



Filed: June 6, 2016
Staff: Trever Parker
Staff Report: July 26, 2016
Commission Hearing Date: August 31, 2016
Commission Action:

STAFF REPORT: CITY OF TRINIDAD

APPLICATION NO: 2016-05

APPLICANT (S): Mike Sebring and Cheryl Kelly

AGENT: RJ Smith, Solid Rock Construction

PROJECT LOCATION: 20 Scenic Drive

PROJECT DESCRIPTION: Grading Permit and Coastal Development Permit to replace a failed 24”/30” (inlet is 24 in. and outlet is 30 in.), approximately 180 ft. long corrugated metal culvert with a new 36 in., 180 ft. HDPE culvert in the same location along the base of Parker Creek. The culvert failed in January of 2016, and the new culvert is sized to accommodate 100 year storm flow.

ASSESSOR’S PARCEL NUMBER: 042-131-07

ZONING: SE – Special Environment

GENERAL PLAN DESIGNATION: SE – Special Environment

ENVIRONMENTAL REVIEW: Categorically Exempt from CEQA per §15302 of the CEQA Guidelines exempting replacement and reconstruction of existing structures and facilities.

APPEAL STATUS:

Planning Commission action on a coastal development permit, a variance or a conditional use permit, and Design Assistance Committee approval of a design review application will become final 10 working days after the date that the Coastal Commission receives a “Notice of Action Taken” from the City unless an appeal to the City Council is filed in the office of the City Clerk at that time. Furthermore, this project is X / ~~is not~~ appealable to the Coastal Commission per the City’s certified LCP, and per Section 30603 of the Coastal Act.

SITE CHARACTERISTICS:

The proposed project is located near the base of Parker Creek, along the Parker Creek Trail and just above Old Home Beach. The project is accessed from a long, gravel, driveway off Scenic Drive. The project is located on a residentially developed parcel, and is surrounded by 'Special Environment' zoned land, including bluffs and riparian habitat. The property is included within the Tsurai Study Area, though the eastern portion that include the culvert is excluded; the Tsurai Village Site is located to the west of the property. The property itself is developed with a single-family residence consisting of two structures. There are also residences to the east and north, on the bluffs above the project site. The Parker Creek Trail runs along the eastern edge of much of the property.

STAFF COMMENTS:

The culvert failed in January 2016. Erosion and sinkholes around the culvert and Parker Creek Trail became apparent. After an investigation of the site by Public Works staff and the City Engineer, the City closed the Parker Creek Trail. Some photos from that site visit are attached to this staff report. It was also determined that the culvert is located on private property. At that time, the City suggested that an emergency repair permit might be appropriate, where the work can move forward, prior to the formal permit process. However, a proposal for repair was not submitted by the property owners until April 22. By that time, the rainy season was almost over, and the City determined (with concurrence by other regulatory agencies) that an emergency situation no longer existed. In accordance with zoning ordinance section 17.72.080, an emergency permit may only be granted to *“prevent loss of or damage to life, health or property, or to restore, repair or maintain public works, utilities and services during and immediately following a natural disaster or serious accident.”*

Since then, the applicants have been working with the City and other permitting agencies to put together their application submittals. The applicants are also working on obtaining permits from CA Department of Fish and Wildlife (CDFW) and the North Coast Regional Water Quality Control Board (RWQCB); no permit from the Army Corps of Engineers is required. I have spoken with staff from both the CDFW and RWQCB, and it appears that both permits are forthcoming.

The project is essentially just the repair and replacement of an existing culvert. However, the new culvert must be larger than the existing one in order to accommodate the estimated 100-year flood flow on Parker Creek. For that reason, and due to the sensitivity of the environment, a Coastal Development Permit / Grading Permit is required to be issued by the City.

The culvert is very long, approximately 190'. There was a desire on the part of the agencies and the owners to 'daylight' or restore all or a portion of the creek rather than installing a new culvert. However, for a variety of reasons, it has been determined that

that is not feasible at this time. The existing leachfield and proposed repair area is within 100 ft. of the Creek (the proposed reserve area is as little as 35 ft. from the existing culvert). A setback of 100 ft. from an open channel is required for a leachfield. There are no other locations to put a leachfield on the property. It may be possible to install an advanced treatment system that would allow an exception to the setback requirements to be made. However, there are other issues as well. The Parker Creek Trail runs parallel and adjacent to the culvert for most of its length (about 120'). In order to restore the creek to an open channel, it would have to be significantly widened. This would encroach further on the leachfield area as well as the trail. Due to steep bluffs to the east of the trail, it can not be relocated further away from the creek. Finally, geologic stability is also a concern. I spoke with the geologist about the possibility of just restoring the bottom 50 or so feet of the culvert area, which would not interfere with the trail. However, due to the steepness of that area, potential instability, and risk of erosion and discharge into the ASBS, that is also problematic. This is not to say that it is absolutely impossible to restore all or a portion of the creek, but it would take significantly more study, analysis, engineering and cost. That would not be able to occur this year, and the City and the applicants recognize the importance of the culvert being repaired and the area restored and stabilized prior to winter. The CA Environmental Quality Act defines feasible as: "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social and technological factors." Based on the above information, staff finds that daylighting and restoration of all or a portion of the culverted area is not feasible.

Referrals for this project were sent to both the City Engineer and Coastal Commission. The City Engineer has visited the site and reviewed the proposal. He did have some comments, and several issues will need to be addressed. Because they are related to technical aspects of the grading ordinance, further discussion is included below.

