6.0 Appendix

6.1 EXISTING CONDITIONS PHOTOS

APARTMENT BUILDING

TOWN OF VAIL **PUBLIC WORKS MASTER PLAN**

ADMINISTRATION INTERIOR

VICTOR MARK DONALDSON
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ADMINISTRATION INTERIOR

BUS GARAGE

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Vail


CLEAN AIR BUS
HYBRID ELECTRIC


140M


MAGNESIUM
CHLORIDE

6.2 Town Interviews

1. Public Works Administration
2. Streets and Parks
3. Facilities Maintenance
4. Transit
5. Fleet Maintenance
6. Environmental
7. Housing
8. Information Sciences
9. Town Manager
10. Police
11. Fire
12. Recreational District

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7
JUL 17, 2018

Public Works Administration Staff
Interview Notes

Interviewees: Greg Hall, Director – Tom Kassmel, Town Engineer – Susie Hervert, General Services Administrator – Janeil Turnbull, Office Manager/Custodial Supervisor – Sean Koenig, GIS Specialist

By: Mark & Chris/VMDA
RE: Master Plan Update Staff Interview

Master Plan Update Priorities:

1. Streets and Parks Building Expansion = 1st Priority
2. Frontage Road Turn-Lane and Improvements
3. Snow Dump Expansion and Site Utilities Upgrades

Master Plan Discussion Items from Staff

1. Cold and Outdoor Yard Storage needs to be cleaned up and organized; Shop spaces are organized.

2. Inventory Control System is needed to avoid waste and expiration and for more efficiency.

3. Paper storage (old blue prints, etc.) are in the Bus Locker Room, all of which needs to stay as laser fiche (?). Is this correct?

4. John King could use storage for all the facilities (locations TBD). Please elaborate John.

5. Housing on Public Works Site - Parking is the limiting factor:

    a. Reconfiguration of future Housing Unit Plans needs to be more targeted and more flexible for seasonal and other types of employee profiles.

    b. Storage for Housing is needed. There are 54 units for Town Employees and dedicated storage is needed for Housing appliances, furniture and miscellaneous inventory, all in one place (needs to be removed from Vail Village Parking Structure), preferably on Public Works site.

    c. Some Housing is needed that is dog friendly, though a bit of a challenge due to Industrial Uses and wildlife – there is little or no green space for dogs.

d. Possible new Housing locations on Public Works Site (Note: Fire Station #1 was OK for Employee Housing - 6 units/3 Bath Rooms and Community Rooms):

   i. Move Administration to the back in favor of Housing

   ii. Some Seasonal Workers could be in the back

   iii. Room by myself- Community Rooms can be shared

   iv. Rental Price Points vary for the type and location of Housing Unit Types

   v. At the Administration Building (on top and behind) Housing here allows this building to be reconfigured.

6. Site Parking - Existing parking count TBD:

   a. On-Site parking for employees is critical.

   b. 10 spaces are used by Golf Course when busy for Tournaments.

   c. Parking requirements for Employee Housing needs to be determined and designated. Each unit needs one space.

   d. After 5:00 pm there is lots of overflow parking.

   e. When Guests come to Administration Building for big meetings it consumes parking used by others on a normal basis.

   f. Two ADA Parking Spaces at surface lot of Buzzard Park.

   g. Parking in front of Administration Building is at the Property line (to back of curb); as the parking goes west, the distance from back of curb increases and may allow parking expansion south of the Bus Barn/Shops Building.

   h. More and more electric Vehicles – charging – upgrade entire electrical services for site.

7. Buzzard Park Snow Storage could be improved by eliminating some landscaping just to the East of the main large Conference room. Existing snow storage space is not adequate during larger winter storms.

8. Security cameras at intersection and at Buzzard Park Housing would be good to add.

9. Break Room at Shops Building needs expansion and improvements and to benefit entire PW Department :

   a. Does not function well
   b. Needs a Commercial Kitchen -1, 2 and 3 freestanding Ovens are used and need 3 Refrigerators, side by side and an Ice Machine.
   c. 100 – 150 people at a time on the 2nd Floor
   d. This is also used as Training and Seminar Rooms

e. Remove large picnic tables in favor of more personal and group seating
f. Need 70 lockers for 70 employees + daily check in/check-out
g. Radio charging and storage is needed
h. Kitchen Island should be dual purpose preparation space
i. Ventilation needs complete overhaul
j. Training Room, here
k. Gathering place town functions
l. Move John and Charlie's offices away from Break Room, likely downstairs

10. Janitor Closet near Break Room and near Men's Room needs to be enlarged

Administration Building Comments

1. 11 Staff Members in Winter and 15 Staff Members in Summer operate out of the Administration Building.

