NOLTE VERTICALFIVE

Dana Schuler
Weber County Engineering Division
2380 Washington Blvd. #240
Ogden, UT 84401

RE: Summit at Powder Mountain Phase 1D
Response to Engineering Comments

Ms. Shuler,

The following are comments and responses pertaining to the civil engineering plans from your review and received on December 13, 2013.

Plat comments:

Sheet 1 of 2

1. Plat Notes – A separate meeting was held on 12/11/13 to discuss the notes. A summary of this meeting will be posted subsequent to this review.

Response: Updated Plat notes as received on 12/13/13 from Ballard Spahr.

Sheet 2 of 2

1. What happened to the "R" designation on lots 101-106?

Response: Civil design never had lots 101-106 as restricted lots, there addition to this plat was originally an error that has been corrected.

2. Building envelope table: should lots 107-115 exclude the easement area?

Response: Yes, Updated B.E. table

3. Why is right-of-way width at end of Meridian uneven?

Response: Unsure, the width of Meridian Ave has been corrected to a 50' private road.

3. The following separate easements are required prior to recording this plat:

1. Sewer easement (adjacent to lot 107)
   Response: This easement was submitted to Weber County for review on November 27th. It is #31 on the list.

2. Drainage easement beyond easement shown on parcel D (see improvement plans)
   Response: Improvements do not extend beyond the subdivision boundary; therefore, no additional easement is needed.

3. Slope easements for all cuts/fills outside of subdivision boundary
   Response: This slope easement is currently being drafted. A draft with be provided for Weber County review upon completion.

4. Temporary turnaround easement
   Response: This easement is currently being drafted. A draft with be provided for Weber County review upon completion.

Improvement Plan Comments (written response required):

1. Sheet 1.03 – Need acknowledgement from sewer district of 17.5' deep sewer line (in plan approval letter is fine).

Response: We are currently coordinating with the sewer district to get approval.

2. Sheets 1.03 and 1.04 – Provide copies of all easements for improvements outside of subdivision boundary. (i.e. grading, drainage, sewer line, utility stubouts)

Response: Copies of easement have been attached.

3. Sheet 2.00 – Per response letter (not dated) submitted on 12/6/13, provide DOT references regarding grade breaks at intersections please.

Response: References have been attached to this response letter.

4. Sheet 2.00 – Keynote located at station 15+00 appears to be incorrect.

Response: Keynote has been fixed to callout gate valve

5. Sheet 2.01 – Provide callouts for water infrastructure at intersection of Daybreak Ridge and Rolling Drive.

Response: Callouts have been added to waterline infrastructure.

6. Sheet 2.01 – station 14+60 – Why not use 10x8 tee for stubout to parcel D rather than having to use a reducer in parcel D improvements? (just a suggestion)

Response: 10x8 tee has been added with 8" gate valve.

7. Sheet 2.01 – Need detail for temporary turnaround driveway. (road section)

Response: Pavement section callout added on sheet 2.01.

Regards,

Ryan Cathey, PE
Engineering Manager

CC: Jared Andersen, PE- Weber County Engineer
Rick Everson, PE- Watts Enterprises, Inc.-Land Owner's Representative

- maintenance of traffic
- environmental impacts
- right-of-way impacts
- pedestrian (ADA) requirements
- safety considerations
- sight distance considerations (all types)
- drainage considerations
- high water considerations
- ability to tie the roadway profile into side roads, driveways and at grade railroad crossings.
- drivability and driver expectancy

4.3.5. Maximum Change in Vertical Grade without Using Vertical Curves

GDOT typically uses vertical curves for changes in vertical grades. However, there are situations where it is either impractical or impossible to utilize a vertical curve. Such situations include:

- temporary vertical tie-ins
- profile tie-ins such as overlay transitions
- avoidance and/or minimization of an environmental impact
- point profiles in overlay and widening sections
- profile reconstruction near fixed objects such as bridges and approach slabs

Table 4.7. lists the maximum vertical grade changes that do not require a vertical curve. Note that these values change per design speed. Grade breaks should only be used when necessary (vertical curves should be used, wherever practical). If two or more of these vertical grade breaks are utilized in succession (i.e., a point profile), the cumulative effect of these grade breaks in the profile shall be evaluated for stopping sight distance and it shall be verified that typical stopping sight distance is always provided. If the cumulative effect of a series of vertical grade breaks violates stopping sight distance criteria, the values in **Table 4.7.** may need to be reduced.