GRADING ORDINANCE / GENERAL PLAN CONSISTANCY:

The City's Grading Ordinance is found in Chapter 15.16 of the City's Municipal Code. The ordinance is fairly technical, and responsibility for implementing it falls mainly on the City Engineer. However, grading (excavation and / or fill) is considered development, necessitating a coastal development permit, a public hearing, and approval by the Planning Commission.

The submitted grading plan includes a brief description of the work, materials and methods. While the description is fairly basic, it does meet the minimum requirements of the Grading Ordinance. Grading Permits are approved by the Planning Commission subject to recommendation by the City Engineer. Grading Permits also require review and recommendation by the Design Assistance Committee (DAC). However, the Planning Commission is the DAC, and the project will not result in substantial changes to ground contours or elevations after completion, so design review findings are not required.

The City Engineer has been involved in this project since the discovery of the failure. In addition to the January 21, 2016 site visit when the failure was first documented (photos attached), the City Engineer visited the site with the property owners and contractor to discuss the culvert repair on May 5, 2016. In response to a referral that was sent on July 28, the City Engineer responded with his support of the project. However, there are also several details he would still like to review. These include the final plans or details of the design for the following:

1. Proposed culvert inlet and debris barrier
2. Proposed culvert backfill to avoid potential for piping along backfill
3. Proposed culvert backfill to restore adjacent trail
4. Proposed culvert outfall to address energy dissipation of new larger smoother pipe which will have higher velocity discharge than current pipe

In addition to the above items, the applicant will need to submit an erosion control and revegetation / restoration plan to the City Engineer for review and approval. The Grading Ordinance also requires several inspections to be conducted by the City Engineer at various points throughout the project. Several pertinent specifications of the grading ordinance have been included as conditions of approval.

CULTURAL RESOURCES

The culvert is not located within the Tsurai Study Area (TSA) as mapped on Plate 1B of the General Plan, nor is it within the 12.5 acres that is the subject of the Tsurai Management Plan (TMP) and Coastal Conservancy easement. However, it is adjacent to the TSA and not far from the village site itself. Therefore the area should be considered culturally sensitive. Referrals for this project were sent to the Tsurai Management Team (Tsurai Ancestral Society, Yurok Tribe, and CA Coastal Conservancy). No comments have been received at this time. However, a condition of approval has been included that the applicant and contractor will ensure that a qualified cultural monitor is onsite at all times during earth moving / soil disturbing activities.

SLOPE STABILITY

The project is located in an area mapped as 'unstable' on Plate 3 of the General Plan. A geologic investigation was conducted in accordance with §17.20.130 of the Zoning Ordinance (determination of development feasibility). The report was written by the same geologist who has been conducting a more detailed geologic analysis of the property for the proposed future home remodel project at the same address. In addition to the findings required by the Zoning Ordinance, the report concluded that: *"Based on geologic conditions at the site and the merits of the proposed culvert replacement project, we conclude that the project is suitable from a geotechnical standpoint. While the project is associated with a low risk of exposure to geologic hazards, it has the potential to provide significant environmental benefits by mitigating a substantial erosion*

source that may deliver large quantities of sediment to Trinidad Bay. As such, we find the proposed project to be a favorable improvement.”

SEWAGE DISPOSAL

There is no sewage disposal system associated with this project. The culvert will not interfere with the existing leachfield or proposed repair (see site plan).

DESIGN REVIEW/VIEW PRESERVATION FINDINGS:

Because the project will not result in topographical changes of greater than two feet in elevation after construction, and because it is replacing an existing culvert of in the same location and approximately the same size, design review findings are not required.

STAFF RECOMMENDATION

Based on the above analysis, the project can be found to be consistent with the City's Grading Ordinance, General Plan, Coastal Act, and other applicable policies and regulations. Therefore the necessary findings for granting approval of the project can be made. If the Planning Commission agrees with staff's analysis, a proposed motion might be similar to the following:

Based on application materials, information and findings included in this Staff Report, and based on public testimony, I move to adopt the information and required findings in this staff report and approve the project as described in this staff report and as conditioned herein.

PLANNING COMMISSION ALTERNATIVES

If the Planning Commission does not agree with staff's analysis, or if information is presented during the hearing that conflicts with the information contained in the staff report, the Planning Commission has several alternatives.

- A. Add conditions of approval to address any specific concerns on the part of the Commission or the public.
- B. Delay action / continue the hearing to obtain further information.
 - In this case, the Planning Commission should specify any additional information required from staff or the applicant and / or suggestions on how to modify the project and / or conditions of approval.
- C. Denial of the project.

- The Planning Commission should provide a motion that identifies the Finding(s) that can not be made and giving the reasons for the inability to make said Finding(s).

CONDITIONS OF APPROVAL

1. The applicant is responsible for reimbursing the City for all costs associated with processing this application, including inspections and other City staff work necessary after project approval. *Responsibility: City Clerk to verify prior to final inspection.*
2. The applicant shall employ a qualified cultural monitor, from either the Yurok Tribe or Tsurai Ancestral Society to monitor any and all soil disturbing activities during construction. *Responsibility: Applicant and City to ensure during construction.*
3. The applicant and contractor are responsible for ensuring the following documents (final plans and details) are submitted to the City Engineer for his review and approval prior to construction:
 - a. Proposed culvert inlet and debris barrier
 - b. Proposed culvert backfill to avoid potential for piping along backfill
 - c. Proposed culvert backfill to restore adjacent trail
 - d. Proposed culvert outfall to address energy dissipation of new larger smoother pipe which will have higher velocity discharge than current pipe
 - e. Proposed erosion control plan
 - f. Proposed revegetation / restoration plan*Responsibility: City Engineer to ensure prior to and during construction.*
4. The applicant and contractor are responsible for ensuring all inspections by the City Engineer as required by §15.16.160 of the grading ordinance are conducted to the satisfaction of the City Engineer. *Responsibility: City Engineer to ensure prior to and during construction.*
5. The applicant and contractor are responsible for ensuring all provisions of the City's grading ordinance are met to the satisfaction of the City Engineer and that any other requirements of the City Engineer are met to his satisfaction. *Responsibility: City Engineer to ensure prior to and during construction.*

Culvert Failure Photos from January 21 City Staff Site Visit



Figure 1:
View of the Parker Creek Trail closure due to a sinkhole along the culvert.