2. Lunch/Break Room needs to be reorganized so it can function as the 3rd (overflow) Conference Room.

3. Configuration seems to work well (except as noted for 'short-cut' Receptionist Traffic)

4. View from Front/Reception Desk would be nice to maintain. Too much travel occurs through the Front/Reception Desk and bothers workers; needs to be re-routed for efficient work spaces.

5. Lofted area is wasted and could go away.

6. Maintain and enhance daylight spaces.

7. Snowmelt stairs good as they are shallow.

8. Administration Conference Rooms:

   a. 2-3 meetings per month are from non-Public Works Staff.

   b. The Main Conference Room is always booked but could function better with modifications (relocate base cabinets for additional seating + provide chair storage).

   c. The option for 2 Conference Rooms or a single Large Conference needs to remain.

   d. This room is good 90% of time, light board technology is important along with TV Screen, cork board, dry board, etc.

   e. North Conference Room has bad ventilation.

   f. Noise separation works between units is needed.

   g. Lunch Room gets used a lot (as well as occasional 3rd Conference Room.

   h. Could the counter in the meeting room fold up?

   i. Does the wipe board get used? Cork board dry erase ? TV monitors?

j. An additional Rest Room is needed for larger meetings – there are big meetings about 3 times a year.

k. If green table is pushed out to line up with Kitchen, would create better function.

9. Administration Offices:

    a. PWs Offices should be on the same floor.

    b. The current Office Suite layout allows everyone to see one another.

    c. The Office Suites on the south side work well and should be maintained other than modifications noted.

    d. Maybe push Office Suites to south and park beneath.

    e. Generally Offices need space for 2 Monitors at each desk

    f. Tom's office is bigger than he needs.

    g. Greg needs more Storage Space a 3-person Meeting Table within his office.

    h. Chad and Todd's Offices are about the right size.

    i. Leonard, Sean, and Molly's Offices are too small:

        i. Leonard needs a more square office instead of narrow and long.
        ii. Sean needs more room for a large standing workspace.
        iii. Molly needs poster, banner, sculpture and miscellaneous storage on a frequent basis
        iv. Stand up desks needed with at least 2 Computer Monitors

10. Engineering and Interior Common Work Areas and Work Stations:

    a. Engineering Work Space needs improvements.

    b. Mail Room does not function well, needs to be more convenient and organized.

    c. The big table near Leonard's Office is under-utilized.

    d. Remove wall between to Copy Room and Green Room to open up Floor Plan.

    e. Uniform storage, shirts need to be improved for storage and efficiency.

    f. Full length of copy room table is often used.

    g. Large table needed for opening up large plans + add workstation with computer.

END.

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JUN 27, 2018

Public Works Staff Interviews

Streets and Parks Department
Interview Notes

Interviewees: Charlie Turnbull, Hawkeye Flaherty, Hanna Sorenson, Blaine Palmer, Rick Gregory and Sam Sandoval

By: Chris and Mark/VMDA

RE: Master Plan Update Staff Interviews with Streets and Parks Department

Priorities: The following are the top 3 priorities identified by Staff

1. Streets and Parks Building Expansion
2. Frontage Road Turn-Lane and Improvements
3. Snow Dump/Storage Expansion and Site Utility Upgrades

Streets Staff Leaders:
Charlie Turnbull, Street Superintendent
Sam Sandoval
Jim Hervert
Hawkeye Flaherty

Parks, Flowers and Mowing Staff Leaders:
Rick Gregory, Mow Crew
Hanna Sorenson, Flowers
Blaine Palmer, Irrigation

Overview of Streets and Parks Department

1. Streets reports the following general operations and needs:

    a. Streets manage all the Town Vehicles
    b. Need Flammable Cabinets + rolling equipment
    c. Need Pull-Through bays for larger equipment that is double and triple stacked and to avoid beating up the Walls and Shop Doors and blocks out Employee Parking
    d. Need 24' Overhead Doors for big Equipment, Plows and Buses
    e. Need area for torch to cut bolts and chains
    f. Shop needs their own dedicated welding area within their space
    g. Need a new home for secure Tools Cage with Room for Small Tools
    h. Moving Inventory back and forth causes 8 hours/Week in wasted time (need more storage) which at $40/HR x 400 Hours = $160,000/YR.