Table 4.7. Maximum Change in Grade that Does Not Require a Vertical Curve

	Design Speed (mph)										
	20	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**
Maximum Change in Grade (%)	1.20	1.10	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20

4.3.6. Vertical Grade Changes at Intersections

If it is impractical to match the elevation of an intersecting road, the crossroad should be reconstructed for a suitable distance using adequate vertical geometry to make the grade adjustment. In general, a 2% maximum tangent grade break is allowed at the edges of signalized intersections to allow vehicles on the crossroads to pass through an intersection on a green signal safely without significantly adjusting their speed. A 4% maximum grade break is allowed in the center of an intersection corresponding to the 4% crown breakover associated with a crossing road.

For the edges of unsignalized or stop condition intersections, a maximum tangent grade break of 4% may be employed.

4.3.7. Minimum Profile Elevation Above High Water

One major factor in establishing a vertical profile for either a roadway or a bridge is clearance over high water or a design flood. For roadways, this is important for two reasons:

- **Pavement Protection -** A major factor in a roadway's durability is minimizing the amount of moisture in the base and pavement. Keeping the roadway base as dry as possible will help prevent or minimize pavement deterioration.
- **Safety -** A roadway with a profile set above the design high water will keep water from overtopping the roadway. Overtopped roadways are a hazard to moving vehicles and can effectively shut down a facility when they are needed most, i.e., a hurricane evacuation route.

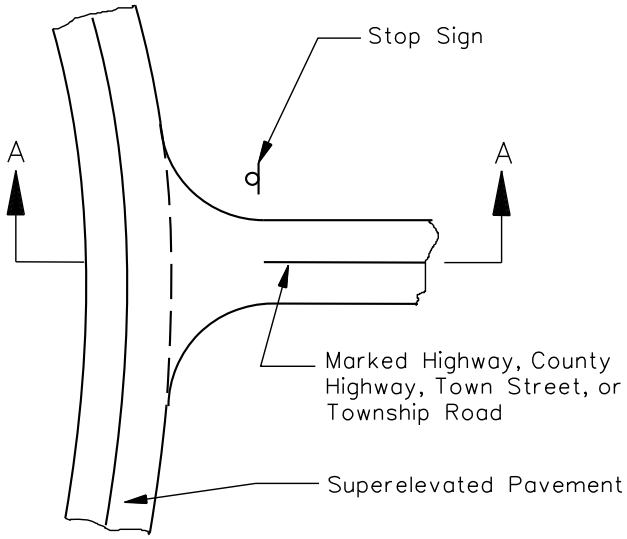
For bridges, prescribed low-chord clearances must be maintained to protect the bridge superstructure from unanticipated lateral forces associated with high-velocity flood waters.

Table 4.8. summarizes the required high water clearances for roadways and bridges in Georgia. A vertical profile that satisfies the worst-case situation for either clearance or overtopping shall be established.

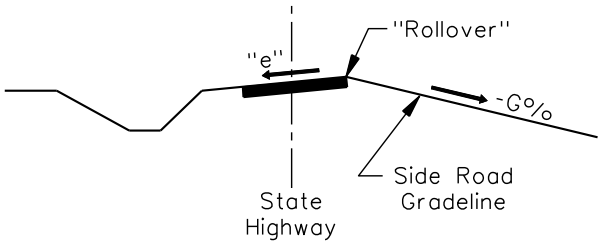
Table 4.8. Vertical Profile Clearance Based on High Water

Facility	Designer's First Priority				Designer Must Check	
	Roadway Base		Bridge Low Chord Clearance		Shoulder Break Point Clearance or Bridge Low Chord Clearance	
	Required Clearance	Design Flood Frequency	Required Clearance	Design Flood Frequency	Required Clearance	Design Flood Frequency
Interstate	1-ft	50-year	2-ft.	50-year	1-ft. below shoulder break point	100-year
Hurricane Evacuation Routes	1-ft.	50-year	2-ft.	50-year	1-ft. below shoulder break point	100-year
Roads Designed as State Routes	1-ft.	50-year	2-ft.	50-year	1-ft. below shoulder break point	100-year
Roads Not Designed as State Routes						
ADT: 0 – 99	1-ft.	5-year	2-ft.	5-year	1-ft. below shoulder break point	10-year
ADT: 100 – 399	1-ft.	10-year	2-ft.	10-year	1-ft. below shoulder break point	25-year
ADT: 400 – 1,499	1-ft.	25-year	2-ft.	25-year	1-ft. below shoulder break point	50-year
ADT: 1,500 or more	1-ft.	50-year	2-ft.	50-year	1-ft. below shoulder break point	100-year
Driveways	1-ft.	25-year	2-ft.	25-year	Shoulder break point not overtopped	50-year
Temporary Detours	1-ft.	10-year	2-ft.	10-year	Shoulder break point not overtopped	25-year
Permanent Bridges	1-ft.	50-year	2-ft.	50-year	1-ft. low-chord clearance	100-year
Temporary Bridges						
Local Road with ADT < 400	1-ft.	2-year	2-ft.	2-year	Low-chord not overtopped	5-year
All Other Roads	1-ft.	10-year	2-ft.	10-year	Low-chord not overtopped	25-year