Figure 2:
Close up view of the sinkhole.



Figure 3:
Photo of
the
blocked
culvert
inlet.



Figure 4:
Another
view of
the
culvert
inlet,
showing
the eroded
culvert
and the
flow
going
around
the culver.



Figure 5:
Erosion
along the
culvert.



Figure 6:
Photo
showing
the eroded
culvert
outlet.

LEGEND

- ROAD
- - - PROPERTY LINE NOT SURVEYED
- ~ VEGETATION/TREE LINE
- TEST PIT LOCATION
- △△ PARKING
- POWER POLE
- ⊙ (P) Pot Hole/Verification

GENERAL NOTES

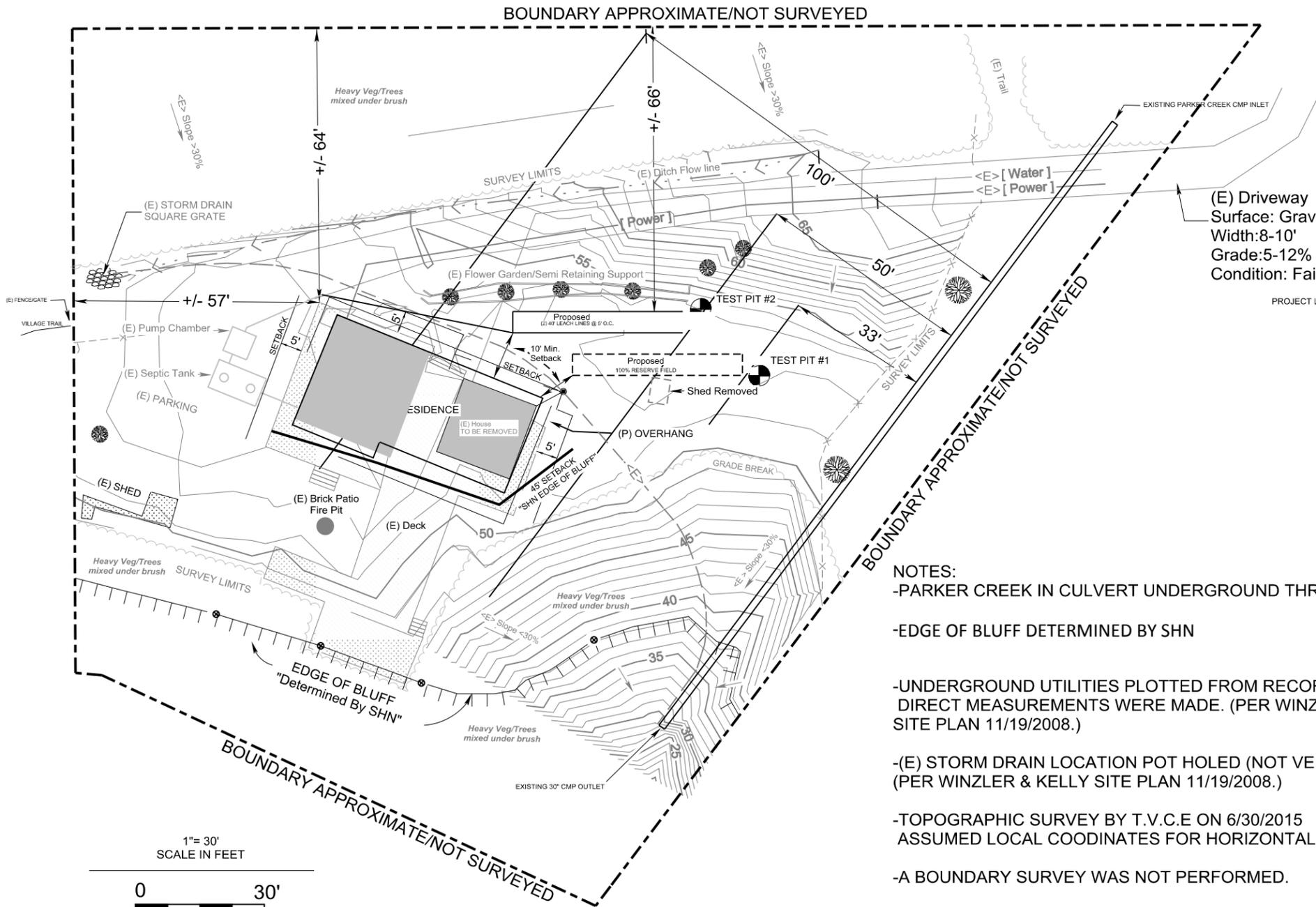
WATER: (E) ONSITE
 WASTE WATER: (E) ONSITE
 POWER: (E) YES
 PHONE: (E) YES
 CREEKS/STREAM: PARKER CREEK
 TREES TO BE REMOVED: NONE
 VEGETATION TO BE REMOVED: NONE
 GRADING: MINIMAL FOR CONSTRUCTION
 (P) NEW BUILDING IN EXISING FOOTPRINT

