

# **BRIDGE FEASIBILITY STUDY**

## **MELROSE DRIVE EXTENSION** **Intersection with North Santa Fe Avenue** City of Oceanside, CA March 2009

Prepared For:  
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## **1. INTRODUCTION**

Conceptual engineering designs are currently in production, supporting the Environmental Impact Report for the Melrose Drive Extension (Project). Three separate alignments are being analyzed to connect Melrose Drive (Melrose) from North Santa Fe Road (NSF) to Spur Ave. One of the largest impacts resulting from this road extension would occur at the intersection of Melrose with NSF. At this intersection, there are three items that PDC has been asked to preserve: the existing drainage patterns (impacts to Guajome Creek), a wildlife corridor, and the potential for an equestrian crossing. While all of these criteria have been met in some form and in different locations with the conceptual engineering designs, they have not all been achieved at this NSF intersection.

This Bridge Feasibility Study has been prepared to allow all three of these criteria to be met at the intersection of Melrose and NSF. This study presents the impacts that constructing a bridge at this intersection may have on the overall conceptual design and the EIR. The discussion of the impacts and potential solutions to the existing/proposed utilities and grading/drainage patterns will be described in further detail.

Along with this study and included in the appendix of this report are improvement plans prepared to the 30% design level to aid in presentation of the bridge and its associated impacts.

## **2. BRIDGE FEASIBILITY ANALYSIS**

This analysis has been performed for alignment A of the three conceptual designs. While only one alignment was chosen at this time the impacts can be anticipated for all three alignments. The vertical variation at the intersection between alignments A, B, and C are minimal. And, only alignment B has a different horizontal alignment. The improvement plans associated with this analysis were prepared reflecting the impacts to alignment A in further detail.

### **2.1 Design Criteria**

The elevation for the bridge deck was established using the minimum clearance of 12' for an equestrian crossing. In addition to this clearance a thickness of 5' was established for the bridge deck and an additional 3' was added to be conservative. This will allow for the possibility of suspending utilities from the bottom of the deck, adding varying elevations to the existing

ground, clearance for foundation materials, drainage concerns, and wildlife crossings. The total clearance from the existing ground used to profile the bridge deck and prepare this analysis is 20'.

## 2.2 Impacts

- Melrose (South of NSF)
  - The bridge will not create additional surface improvements. With the bridge sitting significantly higher than the alignment A intersection, the connection to the existing improvements at Sagewood Drive would occur in a much shorter distance. This will increase the amount of fill in this area and in turn will expand the Area of Potential Effect (APE). Expansion to the APE will encroach closer to the residences on the west side of NSF, but will solely be an impact to the existing slope grading. The road would be closer in elevation to these residences, creating the possibility of opposition from the homeowners and the possibility of needing to construct additional sound walls.
  - While there is a vertical alignment change to Melrose south of NSF, there are not any significant impacts to the drainage patterns. The placement of storm drain structures may shift; however, the overall quantity remains unchanged.
  - At the intersection of Willowbrook Drive, Melrose would now be 13' higher. This increase in elevation would extend the required improvements to Willowbrook Drive by approximately 200LF and also extend the slope grading approximately 30LF.
  - Modification to the existing utilities near the approach to the bridge should be considered as stated below. The depth of these utilities with the bridge construction or the potential conflict with the bridge foundation will need to be considered.
- Melrose & NSF Intersection
  - The bridge deck will sit 20' higher than the existing roadway.

- The bridge deck will sit nearly at the same elevation as the residences on the southwest corner. As stated above this may create public resistance and/or possible increased noise concerns generating additional sound wall costs.
  - There are currently numerous utilities in the existing roadway, when placing a bridge over these utilities special consideration to foundation and envelope of this bridge should be strongly considered. Ideally, all of the existing utilities would remain in place; however potential conflicts could arise that may not allow this. Also, if the utilities would remain in place at the current depth, structural reinforcing and future access for maintenance need to be considered. All of these items could drastically affect the overall bridge design. The bridge, as presented on the improvement plans, should be looked at for the bridge deck and tie-ins to the existing roadway. In the future the bridge substructure can vary and should not affect the impacts discussed herein.
  - The existing culvert system can be omitted with a bridge.
  - Existing storm drain structures that connect into the current culvert system will be rerouted as shown on the improvement plans and outletted either through the bridge abutment wall or into the bridge sub structure in some form (pending the ultimate bridge design).
  - A catch basin and brow ditch system will be required at the southwest corner. This catch basin will be needed to collect the run-off between the right-of-way and back of residences on both Melrose and NSF.
- Melrose (NSF to Spur Ave.)
    - Starting from the intersection the roadway will be 20'-25' above the existing ground. Starting at station 127+00, a crest vertical curve is utilized that cuts through a large slope minimizing this elevation difference. While maximizing the downward slope on this vertical curve, the bridge design will meet the existing alignment A design approximately at Guajome Lake Road. There will not be any impacts to Guajome Lake Road or the bridge that goes over it.