Refer to the most current version of the GDOT *Manual on Drainage Design for Highways* (also referred to as the *Drainage Manual*), which may be downloaded from the GDOT Repository for Online Access to Documentation and Standards (R.O.A.D.S.). For roadways, designers should be familiar with the concept of culvert hydraulics and be aware that head losses associated with culverts will generally produce a headwater greater than the design flood elevation of the natural conditions. A vertical profile that provides the prescribed clearances over either the headwater of



PLAN VIEW



CROSS SECTION A-A

Type of Improvement Category	Maximum Superelevation Rate "e" for Intersections on Curve	Rollover Guidelines
"New Construction" at an important crossroad	4% Desirable Maximum	5% Desirable Maximum 6% Maximum
To remain in place with "Reconstruction" at an important crossroad	6% Maximum	7% Desirable Maximum 8% Maximum
To remain in place with "Reconstruction" at a minor crossroad	8% Maximum	9% Desirable Maximum 10% Maximum

INTERSECTION WITH SUPERELEVATED MAINLINE

Figure 36-1.E

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STATE HIGHWAY ACCESS MANUAL - STREET CONNECTION STANDARDS

12. STREET CONNECTION STANDARDS

This Chapter discusses SHA's standards for street connections that provide access to public or private subdivision roads or provide any other public road intersection with a State highway. These standards are applicable to all proposed connections and any existing connections subject to State regulation.

12.1 Horizontal Layout

12.1.1 Width of Street Connection.

The State standard width for a two-way street connection is 30' minimum. This provides for two 15' curb lanes when the connection is channelized. When an open section is acceptable for the connection, the minimum width is also 30', providing for two 11' lanes and 4' shoulders. Refer to the typical details in **Appendix B**.

12.1.2 Angle of Street Connection.

The angle of intersection, measured as the angle between the centerline of the State highway and the centerline of the street, shall be not less than 70 degrees or greater than ll0 degrees. Every attempt shall be made to provide a connection at 90 degrees.

12.1.3 Intersection Radius.

A. At the intersection of a State highway with a minor road (county, municipal, etc.) the minimum radius shall be a 30 foot or equivalent 3-centered compound curve.
B. At the intersection of a State highway with a State highway or other major arterial highway, the minimum radius shall be a 50 foot or equivalent 3-centered compound curve. The appropriate radius shall be determined by analyzing the turning movement for the design vehicle.
C. At intersections with channelization providing for free right turns, the above mentioned dimensions will be increased as directed by SHA in accordance with accepted engineering practices. The proper radius for this situation will allow the design vehicle (WB-62, WB-67, SU, etc.) to comfortably negotiate through the right turn into the receiving lane without encroaching into the adjacent through lane(s).
D. At intersections where a significant volume of vehicles that require a large turning radius are expected (e.g. tractor trailers, single unit vehicles, industrial areas, along primary routes), the design vehicle for intersection design purposes shall be identified and reviewed with the Assistant District Engineer – Traffic. Near Interstate routes and primary highways, the appropriate design vehicle for effective intersection operations is a WB-67.
E. Where multiple left turn lanes are being considered, the intersection design does not necessarily need to accommodate side-by-side design vehicle passage through the turn. However, a design vehicle and a passenger car should be able to negotiate the turn simultaneously without interfering with opposing left turns under the same phase.

12.1.4 Traffic Control Islands.

Traffic control islands shall be provided where appropriate for the anticipated turning movements and constructed in accordance with the standards given in 15.9. A right-in/right-out design, similar to that used for commercial entrances, may be required for street connections along divided highways. Refer to 11.1.4.B for guidance on appropriate application of this design.

12.1.5 Monumental Entrances.

Monumental entrances are generally not appropriate for public street connections to the State highway. Where the street is to have a divided or channelized cross section on-site, this section shall be introduced outside of the State's right of way. Provisions for u-turns shall be made on-site beyond the intersection area, by way of channelized turn bays or connection with other site roads.

12.2 Vertical Layout

12.2.1 Maximum Landing Grade for Public Streets.

The profile grades of intersecting streets should be as flat as possible on those sections that are to be used for storage space for

stopped vehicles. Grades in excess of 3 percent may not be allowed on the landing grade (first 50 feet) of intersecting public streets, unless otherwise approved by the administration. Grades beyond the landing grade shall be in accordance with currently accepted engineering practices, but may not exceed 6 percent. Design using vertical curves is recommended.