ABBREVIATIONS

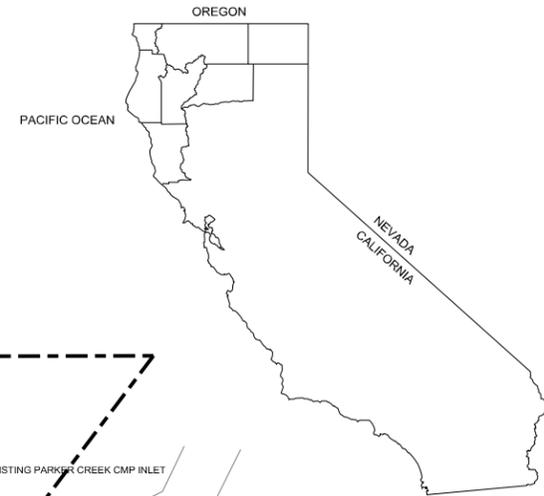
- AC=ASPHALTIC CONCRETE
- AB=AGGREGATE BASE
- A.D.=ALGEBRAIC DIFFERENCE
- BC, PC =BEGIN CURVE
- CO=CLEAN OUT
- CL=CENTER LINE
- CMP=CORRUGATED METAL PIPE
- CPCT.=COMPACT
- D=DELTA
- DET=DETAIL
- DRN=DRAIN
- <E>=EXISTING
- EC=END CURVE
- EG=EXISTING GROUND
- EP=EDGE OF PAVEMENT
- FF= FINISH FLOOR
- FG=FINISH GRADE
- FH= FIRE HYDRENT
- FL=FLOW LINE
- GA=GUY ANCHOR
- GV=GATE VALVE
- HC=HANDICAPPED
- HDPE=HIGH DENSITY POLYETHYLENE PIPE
- INV=INVERT
- (INT-X)=INTERSECTION
- K=SIGHT DISTANCE
- LAT=LATERAL
- LD=LOCAL DEPRESSION
- LF=LINEAR FEET
- LF=SEWER LEACH FIELD
- LT=LEFT
- MAS.=MASONRY
- MI=MILES
- MSE=MECHANICALLY STABILIZED EARTH
- (N)=NEW
- NTS=NOT TO SCALE
- O.C.=ON CENTER
- PG&E=PACIFIC GAS & ELECTRIC
- (P)=PROPOSED
- PP=POWER POLE
- PRC=POINT OF REVERSE CURVE
- PT=POINT
- PVI=POINT OF VERTICAL INTERSECTION
- PVT=PRIVATE
- RT=RIGHT
- RTN=RETERN
- SB=SET BACK
- SDMH=STORM DRAIN MAN HOLE
- SHT=SHEET
- SD=STORM DRAIN
- STA=STATION
- STD.=STANDARD
- TC=TOP OF CURB
- TBC=TOP BACK OF CURB
- TFC=TOP FACE OF CURB
- TOB=TOP OF BANK
- TEL=TELEPHONE
- TP=TOP OF PAVEMENT
- TVCE=TRINITY VALLEY CONSULTING ENGINEERS
- TW=TOP OF WALL
- (TYP)=TYPICAL
- UG=UNDERGROUND
- W=WATER
- WV=WATER VALVE

SITE LAYOUT

PORTION OF SECTION 25 & 26 TOWNSHIP 8 NORTH, RANGE 1 WEST, H.B & M
 APN: 042-131-007
 FOR
 MIKE & CHERYL SEBRING
 TRINIDAD, HUMBOLDT COUNTY, CALIFORNIA



1"= 30'
 SCALE IN FEET



AREA MAP NTS



(E) Driveway Surface: Gravel
 Width: 8-10'
 Grade: 5-12%
 Condition: Fair

NOTES:
 -PARKER CREEK IN CULVERT UNDERGROUND THROUGH SITE
 -EDGE OF BLUFF DETERMINED BY SHN

-UNDERGROUND UTILITIES PLOTTED FROM RECORD DATA. NO DIRECT MEASUREMENTS WERE MADE. (PER WINZLER & KELLY SITE PLAN 11/19/2008.)

-(E) STORM DRAIN LOCATION POT HOLED (NOT VERIFIED ON 11/02/2015), (PER WINZLER & KELLY SITE PLAN 11/19/2008.)

-TOPOGRAPHIC SURVEY BY T.V.C.E ON 6/30/2015 ASSUMED LOCAL COODINATES FOR HORIZONTAL AND VERTICAL DATUM.

-A BOUNDARY SURVEY WAS NOT PERFORMED.

-GRADING: MINIMAL FOR BUILDING FOUNDATION AND LEACH LINES. GRADING ACTIVITIES SHALL NOT ALTER THE EXISTING TERRIAN.

TVCE
 TRINITY VALLEY CONSULTING ENGINEERS, INC.
 810 ROCK HAVEN WAY
 WILLOW CREEK, CA 95573
 PHONE: (530) 699-3000
 FAX: (530) 699-3011



NO.	DATE	DESCRIPTION	APP. BY
1	10/20/15	PLOT PLAN	J.M.