2. Parks reports the following general operations and needs:

    a. Overall the Parks area needs to double in size.
    b. Work Benches and Parts Storage areas are needed
    c. Need Landscape Office for 5 people with 2 computers with - 1 dedicated to Irrigation Systems
    d. More Tool Storage area is needed.
    e. Need Cabinets for Flammables and Chemicals.
    f. A new Hotsie is needed just inside OH Door.
    g. A Pull-Through Bay is needed.
    h. Need storage area for Valve Boxes and Tubing currently stored in Greenhouse.
    i. Currently have about 100 SF and will need 300-400 SF for Irrigation Parts Room.
    j. The Greenhouse size works for Landscape if currently shared storage is moved.
    k. An Asset Management Plan is needed with Input Plan for Job Work Orders.
    l. Staff needs to have designated work space.
    m. The existing Lunch Area needs expanding with more Kitchen space and needs to be more organized with more 'policing' of clutter, trash and clean-up. Also need Check-In & Check-Out Station and Lockers within this space. There are too many people in the Lunch Area for its size.
    n. Air Quality is very bad in the Lunch Area and gets diesel fumes leaked into the area.
    o. Gym Uses are requested for Transit, Administration and Housing and estimate about 200 users. Wellness Benefits will assist in Employee retention rate which is important with 305 full time employees and another 200 for seasonal workers.
    p. Would like to have Foosball, Pool Table, Computer Stations for work with 8-12 Cubicles
    q. Housing and Shops could be mutually exclusive - shining lights from Snow Dump could offend Housing in the Shops area.
    r. Administration needs more parking.

Other General Staff Comments

1. More maintenance area with more doors is needed
2. Pieces of equipment are crowded out with too much Storage in Shops area
3. Hawkeye is not sure about 5'-0" clear between Maintenance Bays
4. John King current list of all the vehicles
5. Extend the existing Employee Parking for 19 people
6. 50 parking spaces are needed for Streets, Buses and Fleet Maintenance
7. Try pushing new Parking into the north hillside
8. The 3-Door Shed across from Greenhouse is used by everybody, mostly Streets
9. North Storage Bins are stuffed too deep and packed too much causing wasted time in moving inventory around
10. The 2 shorter Storage Bins are for trash bags
11. Another Storage Bin is full of Holiday lights for Rick beard
12. Two smaller Storage Bins are for Electrician
13. Need Cold Storage for Tires long items and Canopy Tents
14. Permanent spot for manure, cooked compost, topsoil, cooking compost and mulch. Compost must have access to ground and with Back-Hoe/Loader access. Cooking compost is double with a barricade of silo cinder
15. Impound lot needs to be greatly reduced into a non-strategic area and does not have to be a 'drive-through'. The (death) Jeep needs to stay in perpetuity.

16. 50% more Snow Dump Area is needed to be wider and deeper for more snow cats and other machinery and to avoid Snow Dump at the power lines
17. Mini-Excavator is needed
18. Better Sweeper Clean-Out Area is needed as this is a daily event. They need water so all the debris comes out. The Clean-Out Area needs to be enclosed like the bus area .

    a. Bus Wash Bay works – 6 hours a day
    b. This does not work to wash tractor trailer – they don't like the heavy equipment in there.
    c. Wash daily one or two times a day 15 -20 minutes 4-6 hours a day
    d. How do you clean-out the collection system for this? The bus wash one is shoveled out by hand. Access clean-out with loader – much like the vaults.

19. Old Greenhouse has exceeded its useful life and has become a 'catch-all' and should be removed. Blaine will now have a Part Room for Irrigation system parts.
20. Irrigation is about 12 x 8 – Blaine 200-300 feet
21. Upstairs stuff goes to die, cannot be very safe – it's a catch all – it would be better to trash.
22. Extend snow dump to west.
23. Rick would like additional storage area of 80 SQ FT + one car which is a better way to store stuff so this should probably be increased to 120 to 140 SF.
24. Storage for mowers, weed whackers and things like that are stored for limited access to a more secure area.
25. One Irrigation Vehicle parks inside with all the other equipment around the Vehicle. Two Riding Mowers in Landscaping Double-Bay with pull through load and unload. It takes four days to mow and whip.
26. Shop Expansion will likely move Maintenance and remove items out of Greenhouse.
27. Hannah would be better off and Greenhouse could work for Winter Storage for her without 3rd Party Storage.
28. Lighting in Shops is terrible for lumens foot candles, head lamps, etc. and needs upgrades for safety and close work.
29. Fleet Maintenance Bay Lighting is OK.
30. Also enhance Lighting in Public Works Bay.
31. Diesel Exhaust System in Shops needs to be refurbished.

END.

