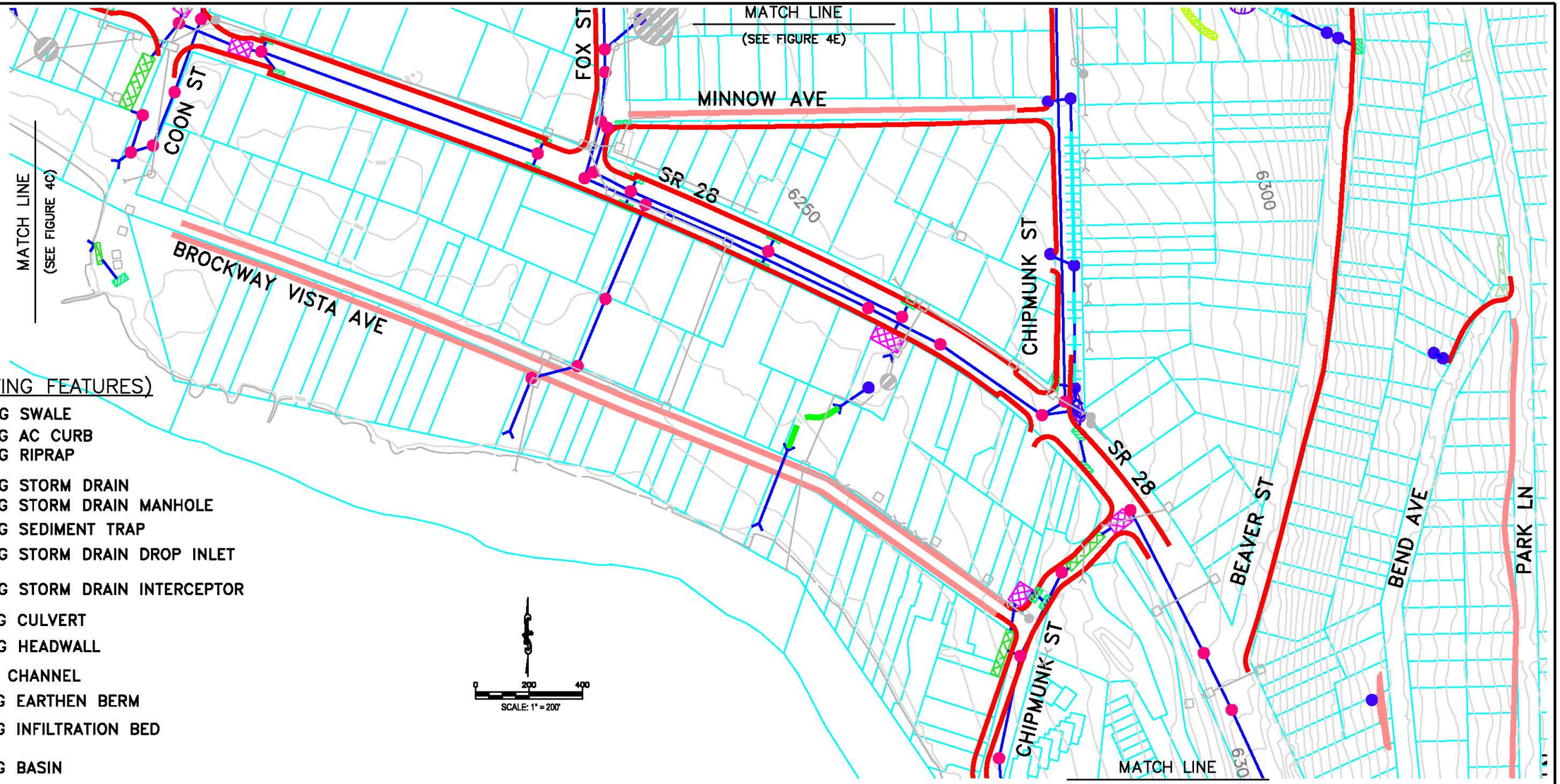

LEGEND (EXISTING FEATURES)

