

**APPENDIX I**  
**ADSC Recommendations**



**APPENDIX I.1**  
**Slide Curve Bridge Recommendations April 28, 2008**



Report of  
Contractor's Panel  
Of ADSC/WSDOT  
Task Force

Memo Date: 28 April 2008

To: Mo Sheikhezadeh

From: Alan Macnab

Re: I-90 Snoqualmie East Project

The contractors of the Task force reviewed soils information and preliminary drawings of the widening planned for I-90 specifically at Structural Wall 1. The TF also heard an update from John Zeman of URS and Bruce Erickson of KPFF.

The Contractors had the following comments.

**Soil Nailing**

While nothing about this job is easy, the contractors felt that the best solution to shoring the wall for access to Structural Wall 1 was with the use of soil nailing. Soil Nailing in the road bed materials is problematic due to the large erratics and coarse grained materials, but is better than the alternatives. The contractors suggested that some test pits be excavated to ascertain the standup characteristics of the excavated faces. Absent results of these tests, the contractors felt that a wall constructed at 2V/1H could be installed utilizing standard construction techniques. If a steeper wall is desired, the contractors recommended the use of micropiles to act as vertical elements in the face.

Grout takes in the soil nails could be excessive and measures such as grout socks maybe necessary.

A better definition of the rock horizon is also needed as it would be more economic for the project if soil nails did not have to extend into the bed rock.

**Soldier Piles**

The Contractors felt that installation of soldier piles was much more problematic than soil nailing.

The contractors felt that the smaller, single pile alternative was preferable over the double pile 6 foot diameter.

The contractors felt that added thought should go into the required depth of embedment into the rock for soldier piles and that more definition of the rock interface was needed.

## Overall Scheme

The contactors suggested that the bridge alternative was preferable to the MSE Wall when risk was considered.

The contactors suggested that the access shoring be made permanent if the bridge alternative was used.

The work windows when overlaid with the historic water levels create a scheduling scenario which is very problematic. It was suggested that an arrangement with the dam operator would help to create a clear view of the work window available. Frankly, the current presentation of work window will make it very difficult for anyone to accurately estimate the amount of time necessary to perform the work at elevation 2475. It may be impossible to bid this work on a fixed price basis.

## Drilled Shafts

An access bench of 65 feet in width as suggested is good. A 45 foot bench, while doable, will cause constructability slowdowns due to restricted access.

More definition is needed in the rock. The rock strengths suggested (average 22 ksi and maximums of 56 ksi) do not correspond to the descriptions of R3 and R4. Better definition of rock interface depths and rock sloping at the interface is needed.

Oscillator casing can be keyed into the rock with difficulty. Rock sockets can be excavated in the stated rock, but slowly. It is not necessary generally to case to the bottom of the rock socket.

If the design team has any more questions the contractors would be happy to assist you further

**APPENDIX I.2**  
**Snowshed Pier 2 Recommendations Dated November 6, 2009**



Date: 6 November 2009

Memo To: Mo Sheikhezadeh

From: Alan Macnab

Re: Snoqualmie Pass Snow Sheds Project Review – 11/5

The contractors of the ADSC/WSDOT Task force reviewed plans and geotechnical information and listened to a presentation by Chuck Vita of URS and Randy Giles of WSDOT . In response to several questions asked and opinions offered we answer as follows

The contractors were in agreement that this project will need to be performed utilizing oscillator/rotator methods. As to the question of whether the casing can be brought down to a level seal on the sloping bedrock, there were varying opinions and in the end it really will come down to how strong the rock is at the rock/soil interface. If necessary, it was also suggested that if the casing cannot be advanced to a level seal then it may be necessary to grout the low side of the rock within the casing to control the ground water.

Contractors suggested that 8 foot or 10 foot shafts were workable but seemed to prefer 8 foot diameter. In either case WSDOT should assume that the rock socket will step down to one foot less than the nominal diameter of the shaft. So, an 8 foot diameter shaft will have a 7 foot diameter socket.

The contractors were in agreement that while the sloping bedrock would be troublesome, it can be dealt with. The sloping bedrock is not expected to have any effect on tieback or soil nail installation.