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JUN 26, 2018

Public Works Staff Interviews

Facilities Maintenance Department
Interview Notes

Interviewees: Randy Guzik, Facilities Maintenance Supervisor
Adam Johnson, Electrical Supervisor
Donald Gallegos, Master Carpenter

By: Mark Donaldson/VMDA

RE: Master Plan Update Staff Interviews with Building Maintenance Department

General Maintenance Building Department Notes

The Facilities Maintenance Department manages and maintains most Town of Vail properties (32+) along with snow melt maintenance with a Staff of 15-16 people. About 10 people work out of the 'concrete cavern' in the Vail Village Parking Structure and about 5-6 people work out of the Electrical and Carpentry Bays at Public Works.

This group needs personal car parking for 12 each day as well as truck parking that could be 2 deep tandem parking on site.

1. Randy's Level 2, Southside Village Parking Structure Work Space is cramped with about 10 people and is short on actual Office area and Computer Stations. It is difficult for 10 people to work and interact efficiently in such small quarters. This Work Space also has vehicle parking within the Work Space at night due to ongoing vehicle parking shortages.

   With the above limitations and no expansion potential of this Work Space, some Staff will need to move to the Public Works site within a couple of years. Staff parking is also tight at Public Works. We will review the Village Parking Structure Work Space prior to finalizing this report.

2. The Public Works areas include the following and experience tight Staff parking on site:

   Carpentry currently occupies a full Bay with a partial mezzanine on a south bay with carpentry equipment, tools, building materials with Office Space behind the existing Landscape Bay as well as about half of another bay currently used for new outdoor furniture storage.

   Electrical currently occupies a full Bay with mezzanine on a north bay and has some outside storage for Street Light Poles and concrete bases. The office within the Bay is ample and organized for the on-site Staff. The balance of the Bay is also well-organized with clear and secure access to the inventory of Electrical parts, components and materials.

Randy Guzik, Facilities Maintenance Supervisor

1. The Village location, though tight, allows good response time and access to Vail Village and other Town properties for maintenance and service work. However, about 3-4 years hence, Facilities Maintenance will need a new full Bay at Public Works for growth & operations.

   The following equipment and vehicles exist at this location:

   a. 5 Trucks + need 1 new Truck
   b. Skidster
   c. Sweeper
   d. Sweeper
   e. Plumbing Supplies
   f. Drill Press
   g. Small Office with a single computer station used by 10 guys (more computers and less paper is needed) + need a new office for Randy/Supervisor
   h. Pumps, Motors, Piping, PVC and Wood Products
   i. Need their own Restroom within the Village Structure
   j. Additionally they will need a 'low-boy' trailer (and a place to store the trailer) to deliver Sweeper to the new Parking Structure on the north frontage road due to no maintenance space being provided in the Parking Structure design.

2. Randy and about 9 other staff conduct their weekly staff meetings in the Village Parking Structure Breakroom. 2-3 of these staff members work night shifts.

3. Temporary storage and staging areas are needed frequently by various Public Works groups as they tend to poach and cross-store materials within one others areas when overflow storage and staging occurs.

   For example the new Lions Head Welcome Center furniture is now stored in part of the Bay next to Carpentry and Streets stores their 'sniper' plus catch-all furniture, etc. in the Village Structure Bay. Similarly the old Greenhouse on the Public Works site has summer benches, filter barriers and other goods stored.

   It does seem that some 'stored items' get forgotten and take up space without further use.

   The 20 year vision is there will be growth required for more buildings to maintain, more people, parking and equipment within the Department to meet those maintenance requirements.

Adam Johnson, Electrical Supervisor

1. Adam and two other Staff members (Electrician and Helper) handle the current work load with 1 additional Electrical Staff member added in the foreseeable future for this north Electrical Bay at Public Works. This Bay with a partial mezzanine is deemed adequate due to organization and accessibility of parts and inventory.

2. Additional and organized Outdoor Cold Storage is needed for 60+ Light Fixture Heads, 60-80 Poles and 20-30 concrete bases, some of which currently take up valuable indoor area. The Poles should be stored horizontally on 3 outdoor storage racks with 5 racks high; the Fixture Heads should be stored on shelves and the concrete bases stored on grade along with other outside cold storage. Ideally this cold storage will be proximate to the north Electrical bay.

3. The outdoor storage bins do not work as well as a more accessible storage shed would be.

4. 3 existing vehicles are stored/used on and off-site. 1 new Bucket Truck is needed to be used by Streets and for Building Maintenance to clean street light fixtures more often.