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FIGURE-5F

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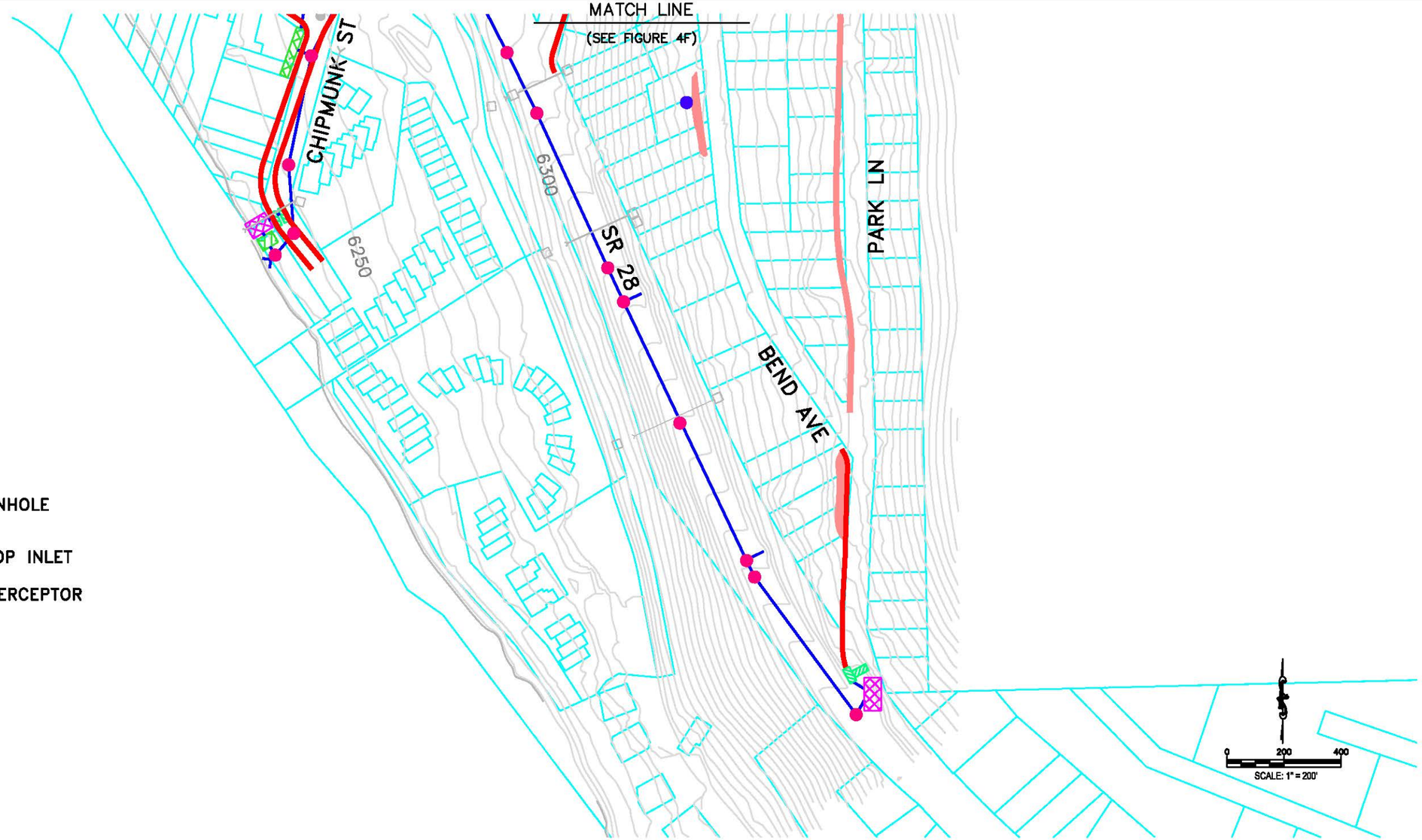

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KINGS BEACH WATERSHED & SEZ IMPROVEMENT PROJECT
PREFERED ALTERNATIVE
PLACER COUNTY, CALIFORNIA

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FIGURE-5G

W.O. No.
3128703

Rock-lined channel

Rock bowl with sediment trap

Curb-and-gutter with storm drain inlet

Detention basin w/ sediment trap and earth berm

Pervious pavement

Vault containing filtration system

Figure 6a. Photographic examples of typical erosion control and water treatment improvements (page 1 of 2).

Revegetated hillside

Rock slope protection

Boulder barrier

Fence

Crushed rock surface treatment

Infiltration trench

Figure 6b. Photographic examples of typical erosion control and water treatment improvements (page 2 of 2).