12.2.2 Grade Breaks.

The maximum allowable grade break between the preference road cross slope and the profile grade of the non-preference public road is normally 5%. This allows for a landing grade of up to 3% on the non-preference road when the cross slope of the preference road is 2%. In the case of superelevated highway cross sections, a grade break of up to 7% may be allowed. This accommodates a landing grade of up to 3% on the non-preference road when the preference road cross slope is superelevated at up to 4%.

12.2.3 Grading and Drainage Provisions.

The profile grade lines and cross sections on the non-preference intersecting streets shall be designed to provide a smooth junction and proper drainage. Normally, the grade line of the major highway should be carried through the intersection, and that of the intersecting street should be adjusted to it.

12.2.4 Vertical Layout for Private Streets.

The vertical layout for private street connections shall conform to the criteria for Commercial Entrances given in 11.3.

12.2.5 Entrance Profile.

A profile of all street connections shall be supplied for EAPD review. The profile shall be submitted on a scale drawing showing existing and proposed grade lines at the centerline of the highway and along the radius returns (fillet profiles) of the intersection. All grades and control points shall be clearly identified. The existing and proposed profile grades along the centerline of the entrance shall be shown extending from the preference road centerline into the site for a distance sufficient to demonstrate compliance with the above standards. All grades, elevations, offsets, flow lines, grade breaks, and controls shall be clearly labeled and drawn to scale.

Previous Next

Maryland Department of Transportation

9.0 INTERSECTION AND INTERCHANGE DESIGN

- **General**

  This chapter covers the design standards, guidelines, and processes for designing road approaches, signalized and unsignalized at-grade intersections, and interchanges for State Highways. For information on general design considerations not fully covered in this chapter, or other parts of this manual, refer to AASHTO's *"A Policy on Geometric Design of Highways and Streets – 2001," C*hapters 9 and 10; the FHWA *"Design of Urban Streets,"* Jan. 1980; *"Technology Sharing Report 80-204,"* Chapter 8; and/or the ODOT *"Modern Roundabouts For Oregon, Report 98-SRS-522,"* and those documents referenced in Section 9.5.

  The Engineering Services Unit can provide design assistance in the areas of interchange design, intersection design, channelizations, road approaches, roundabouts, large vehicle accommodation, and alternative mode accommodation. The Engineering Services Unit is responsible for the preparation of all interchange layout sheets for all new and modified interchanges. In addition, the Engineering Services Unit should be consulted about complex intersection designs that cannot meet the standards contained in this design manual.

  Information on traffic volumes and requirements can be found in Section 10.6 of this manual or further information can be obtained from the Transportation Planning Analysis Unit of the Transportation Development Division of ODOT.

9.1 ROAD APPROACHES

- **General**

The location and spacing of road approaches should be in conformance with the Access Management standards as described in the Oregon Highway Plan, Appendix C. The decision for placement and design of a road approach must be consistent with the function of the highway and optimize the safety and operational efficiency for vehicles as well as bicyclists and pedestrians. The road approach design must accommodate the turning movements of the appropriate design vehicle. All road approaches, public and private, require a construction permit from the appropriate District Maintenance Office. The District Manager and Regional

9.2 GENERAL INTERSECTION DESIGN

- **General**

  This section describes the standards and guidelines for the geometric design of traditional at-grade intersections including lane widths, shoulders, superelevation, skew angles, turning radii, left turn lanes, right turn lanes, channelization islands, curb extensions, and bicycle and pedestrian needs. Other factors in the design of intersections include the adjacent land use, urban or rural condition, and speeds.

  Specific design issues and concerns related to signalized and unsignalized intersections are discussed in Sections 9.3 and 9.4, respectively. The design standards and considerations for modern roundabouts are contained in Section 9.5

9.2.1 DESIGN CONSIDERATIONS

- **Approach Grades**

  The approach grades of intersecting roadways with a state highway should be kept to a minimum. It is preferable to have a relatively flat or slightly elevated roadway connecting with a state highway. This helps improve the visibility of the intersecting roadway.

  Generally the intersecting roadway's vertical alignment should match with the cross slope of the highway as long as the cross slope is less than 3%. Where the cross slope is equal to or greater than 3% a small break in the grade or vertical curve may necessary. The goal is to provide a connection that does not require vehicles to stop and enter the highway from a steep grade. The flatter the approach, the better, particularly for large vehicles.

  The maximum grade break between the highway shoulder and intersecting road should be held to 6% or less. Where the algebraic grade difference is greater than 6%, a short vertical curve should be used. In addition, a 20 foot landing should be provided (see Figure 9-5, Standard Drawing RD725). In a marked or unmarked crosswalk, the cross slope should be held to 2% or less to meet ADA requirements.

  NOTE: Crosswalks, whether marked or unmarked, exist across each approach to an intersection unless specifically closed by the road authority.