MIKE AND CHERYL SEBRING
 APN: 042-131-07
SITE LAYOUT
 TRINIDAD, HUMBOLDT COUNTY, CALIFORNIA

DESIGNED BY:	J.M.
CHECKED BY:	J.M.
APPROVED BY:	TVCE
DATE OF ISSUE:	8/10/2016
SCALE:	AS SHOWN
PROJECT NO.:	840
DRAWING NO.:	

Parker Creek Culvert Project – June 2016



PROJECT DESCRIPTION

The Kelly–Sebring Parker Creek Culvert is a high priority culvert replacement project due to the culvert’s structural failure in late January of 2016. This failure has led to damage from water erosion, potential sediment discharge into Trinidad Bay ASBS, could lead to private roadway/driveway collapse and has resulted in the development of a sink hole on the Parker Creek trail which

has led to the closure this Old Home Beach access trail. There is immediate risk to pedestrians who violate trail closure and continue to use the trail.

The project will replace the deteriorating 24”/30” culvert with a new, 36” culvert pipe which will increase current capacity by 20–30%. In addition, the current corrugated metal piping will be replaced with HDPE to facilitate flow by eliminating friction points, reducing the possibility of inner– pipe blockages. The total length of the culvert remains consistent at approximately 140 ft. Finally, a debris barrier will be added to the new culvert inlet which can be cleaned periodically to prevent blockage.

It is important to note here, that no documented capacity–related failures have been reported in the last 20 years. However, the culvert has overflowed occasionally due to debris (trees, branches, etc.) flowing from upstream Parker Creek into the culvert inlet creating blockage. The primary failure is due to material aging as the culvert reaches the end of its natural lifespan. Thus, the increased capacity, inlet barrier to prevent blockage and use of modern materials will ensure the culvert’s integrity for many decades. In fact, HDPE lifespan is estimated at one century.

CONSTRUCTION EQUIPMENT & METHODS

ESTIMATED START DATE: June 20, 2016 (actual start date and completion will depend on permit approval)

ESTIMATED END DATE: July 1, 2016

CONTRACTOR: Solid Rock Construction, 6654 Airport Road, Redding, CA, 96002, Lic # 671848

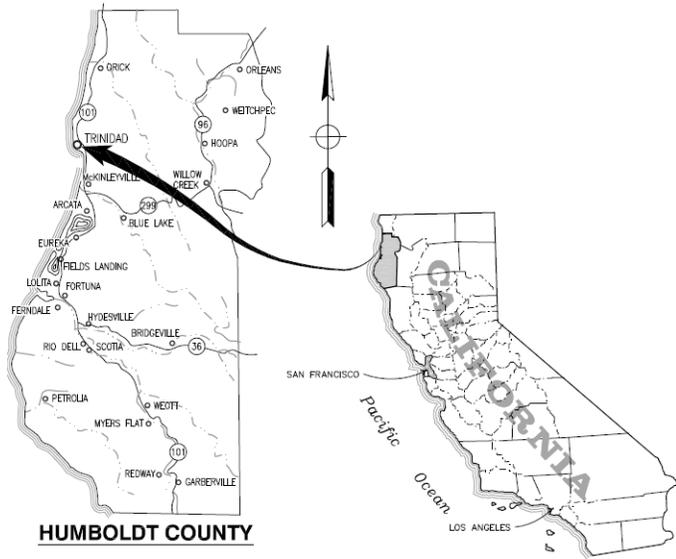
EQUIPMENT TO BE USED: Cat 313 excavator-570 case loader.

Solid Rock Construction will remove brush and small trees, then dig down to the top of the existing culvert. If needed, they plan to pump water around the project, then remove the existing culvert, prep the grade and install new 36" HDPE culvert. Complete surface restoration.

Dirt disposal and import will be coming from Kernan in Blue Lake and Solid Rock will do its own trucking as needed.

Bench and fencing, and any trees over 6" (marked in green on Site Plan), will be replaced post-construction will be replaced with similar/same species by property owners.

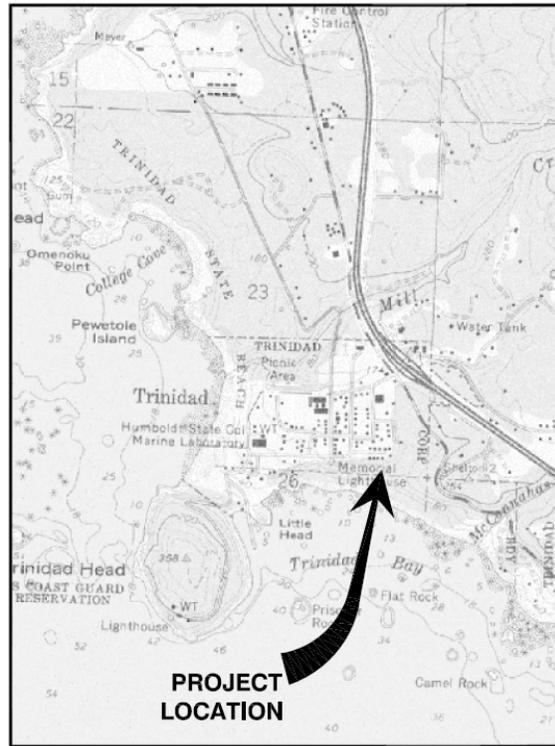
PROJECT LOCATION and VICINITY MAPS



HUMBOLDT COUNTY

LOCATION MAP

N.T.S.



