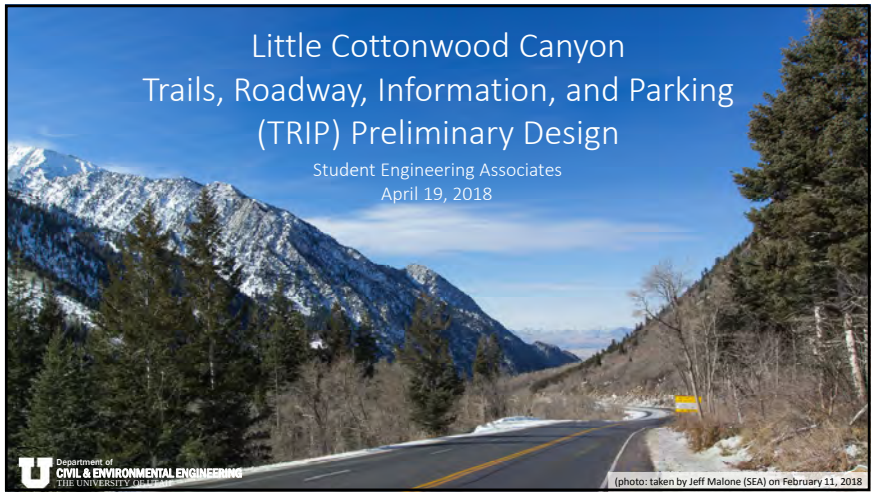

Who We Are

- Student Association of Engineers (SEA)
- Civil and Environmental Engineering Undergraduate
- On behalf of Granite Community Council

(photo: taken by Jeff Malone (SEA) on February 11, 2018

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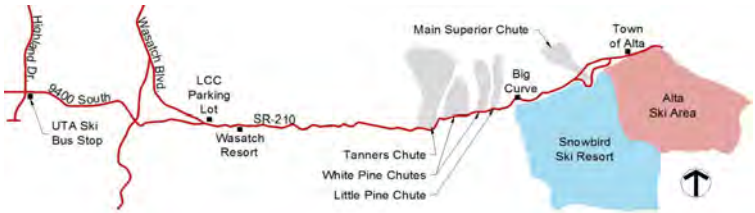
Transportation Network



(image source: developed by Savanah Whitaker (SEA) with insight from David Eckhoff, PhD, PE)

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Ranking Criteria

Safety 30%
- Ability to increase safety

Serviceability/Mobility 25%
- Meets performance goals
- Provides level of comfort & reliability

Environmental Impact 20%
- Creates minimal impact from construction & operations

Affordability 15%
- Estimated capital costs are within budget

Aesthetics 10%
- Ability to incorporate into surroundings and community

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Feasibility Study Review

Gondola

Ranking of Criteria
- Safety
- Serviceability/Mobility
- Environmental Impact
- Cost
- Aesthetics

Autonomous Vehicle Network

Ranking of Criteria
- Safety
- Environmental Impact
- Aesthetics
- Serviceability/Mobility
- Cost

Bike and Pedestrian Path

Ranking of Criteria
- Safety
- Serviceability/Mobility
- Aesthetics
- Environmental Impact
- Cost

Multimodal Transportation Hub

Ranking of Criteria
- Serviceability/Mobility
- Environmental Impact
- Safety
- Cost
- Aesthetics

Feasibility Study Review

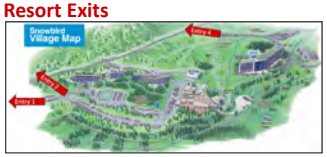
Snow Shed

Ranking of Criteria
- Safety
- Serviceability/Mobility
- Environmental Impact
- Cost
- Aesthetics

The Big Curve Realignment

Ranking of Criteria
- Safety
- Aesthetics
- Serviceability/Mobility
- Environmental Impact
- Cost

Resort Exits



Ranking of Criteria
- Safety
- Serviceability/Mobility
- Environmental Impact
- Cost
- Aesthetics

Preliminary Design

- Utilities: Potable Water and Flushing Toilets
- Law Enforcement
- Parking
- Snow Sheds
- Roadway Improvements
- Resort Intersections

Preliminary Design

- Coordination within LCC
- Intelligent Transportation
- Roadway Improvements
- Visitor Center
- ADA Accessible Path
- Financial Model