- All of the Commercial Core area utilizes a treatment train approach. The drain inlets would all have sumps, all water would go through sediment vaults and then through the advanced treatment system. ("Treatment train" refers to various components of a wastewater treatment system connected in succession. An example would be a sediment vault followed immediately by a filter vault, each component removing progressively smaller contaminants (suspended particles and dissolved pollutants) before discharging (clean) water into the receiving environment.)
- The existing detention basins in the Commercial Core area would continue to be used, with pre-treatment enhancements added.
- All of the storm drain outfalls to Lake Tahoe would remain in their existing locations, except for the outfall by the boat launch at Coon Street. This one would be relocated 15 feet to the north to allow for a treatment system to be installed.
- Related installations include manholes and drainage inlets. Drainage inlets would feature bicycle-safe grates.

2.2 Griff Creek SEZ Restoration

Formulation of the Griff Creek component of the Project was based on analysis of the alternatives ranking process described in the *SEZ Improvement Plan* (Placer County 2006c). Twenty priority areas were identified in which water quality, geomorphic channel stability, floodplain connectivity, riparian habitats, and fish passage could be improved by addressing an existing problem or taking advantage of an enhancement opportunity. These priority areas are referred to as Enhancement Sites, and are shown in Figure 7.

Proposed Griff Creek SEZ restoration actions are summarized below and shown on Figure 5. Major components of the restoration include replacement of existing culverts at the Dolly Varden Avenue and Speckled Avenue crossings of Griff Creek to enhance fish passage. Additionally, the improvements would include creation of secondary channels between Golden Avenue and Steelhead Avenue (about 470 linear feet) and between of Speckled Avenue and Dolly Varden Avenue (about 425 feet linear feet). The secondary channel would transport some of the Griff Creek flows to a newly created detention basin at the northwest corner of Dolly Varden Avenue and Wolf Street. The basin would provide for precipitation of suspended sediment and nutrients, thereby improving water quality. The outflow pipe from the detention basin would direct water onto the Griff Creek floodplain south of Dolly Varden Avenue to allow further infiltration and water quality treatment.

Excavation of sediments in three main areas is proposed to lower the floodplain surface, improving the continuity of the floodplain and its hydraulic connection to the creek. The three areas of floodplain excavation include:

- West side of the creek, just downstream of the SR 28 crossing (Area = $\pm$2,700 ft^2);
- East side of the creek; west of the intersection of Secline Street and Golden Avenue (Area = $\pm$2,000 ft^2);
- West side of the creek; just upstream of the Speckled Avenue crossing (Area = $\pm$1,600 ft^2);

The excavations would be approximately two feet in depth and would remove 140 to 370 cubic yards of soil at each area. During excavation, the existing vegetation would be removed but would be replaced in accordance with a revegetation plan. Any sod removed during excavation would be harvested, stored during construction, and reused in disturbed areas. All willows or alders within the disturbed areas would be salvaged and replaced within the excavation area. These improvements would increase floodplain inundation in these areas and promote increased sediment deposition and infiltration of storm flows.

Other improvements include:

- Installation of grade control structures (i.e., boulders embedded in channel bed) to stabilize stream gradient and reduce incision potential and improve fish passage;
- Bank protection (e.g., boulder toe protection and willow plantings) to prevent further erosion of stream banks (five locations, about 200 linear feet of total treatment);
- Removal of a foot bridge and low flow crossing; and
- Installation of energy dissipaters at critical areas of runoff discharge to creek.

Detailed text descriptions of proposed restoration actions at each Enhancement Site are provided in Table 3.