PROJECT LOCATION

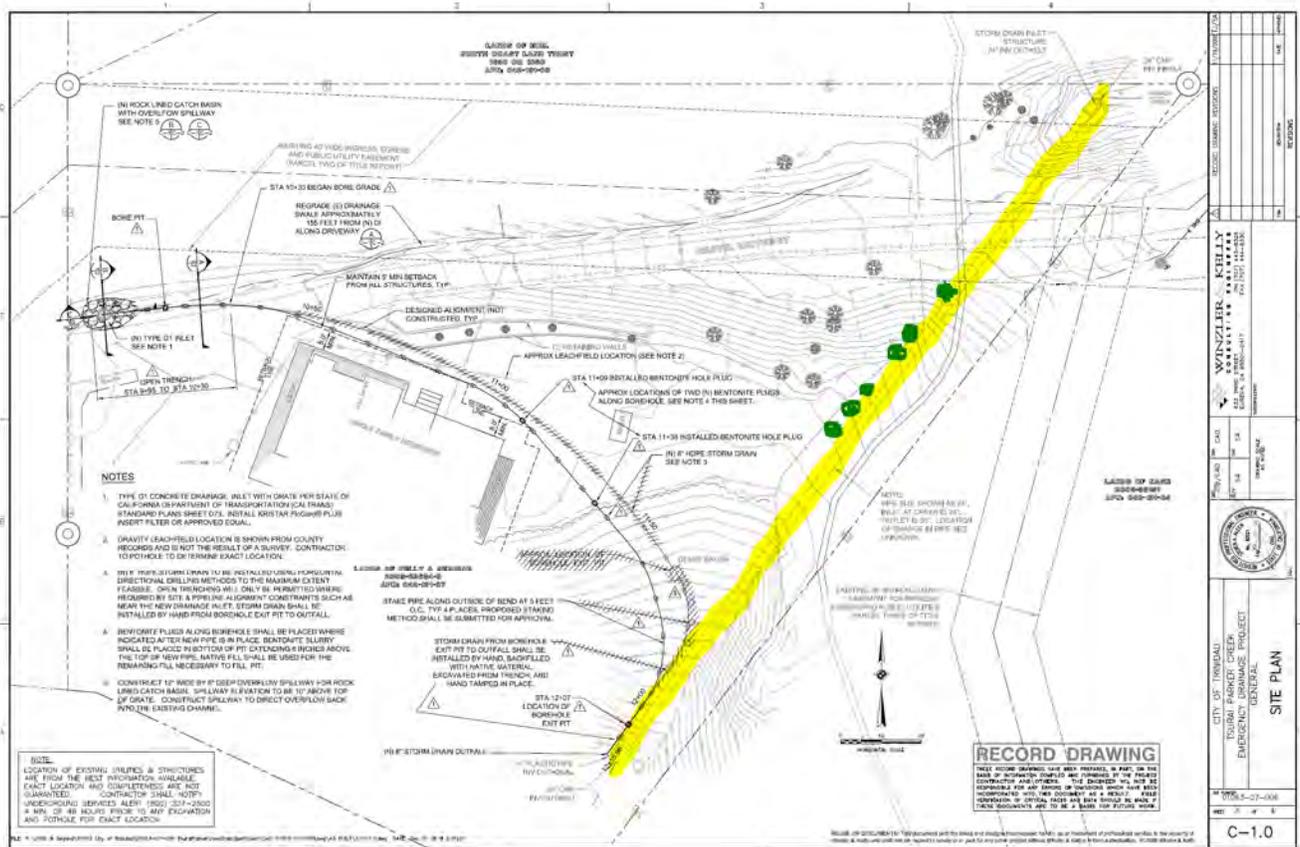
VICINITY MAP

SCALE: 1"=1,000'

SITE PLAN

The following site plan is reused from the *City of Trinidad, Tsurai Parker Creek, Emergency Drainage Project, August 2008*, with written permission from Steve Allen of GHD. This Record Drawing identifies the existing Kelly-Sebring, Parker Creek culvert (yellow highlight below) in relation to the overall site layout. The current culvert measures 24" at inlet and 30" at outlet and is 140' long.

[11" x 17" copies of Site Plan attached]





Reference: 016142

June 2, 2016

Mr. Mike Sebring
Ms. Cheryl Kelly
20 Scenic Drive
Trinidad, CA 95570

Subject: Geologic Evaluation of Proposed Parker Creek Culvert Replacement Project, Trinidad, California

Mike and Cheryl:

SHN is providing this letter report at your request to present the results of our geologic evaluation of the proposed replacement of the Parker Creek culvert on your property in Trinidad, California. This letter is intended to provide the necessary information to satisfy the City of Trinidad's requirements for geologic reporting relative to the proposed project.

The existing Parker Creek culvert carries stream flow in the lower reach of the creek, from the point where your driveway crosses the creek downstream to the mouth at Indian Beach (an estimated 180 to 190 feet based on Google Earth imagery). The culvert is embedded within a fill prism that forms the Parker Creek Trail that leads from Scenic Drive to Indian Beach. It is our understanding that the culvert pipe has steadily degraded over the years, until sufficient erosion around the pipe occurred this past winter (an above-average rainfall year), resulting in formation of a sinkhole around the pipe. The sinkhole exposed the culvert pipe, which revealed that it was rusted and seriously degraded. Inspection at the outlet of the culvert at Indian Beach also indicated significant degradation and leakage, with abundant flow emanating from beneath the pipe. The current condition of the culvert pipe requires replacement prior to the next rainy season in order to avoid additional erosion of the trail and sediment delivery to the waters of Trinidad Bay.