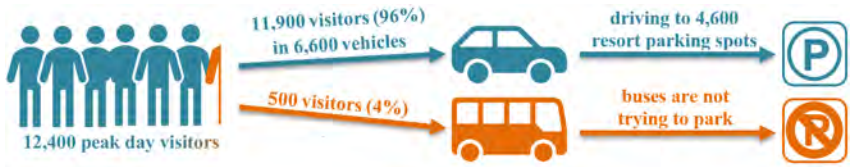
Intelligent Transportation System

Valley Parking – Alexis Richards

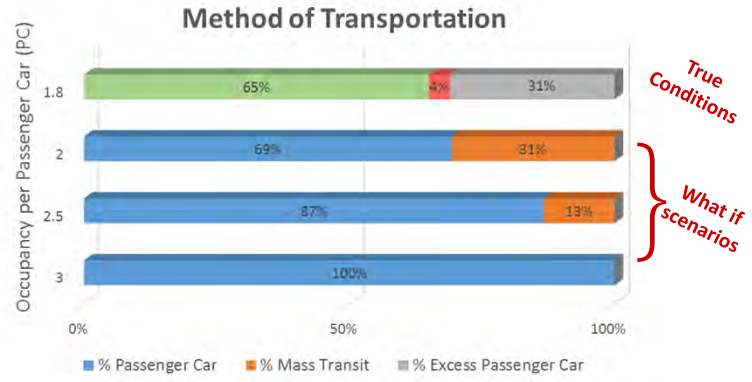
Intelligent Vehicles – Alexis Richards

User Interface – Endre Bjertness and Austin Bowe

Existing Conditions- Peak Day



(image source: developed by Savanah Whitaker (SEA) with data from Mountain Accord)



(image source: developed by Alexis Richards (SEA) with data from Mountain Accord, 2015)

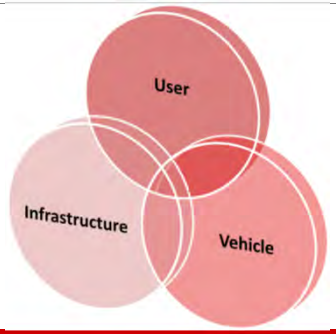
Building a Sustainable Future

A successful transportation system for LCC must:

1. Encourage carpooling and mass transit
2. Accommodate increased visitation with minimal human footprint in the canyon
3. Create a transportation network that can adapt to demand

(image source: greenhumor.com)

Intelligent Transportation System



Connecting Factors
- Communication
- Information sharing

Outcomes
- Changes in user behavior
- Convenient and responsive mass transit

Intelligent Transportation System

Performance Goals
- Reduced congestion
- Increased ridership
- Improve safety

Features
- Valley Parking
- Intelligent Vehicle
- User Interface

Valley Parking

Current Capacity & Utilization
- Formal parking, P&R
- Informal parking, schools & churches

Future Capacity & Utilization
- 9400 S. & Highland Dr.
- 6200 S. & Wasatch Blvd.

(image source: developed by Moriah Gomache (SEA) with data from Mountain Accord, 2017)

Valley Parking

Performance Goals and Requirements
- Priorities existing infrastructure & minimize new construction
- Multimodal transportation
- Location choice:
  - Distributed Parking
  - Away from the mouth of canyon

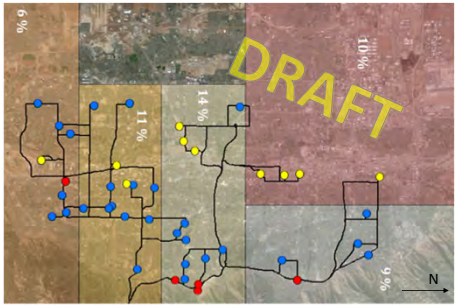
(image source: Mountain Accord)

Valley Parking

Preliminary Design

Node distinction by **outbound** transit

- Blue: shuttle and carpool
- Red: bus only
- Green & Yellow: bus and shuttle
  - Green: ski bus
  - Yellow: regular bus



(image source: developed by Moriah Gomache (SEA) with data from Mountain Accord, 2017)

Intelligent Parking

Levels of Autonomation			
	Rank	Name	Availablility
Human driver	0	No Automation	Today
	1	Driver Assistance	
	2	Partial Automation	
Automated driving systems	3	Conditional Automation	In Testing
	4	High Automation	
	5	Full Automation	Planning

(image content provided by Blaine D. Leonard, P.E., F.ASCE, UDOT)

Intelligent Vehicles

Qualities of an Ideal Autonomous Vehicle

- Shuttle
  - 6-10 passengers
  - All terrain
  - Storage Space
- Pilot Program
  - Lincoln, NE
  - HDR engineering

(image source: https://www.imeche.org/images/default-source/default-album/driverless_cars_illustration_main.jpg?sfvrsn=0)