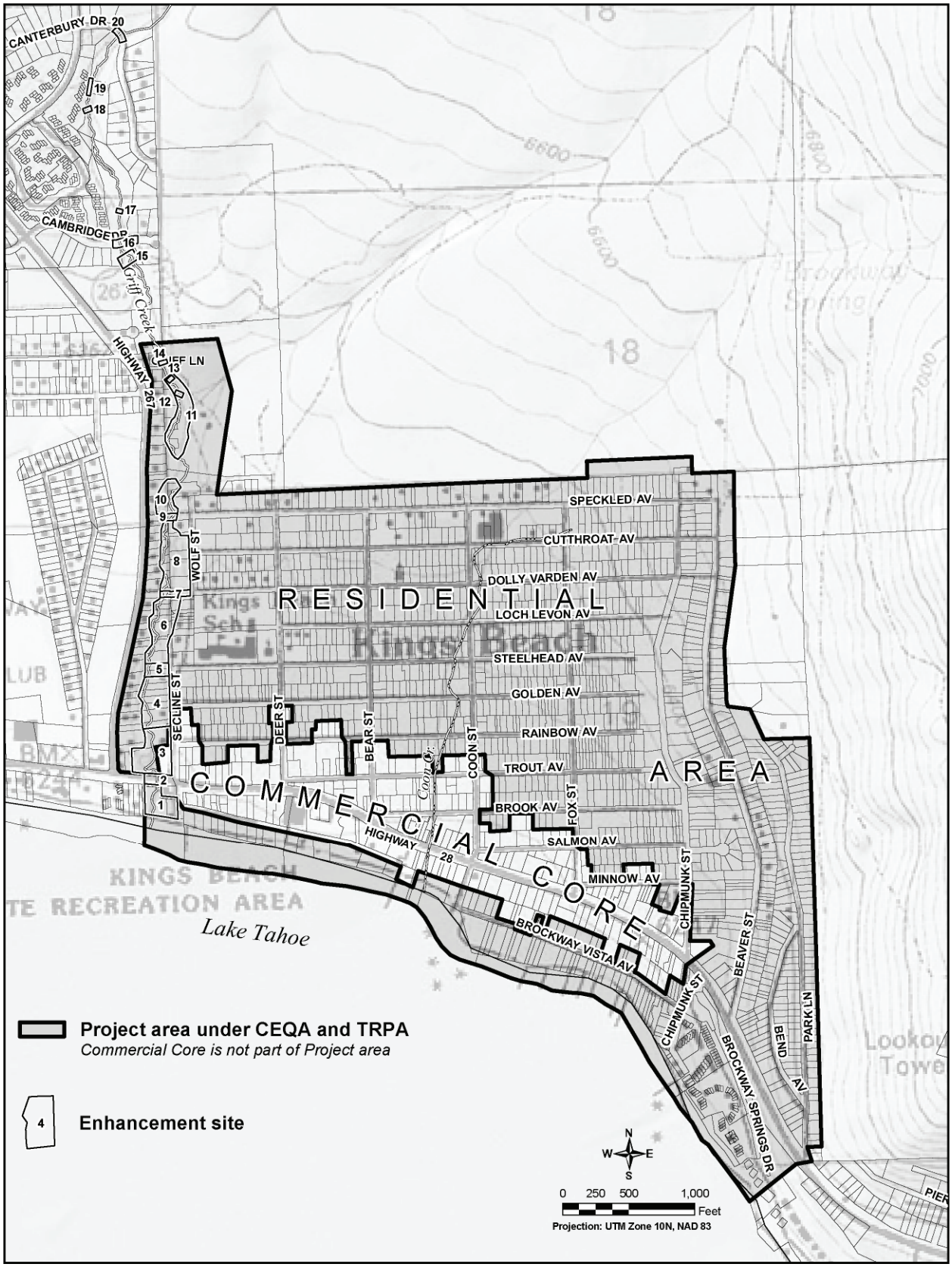

Figure 7. Griff Creek Enhancement Sites evaluated for restoration potential in the SEZ Improvement Plan.
(Source: Placer County 2006c)