Geologic Setting

The existing Parker Creek culvert follows the stream channel from the driveway crossing to Indian Beach. Available geologic maps indicate that bedrock in the Trinidad area is associated with the Cretaceous age Franciscan complex, a regional unit of highly variable, strongly deformed material generally characterized in the area as "mélange". Melange is associated with a distinct block-in-matrix texture where variably-sized rock blocks (Trinidad Head and offshore sea stacks, for example) of wide-ranging lithologies are suspended in a sheared, low strength clay-rich matrix (locally referred to as "blue goo"). Earthflow-type landslides are common within the matrix material of the mélange due to its low strength and high cohesion. Several published and unpublished geologic maps show numerous landslides emanating from the upland slopes surrounding Trinidad Bay.

The subject site occupies what appears to be a stream terrace along Parker Creek; this interpretation is consistent with available geologic maps of the site. The terrace forms a distinct bench above

Indian Beach that is the site of the former Tsurai village. During our site visit, we did not observe alluvial gravels on the terrace surface, which suggests the feature is an erosional landform (that is, a "strath" terrace) cut into the Franciscan Complex bedrock (mélange), which is exposed in the low bluff face adjacent to Indian Beach.

Review of historic aerial photographs and field sketches of Indian Beach from as far back as 1851 indicate that the rate of coastal erosion and bluff retreat are relatively low. A historic review of bluff retreat in northern Humboldt County by Don Tuttle, former Humboldt County Environmental Services Director, documented the absence of erosion or bluff retreat along Indian Beach (Tuttle, 1982). Location within Trinidad Bay, which is shielded from much of the winter wave energy by Trinidad Head, is partially responsible for the low erosion rates in the site vicinity. We are aware of an episode of retreat along the bluff adjacent to the Tsurai village that occurred during the 1982-83 storm season. That year was a strong El Nino winter that represented a peak erosion event along much of the north coast. Extensive beach erosion at Indian Beach was documented that winter, which exposed the bluff face to wave erosion. A slump earthflow was documented on the bluff just west of your property that resulted in a localized area that experienced up to 10 feet of retreat of the bluff crest (that is, about 10 feet of the seaward edge of the Parker Creek terrace was lost). As the 1982-83 winter is notable for the level of erosion along the entire regional coastline, this appears to be an example of the potential effects of episodic erosion during a worst case condition.

The Parker Creek trail and immediate surroundings exhibit no evidence of instability that would suggest active landsliding in the native earth materials underlying the trail. The fill prism associated with the trail appears generally intact, except in areas that have been subject to erosion due to the degraded culvert pipe. We noted a large rock block just above the beach that appears to limit landslide potential in the project vicinity.

Conclusions

Based on the geologic conditions at the site and the merits of the proposed culvert replacement project, we conclude that the project is suitable from a geotechnical standpoint. While the project is associated with a low risk of exposure to geologic hazards, it has the potential to provide significant environmental benefits by mitigating a substantial erosion source that may deliver large quantities of sediment to Trinidad Bay. As such, we find the proposed project to be a favorable improvement.

In terms of the specific language requested by the City of Trinidad, we have evaluated the geologic conditions in the entire area surrounding the proposed culvert replacement and Parker Creek Trail. As the proposed project involves a culvert pipe buried in engineered fill, it will not be exposed to significant geologic hazards related to seismic shaking or other secondary seismic effects (liquefaction and so on). The fill prism and underlying native bedrock do not exhibit evidence of instability in the project vicinity. As the replacement of the culvert pipe will remove a source of potential erosion and groundwater infiltration, it will have a beneficial effect on the stability of the surrounding area, including the coastal bluff. The existing culvert appears to be in a suitable location based on past performance, such that replacement of the existing pipe will not be subject to, nor contribute to, geologic instability. The conclusions presented herein are associated with a

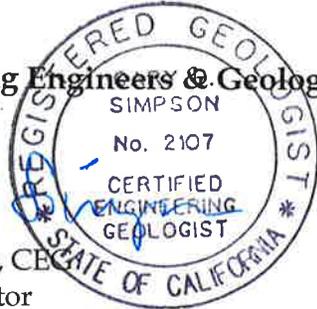
low level of uncertainty, as we have the opportunity to evaluate the project based on its past performance and benefit.

We hope that this letter provides the information that you need at this time. If we can provide further information or clarification of the conclusions presented herein, please do not hesitate to contact our office.

Respectfully,

SHN Consulting Engineers & Geologists, Inc.


Gary D. Simpson, CEG
Geoscience Director



References

Tuttle, D.C. (1981). "Investigation of Methods for Determining Coastal Bluff Erosion, Historical Section." Unpublished report funded by Sea Grant. 161 pages.

Lisa Stomme's calculations:

Hi Mike –

I ran the calculations this morning using the USGS streamstats program, see file attached. The second page shows the 100-year peak flow is estimated to be approximately 156 cfs.

Do you need to verify that the new culvert being placed will pass the 100-year flow?
If so, I can run another quick calculation if you know the slope and the size of the culvert being installed.

Thanks, Lisa

Lisa Stomme lstromme@shn-engr.com

June 29, 2016

Hi Mike –

I reviewed the W&K plans from 2008. The plans show that the culvert is approximately 190 feet long. At the inlet, the culvert is listed as a 24-inch CMP with an invert elevation of 53.7 feet, and at the outlet, the culvert is listed as a 30-inch CMP with an invert elevation of 25.1 feet. Based on these dimensions, the culvert slope is estimated to be approximately 15%.

I am not sure what the proposed new culvert layout will be, however I calculated the full flow capacity of the existing CMP culvert ($n=0.024$) using the manning's equation for both pipe sizes. The full flow capacity for a 24-inch CMP culvert at 15% slope is 47 cfs and the full flow capacity for a 30-inch CMP culvert at 15% slope is 86 cfs. Both of these flow rates are significantly less than the estimated 100-year peak flow of 156 cfs.