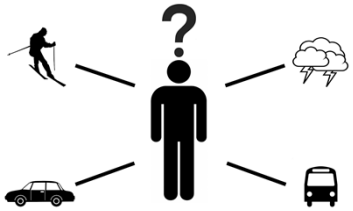
Insert slides from Austin

(image source: appstore.com)

ITS – User Interface

Performance Goals

- Attract more users to high occupancy modes of travel
- Help users make informed decisions that benefit themselves and the Canyon



ITS – User Interface

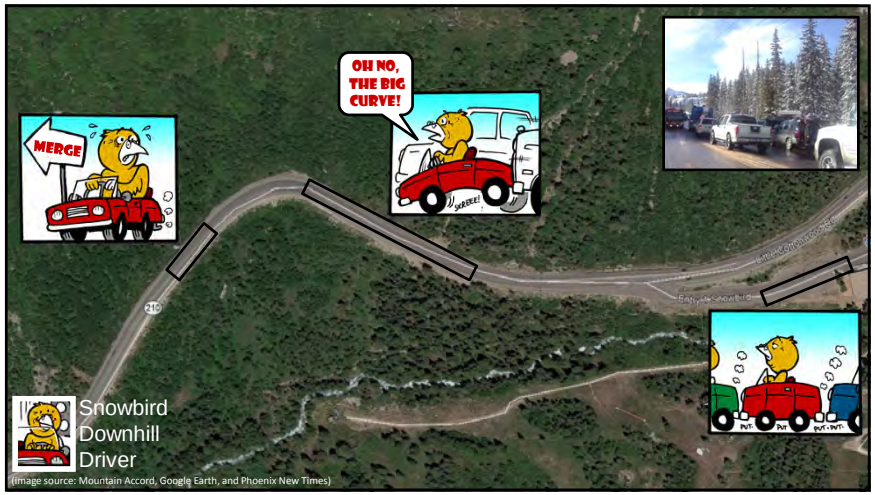
Preliminary Design

- Information gathering
- Notifications/Alerts
- Link to 3rd party apps versus integrated features
- Incremental development with more integrated features

(image source: epak)

Roadway Improvements

Resort Exit and The Big Curve – Jorgen Swenson



Roadway: Entry 1 and Big Curve

Performance Requirements and Goals

- Improving Driver Safety By Reducing Conflict Points
  - Intersection
  - Merge Point
- Improve Traffic Flow
  - Vehicles Exiting the Resort
- Reduce Vehicle Emissions
  - Less Vehicles at a Standstill

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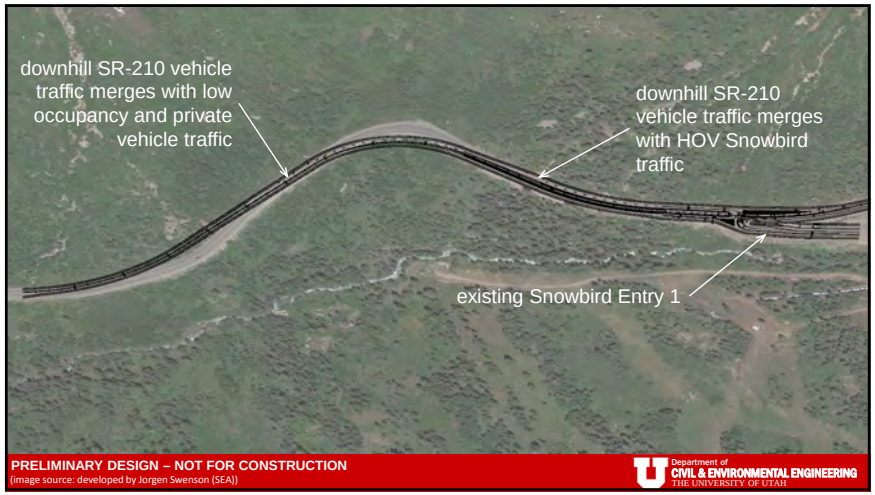

PRELIMINARY DESIGN – NOT FOR CONSTRUCTION
(image source: developed by Jorgen Swenson (SEA))

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Roadway: Entry 1 and Big Curve

PRELIMINARY DESIGN – NOT FOR CONSTRUCTION
(image source: developed by Jorgen Swenson (SEA))

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PRELIMINARY DESIGN – NOT FOR CONSTRUCTION
(image source: developed by Jorgen Swenson (SEA))