Table 3. Proposed Griff Creek SEZ Restoration Actions

ENHANCEMENT SITE NUMBER	ENHANCEMENT SITE OPPORTUNITY	PROJECT ACTION
1	Griff Creek downstream of State Route 28 is a trapezoidal, rip-rapped channel constructed in 1984 as part of Placer County's Phase I Erosion Control Project. Because of the channel's high conveyance capacity, a 50 to 100 year flow event is needed for overbanking to occur, limiting any SEZ connection. The high terrace east of the channel has little ecological value and no Griff Creek pollutant filtering potential. Furthermore the uniform channel bed has little hydraulic diversity to support aquatic habitat and offers little fish refuge from high velocity stream flows.	No action.
2	State Route 28 culverts do not meet conveyance requirements of CALTRANS and the Placer County SWMM (MACTEC 2003a). Furthermore, they are a temporal barrier to fish passage and prevent any potential floodplain connectivity up and downstream of State Route 28.	Install a grade control structure at the culvert outlet to enhance fish passage. The grade control structure consists of the placement of large boulders embedded into the bed of the channel and surrounded with smaller boulders.
3	The function of the in-channel sediment basin upstream of State Route 28 has the potential to be enhanced. The trapezoidal, rip-rapped channel constructed in 1984 as part of Placer County's Phase I Erosion Control Project upstream of State Route 28 has high flow conveyance capacity and only overbanks approximately every 9 to 10 years.	Excavate a portion (approximately 10,000 square feet) of the Placer County parcel east of the channel to create a new water quality basin (approximate volume of 57,000 cubic feet). Storm water would be collected from the roadways in the basin before releasing into the creek channel. The retention of water will promote riparian vegetation in this area. Since Placer County owns this land, it is a great opportunity to treat stormwater. The development of a management plan to periodically dredge the existing basin could enhance its effectiveness. The existing primary channel would be retained with no modifications.
4	This is the most incised Griff Creek reach and the largest channel source of fine-grained sediment from bank failure. Parcels on both sides of the channel are privately owned. The land east of the channel is largely an undeveloped, abandoned floodplain with remnant channels. The primary channel overbanks into the abandoned floodplain about once every 4 to 8 years.	Obtain drainage easements along the left bank for channel excavation and a secondary channel. Channel excavation (about 500 cubic yards) will create a new inset floodplain re-connecting the existing primary channel. Diverted flows from enhancement site 5 would be directed into a secondary channel. Construction of the secondary channel (about 470 linear feet) would follow a remnant channel path before reconnecting to the primary channel. A constructed berm will prevent channel migration and ensure tie-in into the primary channel. Construct bank stabilization along sections of the eroding banks (e.g., rock wall, large wood, and bio-engineering).
5	The two parcels in this area disrupt the longitudinal connectivity of the left floodplain. Upstream of these parcels, the floodplain is active, with fairly regular overbanking events. The abandoned floodplain downstream of these parcels is not inundated as frequently. Griff Creek is also incised in this reach and has sections of unstable banks.	Obtain necessary easements to excavate a portion of the left bank creating a new inset floodplain re-connected to the existing primary channel. The new floodplain would provide a link with the active floodplain upstream and the abandoned floodplain downstream. Construct in-channel grade control structures (e.g. check dams, rock weirs, large wood) to prevent migrating head cut and to slow water velocities.