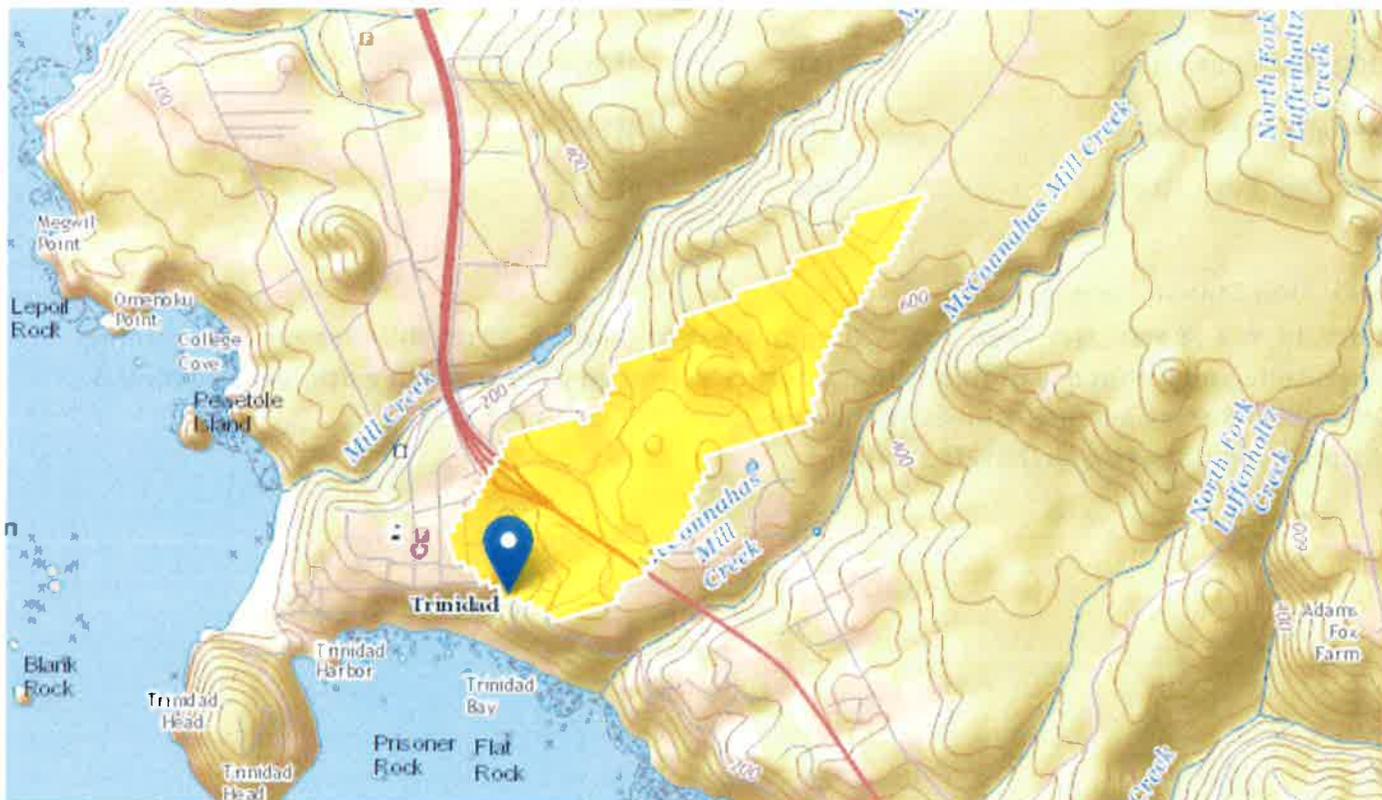
I noted on the letter from the City of Trinidad that two culverts are proposed to be installed to replace the existing culvert, however the letter references that the existing culvert is a 36-inch culvert which is different from what is shown on the plans. I am not sure how far along the design is yet, but I did calculate that one 30-inch HDPE storm drain pipe with a smooth interior ($n= 0.012$) at 15% slope will have full flow capacity of 172 cfs, which is greater than the estimated 100-year peak flow. The difference is the roughness factor applied for the flow calculations, with a smoother pipe you will have less friction and more velocity, resulting in more pipe capacity.

Let me know if there is a specific culvert design layout that you would like me to analyze for full flow capacity and I can run these calculations again.

Thanks, Lisa

StreamStats Report

Region ID: CA
Workspace ID: CA20160629103558231000
Clicked Point (Latit...): 41.05821,-124.13916
Time: 2016-06-29 09:36:55 -0700



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.3	square miles
PRECIP	Mean Annual Precipitation	53.4	inches

Peak-Flow Statistics Parameters [100.00 Percent 2012 5113 Region 1 North Coast]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.3	0.04	3200
Mean Annual Precipitation	53.4	20	125

Peak-Flow Statistics Flow Report [100.00 Percent 2012 5113 Region 1 North Coast]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	30.589	ft ³ /s	58.6
5 Year Peak Flood	60.102	ft ³ /s	47.4
10 Year Peak Flood	81.752	ft ³ /s	44.2
25 Year Peak Flood	110	ft ³ /s	42.7
50 Year Peak Flood	133	ft ³ /s	42.7
100 Year Peak Flood	156	ft ³ /s	44.3
200 Year Peak Flood	178	ft ³ /s	44.4
500 Year Peak Flood	208	ft ³ /s	46

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles, 2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012-5113, 38 p
(<http://pubs.usgs.gov/sir/2012/5113/>)