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Visitor Center and Path

Visitor Center and ADA Accessible Path – Tyler Anderson

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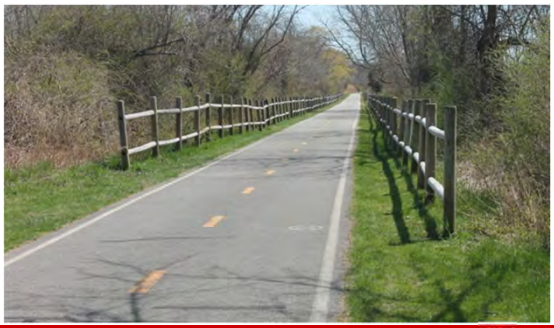
Visitor Center and Path



(image source: left - developed by Tyler Anderson (SEA) and right -)

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Path Alignment

(image source: developed by Tyler Anderson (SEA))

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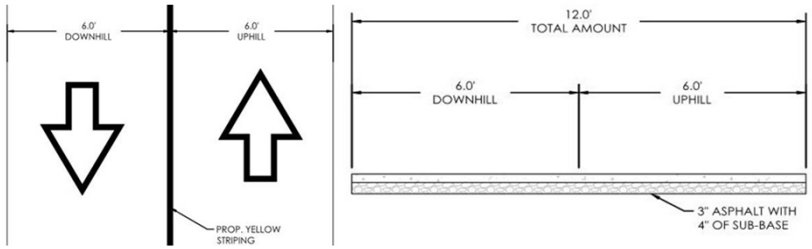
Cross Section of Path



(image source: developed by Tyler Anderson (SEA))

Visitor Center Location

(image source: left - developed by Tyler Anderson (SEA) and right -)

Financial Model

Financial Model – Stockton Denos

Financial Model

Canyon Improvements

$200 million
Capital Costs

$260 million
O&M Costs

Financial Model

Funding Generation

Phase	Funded By	Cost (millions)
Phase 1 (10 years)	SB 277	$65
Phase 2 (15 years)	Cottonwood Rec Pass	$115
Phase 3 (15 years)	Cottonwood Rec Pass	$137
Phase 4 (10 years)	Cottonwood Rec Pass	$143
	Grand Total	$**460**

(image source:)

Financial Model

User Fee Structure

- Function of:
  - Vehicle occupancy
  - Day of the week
  - Time of day
  - Season
  - Current weather conditions
  - Current traffic conditions

Goal

Objective

Financial Model

Exceptions

- Residents get a certain number of free passes
- Employers can be given a certain number of free passes, but will be responsible for their getting their employees up the Canyon
- Service opportunities to get a free pass

(image source:)

Coordination for LCC

Coordination of the LCC System – Savanah Whitaker

Coordination for LCC

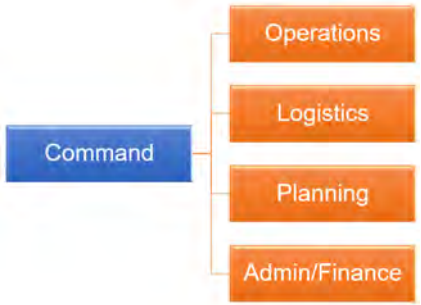
(image source: developed by Savanah Whitaker (SEA))

IT Management

(image source: developed by Savanah Whitaker (SEA) with online clipart)

Incident Commander

- Provide Canyon coordination to existing LCC Roadway Team
- Utilized during emergencies or planned events
- Direct line of communication to the ITS



Public Stewardship Program

(image source: developed by Savanah Whitaker (SEA))

National Forest System Trails

- Create inventory
- Assess existing trail needs
- Evaluate proposed trails through NEPA
- Implement new trails

(image source: U.S. Forest Service, National Forest System Trails)

Conclusion

We envision Little Cottonwood Canyon to remain a natural and captivating destination for people with diverse interests and hobbies to safely experience Utah's Wasatch Mountains. We believe this will be accomplished by protecting the Canyon's sensitive ecosystem and by minimizing the footprint of future transportation systems operating within its boundaries. We hold that these goals can be accomplished while maintaining the vitality of nearby communities.

Bringing transportation diversity, information, and safety to LCC

Thank You

GRANITE COMMUNITY COUNCIL

UDOT Keeping Utah Moving · MOUNTAIN ACCORD · SALT LAKE COUNTY · UTA

Special Thanks to Guest Speakers:

John Thomas, UDOT PM
Blaine Leonard, UDOT
Laynee Jones, MA & LJ Consulting
Laura Hanson, UTA
Mark Goodsell, Hayward-Baker

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Mary DeLoretto, UTA
Mary Young, GCC
John Thomas, UDOT PM
Vince Izzo, HDR Consultants
Jamie Mackey, UDOT