- Just north of the NSF intersection the APE will be extended approximately 50LF West and 30LF East.
  - At Station 130+50 there is an elevation difference of 8', with the road associated with this bridge study being higher. This will in turn expand out the APE by approximately 20LF to the east and west.
  - The improvement plans associated with the bridge reflect 2:1 cut slopes while the conceptual engineering design reflected 1½:1 slopes. The cut slopes as shown on the bridge plans are much more conservative and are intended to show the worst case scenario. This would occur at Sta. 130+50 were the APE would be expanded by 220LF East and 60LF West.
  - The overall drainage concept will remain the same with storm drain structures only needing to be relocated. The overall quantity of structures and storm drain improvements would remain the same.
- NSF (west of Melrose)
    - 350LF of additional surface improvements will be required to this road west of Melrose. These improvements are required to meet the existing grade when sloping down from the elevation of the bridge deck.
    - On the north side of the road the fill slope will extend approximately an additional 30LF. This in turn would expand the APE by this much.
    - There will not be any substantial storm drain improvements on the west side. A previous low point with localized outlets will shift further west, functioning in the same manor. Two additional inlets have also been added at the end of the improvements. The existing drainage conditions in this area are unknown; these inlets have been added as a place holder for possible future drainage improvements.
    - Modification to the existing utilities near the approach to the bridge should be considered as previously stated. The depth of these utilities with the bridge construction or the potential conflict with the bridge foundation will need to be considered.

- NSF (east of Melrose)

- East of Melrose the tie in point will be at the same location; therefore, there will not be any additional surface improvements.
- The low point in this road way is shifted approximately 300LF to the east. This will only create the need for localized storm drain outlets. This will in turn decrease the quantity of storm drain pipe required.
- At its highest point, on both the north and south sides of the road the fill slope will extend an additional 40LF. This in turn would expand the APE by the same amount.
- Modification to the existing utilities near the approach to the bridge should be considered as previously stated. The depth of these utilities with the bridge construction or the potential conflict with the bridge foundation will need to be considered.

- Alignments B & C

As mentioned above, the feasibility analysis was performed on alignment A; however, due to similarities with alignments B & C an idea of the impacts to these alignments can be deduced.

- Alignment B - the required surface improvements would not expand beyond those already accounted for in the conceptual engineering design.
- Alignment C – the required surface improvements would match those of the bridge alignment for A, as outlined above. The only additional required surface improvements would be the 350LF on NSF west of Melrose.
- The maximum elevation differences for alignments B & C would both be approximately 15' of fill. This would lead to a maximum possible grading and APE expansion of 30LF.

*Note: Appendix 9 & 10 of the drainage study reflect the HEC RAS analysis supporting the storm drain layout mentioned in this analysis.*

### **2.3 Earthwork**

An earthwork analysis was performed using the vertical alignment of Melrose and NSF as they tie into the bridge deck (see improvement plans). The result of this analysis generated an import of 15,000 CY. This number factors in the bridge design as shown on the improvement plans. Any variance to this design could change this number significantly. It is worth noting that, with adding a bridge there is a strong possibility that this earthwork operation could be very close to being balanced. This could be true for all of the alignments as raising the road does not force maximization of the slopes of the vertical curves (currently restricting the earthwork numbers). This would omit the current estimated export fees that would represent a large portion of the construction costs.

### **3. CONCLUSION**

The bridge feasibility analysis presented herein provides the potential impacts to the conceptual engineering design for the Environmental Impact Report associated with the Melrose Drive Extension Project. The results of this analysis show what the potential implications would be upon constructing a bridge at the intersection of NSF and Melrose. From this analysis it can be determined that an increase in the required surface improvements would be minimal. Also, looking at the earthwork, the amount of export would be reduced significantly. The additional costs that may arise from this bridge would be associated with impacts to the existing utilities. This however, may ultimately be a concern with the at grade road improvements. To reiterate this study was prepared with the intentions of providing an overview of possible considerations associated with constructing a bridge. Once one of the three alignments is selected and progression towards a final design continues, further analysis of the feasibility of a bridge should occur. This analysis, should further explore a bridge design and how the substructure would incorporate the existing utilities.



## **APPENDIX 1**

### **Opinion of Probable Construction Cost**