ENHANCEMENT SITE NUMBER	ENHANCEMENT SITE OPPORTUNITY	PROJECT ACTION
6	The land east of the channel is active floodplain. Griff Creek is less incised in this reach than downstream. The channel overbanks into the floodplain about once every 4 to 5 years. The floodplain is actively supported by diversion of some of the high flow at Dolly Varden Avenue into a flood channel that traverses through the floodplain. Overbanking of the flood channel(s) currently provides the best pollutant filtering opportunity on lower Griff Creek.	Construct a new floodplain swale just downstream of the Dolly Varden Avenue road crossing that would connect with the new floodplain swale proposed upstream at enhancement sites 7 and 8. The new swale would divert a higher percentage of Griff Creek's flow into the existing active floodplain. Modify the exit of the left open arched culvert to direct flows into the primary channel. Also, construct in-channel grade control features (e.g., check dams, rock weirs, large wood) to prevent additional potential incision of the primary channel and downstream end of the floodplain swale. Structures would also add channel roughness that would decrease channel capacity and enable overbanking to occur at a somewhat lower discharge. Bank stabilization and grade control features would be in place to arrest future primary channel incision, but would also enhance flooding of the active floodplain without disturbing the existing healthy riparian vegetation community.
7	The culverts at Dolly Varden Avenue are a barrier to floodplain flow and provide poor fish passage and high flow conveyance. The right circular CMP culvert outlet at Dolly Varden Avenue is suspended about 1 foot above the low-flow water surface and is a barrier to fish passage.	Make no modifications to the west secondary channel (enhancement site 8) and the right circular CMP culvert. Replace the left arch CMP culvert on the primary channel with a channel spanning, natural bottom culvert, such as a single or double barrel concrete arch structure, to enhance fish passage and improve channel and floodplain conveyance capacity. Install a separate box culvert for the new proposed floodplain swale upstream of Dolly Varden Avenue (enhancement site 8) to connect with the existing floodplain downstream. Install a grade control structure just upstream from culvert.
8	Urban encroachment along Griff Creek's right bank and modification of the channel is extensive in this reach. Although Griff Creek is less incised upstream of Dolly Varden Avenue compared to reaches downstream, existing overbank opportunities are still limited, and only occur about once every 4 to 5 years. A great opportunity is available to enhance the hydrologic connectivity between the channel and the undeveloped CTC land east of the channel.	Excavate a floodplain entrance and new floodplain swale (about 425 linear feet) through the CTC's property east of the main channel, including removal of a majority of the berm paralleling the upstream side of Dolly Varden Avenue. The existing ground on private property would remain as a vegetated island between the new floodplain and existing primary channel. The CTC-owned parcels east of Griff Creek at this site are a great opportunity for enhanced water quality. No private property easements are required and minimal disturbance of the existing riparian vegetation would be expected.
9	The culverts at Speckled Avenue are in poor condition. The small circular CMP culvert right of the main channel that conveys water from the meadow flood channels is undersized, its outlet is submerged, and provides poor fish passage. Incision of the meadow flood channels upstream of the culvert may be related to the configuration of this culvert. The right culvert of the two twin arch CMP main channel culverts is blocked and does not convey any flow.	To enhance fish passage and improve channel conveyance capacity replace the left twin arch CMP culverts with a channel-spanning (40 feet) natural bottom culvert. Modify inlet and outlet conditions on the CMP right of the main channel to improve conveyance and possible fish passage.
10	The flood channels in the meadow upstream of Speckled Avenue exhibit evidence of prior channel incision, possibly related to poor alignment with the road culverts. This incision appears to have been arrested by constructed rock grade control. The existing flood channels overbank about every 3 to 4 years. An opportunity exists to increase the frequency of overbanking into the large grassy meadow with high pollutant filtering potential.	Excavate a floodplain (about 3,000 square feet) in the area of primary channel to redirect a newly designed channel for improved alignment and conveyance under the roadway. Improvements in enhancement site 9 to the elevated inlet culvert will benefit the grassy meadow channel area.
11	Although a flood channel diverts a portion of Griff Creek's high flow at upstream at enhancement site 14, overbanking of water into low velocity areas that would enable settling of pollutants occurs somewhat infrequently in this area. The existing flood channel may have been the historic primary channel.	No action.

ENHANCEMENT SITE NUMBER	ENHANCEMENT SITE OPPORTUNITY	PROJECT ACTION
12	A large step in the channel is a potential fish passage barrier.	No action.
13	A low-water bridge that diverts a portion of the high flow into a flood channel is a barrier to fish passage.	No action.
14	An old culvert is lying longitudinally on the channel bed against the right bank at this location. The purpose of the culvert's placement is not certain. It may have been placed in the channel to provide bank protection, or could be a remnant from the historic road that used to cross Griff Creek. Fill used to construct the old road east of the channel is a hydrologic barrier to floodplain flow.	Remove the culvert and, if necessary, provide bank stabilization (e.g., rock, large wood, bio-engineering). In addition, remove the old road fill east of the channel that is a barrier to floodplain flow. (The historic road crossing of Griff Creek at this location no longer exists. It appears that the original function of this fill as an approach to the crossing is no longer necessary, and should be removed.)
15	The channel splits at this location. Most of the flow is diverted into the steeper channel at the base of the east valley wall. An existing grassy meadow located at the channel split is an opportunity to increase pollutant filtering.	No action.
16	The twin circular CMP culverts at Cambridge Drive are a fish passage barrier during high and low flows since the outlets are not at grade with the channel bed, and are a hydrologic barrier to floodplain connectivity.	No action. Funding constraints and poor quality of upstream fish habitat limit the priority for replacement of culvert.
17	A large step in the channel is a potential fish passage barrier.	No action.
18	A roadside drainage problem was observed during spring snowmelt flows on the road west of the low-water crossing.	No action.
19	The North Tahoe Public Utility District (NTPUD) water tower east of the channel that cuts into the floodplain and constricts flood flow conveyance has resulted in some local channel incision.	No action.
20	The single circular culvert at Canterbury Drive constricts the Griff Creek floodplain and is a potential fish passage barrier at high flows.	No action. Funding constraints and poor quality of upstream fish habitat limit the priority for replacement of culvert.