We understand that the current thinking is to have one not two beams in the shaft to provide shear resistance to the socket. One contractor felt that this beam should be wet set after the installation of the shaft concrete utilizing a light extension. Two contractors were willing to use a bifurcated tremie to pour around the beam. All contractors agreed that the bifurcated or two tremie method will certainly yield anomalies in the shaft when CSL tested. If it becomes necessary to install beams in this fashion, the contractors will expect a level of understanding and participation on the part of WSDOT when it comes to anomaly repair.

It was anticipated that socket drilling will probably progress at a rate of something like 6 inches per hour.

The contractors pointed out to the design team that the current shaft cage design is too tight and does not meet the minimum windows for tremie concrete. Further bundling will be necessary

In addition WSDOT was cautioned to be careful about the use of heavy beams in the shaft which will require special rollings. Long lead times and Buy America restrictions could be a problem with this material.

It was suggested that geotechnical investigation holes maybe drilled at each shaft location in order to locate the rock interface. The contractors suggested that the holes be extended into the rock by coring to investigate the rock properties which are currently not well described for purposes of bidding. It was further suggested that these holes be drilled next summer prior to bidding so that the information could assist in bid preparation as well as optimization of shaft design.

The Contractors of the ADSC/WSDOT Task Force thank you for the opportunity to comment on this project and extend our offer to assist in the future if added questions are raised on this or any other project.

**APPENDIX I.3**  
**Snowshed Recommendations Dated October 7, 2010**



Memo To: Mohammed Sheikhezadeh

From: Alan Macnab for contractors of the ADSC/WSDOT Task Force

Date 7 October 2010

Re: I-90 Snowsheds (28 September review)

The contractors of the ADSC/WSDOT Task Force reviewed the above mentioned project in cooperation with WSDOT personnel on 28 September. The following are the comments. Drawings provided which showed cages were found to be problematic for a number of reasons. Inadequate spacing of rebar verticals, hoops, spirals and concrete cover problems were noted.

If the reinforcing cage method is used, the CSL tubes must be secured full length through attachment to the rebar or spacing hoops.

WSDOT asked the contractors opinion of a recommendation to replace the reinforcing steel cage with a steel pipe which would be somewhat smaller than the drilled shaft such that it had concrete cover on the outside. The contractors were supportive of this approach with the following conditions. Most contractors felt that it would be necessary to wet set the pipe. The specification should indicate that this would be an acceptable method of placement. At least one contractor stated that it felt that means and methods of concrete placement should be left to the contractor.

A question from WSDOT about using studs to increase bond was rejected by the contractors except in areas where concrete is placed by dry placement methods.

It was pointed out by the contractors that pipe is a long lead item and if the shafts are to be geotechnically investigated before pipe order this may significantly lengthen the construction schedule. If this type of investigation is not undertaken before the ordering of pipe, most contractors recommended that the order lengthens for pipes should be increased by 20% although bidding of excavation and concreting quantities should represent best available information ( don't add the 20% here). Changes in quantities should be covered by the 25% rule for over or under provided that the permanent materials such as pipe which must be preordered should be paid based on delivered length regardless of quantity used.

Regardless of the method of concrete/grout placement for encapsulation of the pipe, the coarse nature of the overburden fill materials will cause problems. Migration of the concrete/grout should be expected and the contractors cannot guarantee the extent of the migration.

WSDOT requested guidance on ensuring that spacing of anchors be maintained. The contractors pointed out that no economic system of anchor installation exists that will ensure a minimum spacing of 5 feet can be guaranteed. Contractors were not overly concerned about the danger of group effects when anchors are founded in rock. In order to minimize the spacing issue it was recommended that anchors be splayed and anchor declination angles be varied. The anchors would most likely be drilled after placement of the cap and should be guided through the caps by preplaced blockout tubes.

One contractor suggested that if the caps were redesigned as a continuous beam, the anchors could be further spaced.

Anchors will need to be prefabricated prior to drilling and as such will be affected by variations in rock profiles. WSDOT were requested to provide any rock profile information to look at 3D effects of rock slopes on anchor lengths. It was reported that significant center line drilling had been done which will give a 3<sup>rd</sup> dimension look at the rock. Anchors should be ordered and paid with extra length in the no-load zone so that anchors can be cut to length once rock elevation is confirmed.

One contractor requested that the bond length be ordered over length.

The contractors of the ADSC/WSDOT Task Force appreciate the continuing opportunity to comment on this difficult project and offer to continue to support the design team in its efforts.