Donald Gallegos, Master Carpenter

1. Donald's existing work bay at the south side of Public Works is about 25' x 60' plus about a 15' x 15' finishing room as well as a partial mezzanine above, all used for storage and various carpentry tools, equipment, planer, table saw(s), materials storage (12' long 2x4s, 4x4s, 6x4s, 10x10s, 12x12s, Plywood, boards, etc.) along with office and miscellaneous storage.

2. This work bay also houses a utility truck and seasonal vehicle stored indoors.

3. The existing ventilation within Carpentry should be maintained or enhanced for air quality.

4. Based on the need for a 2 table saws (1 for wood & 1 for aluminum), possible carpentry spray paint booth, sandblaster for signs and a new restroom it appears that 1.5 to 2 full bays may be needed to fully accommodate all operations and storage requirements.

Facilities Maintenance Commentary on Public Works Wellness & Break Room

1. Common Wellness Center Needs:

    a. Would likely be used and hour before and/or after work shift by PW staff.
    b. Suggest 10-12 pieces of work out equipment including weights, treadmill, etc.
    c. Restroom

2. Common Break Room:

    a. Air Conditioning as well as improved ventilation
    b. Additional space for larger events (150-200 people)
    c. Larger more diverse Kitchen and possibly BBQ Grilles
    d. Serve as multi-purpose Commons Areas and Safety and other Programs, Conferences and seasonal staff meetings

END.

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JUN 6, 2018

Public Works Staff Interviews

John A. King, Facilities Manager
Interview Notes

Interviewee: John King, Facilities Maintenance Manager

By: Mark & Chris/VMDA

RE: Master Plan Update Staff Interview

1. Master Plan Update Priorities:

a. Streets and Parks Building Expansion – 1st Priority
b. Frontage Road Turn Lane and Improvements
c. Snow Dump/Storage Expansion and Site Utilities Upgrades

2. Interviewees:

a. Facilities: 2 meetings (22 total with about 10-15 in Parking Structure)

1. John King, Facilities Manager (to be interviewed separately and last)
2. Randy Guzlik – Building Maintenance Supervisor (Works in Parking Structure)
3. Adam Johnson – Electrical Supervisor
4. Donald Gallegos – Master Carpenter

b. Streets & Parks/Flowers/Mowing: 1 Meeting (35 in winter & 55-60 in summer)

A. Charlie Turnbull
B. Sam Sandoval
C. Hawkeye Flaherty – signs this is not full time
D. Hanna Sorensen - Flowers
A. Rick Gregory – Mow Crew
B. Blaine Palmer – Irrigation

c. Fleet Maintenance: 1 Meeting (12 year round)

A. Todd Scholl, Manager (soon to be Retired)
B. Sean Heade, likely Manager successor
C. Jeff Darnell, Parts, Shipping/Receiving

d. Transit: 1 Meeting (50 summer – 100 winter)

A. Mike Rose – Parking Supervisor Bus Breakroom
B. Jordan Winters
C. Ed Hanson – Transit
D. John Sheehan

e. Administration (11 in winter 15 in summer)

A. Greg Hall, Director Public Works
B. Tom Kassmel, Town Engineer
C. Susie Hervert, General Services Administrator
D. Janeil Turnbull, Office Manager/Custodial Supervisor

John King, Facilities Maintenance Manager Comments/Direction:

1. Second Level of Shops – Break Room, Charlie and John's (FM) Office, Add Locker Room Upstairs – keep these together.

2. Randy has himself, Adam Electrical Supervisor and Donald Master Carpenter

3. Training Room upstairs to be expanded for larger groups

4. Fleet Maintenance – single Restroom with Urinal and Toilet - Streets guys use/need more

5. John manages Town of Vail facilities all over town – Dobson, Golf Course, Gymnastic, Center, Park Restrooms, etc.

6. Randy manages most of the Buildings and has staff of about 10 people that operate out of the parking structure + 5-6 at Public Works. Their Staff Meetings occur in parking structure once a week

7. Donald needs more space and larger bay with planer and more room for storage of materials, etc.

8. Parking onsite at Village Parking and at Public Works is lacking – how much more do you need? Parking plows outside blocks winter parking to some degree and should be alleviated in favor of protecting such Town assets indoors.

9. In theory the new space will accommodate all of street space projected needs

10. The old streets will become carpentry and landscape operations

11. John may prefer to be downstairs – discuss further after all Staff Interviews

12. Could the upstairs be employee housing and relocate Break Room/Multi-Purpose area? Maybe upstairs over existing shops could be housing – each of these add parking and places housing near industrial noise and light1.

13. Snow storage does not have a dual use.

14. Some of Streets is in the Bus Barn

15. Guess that Streets is 120 x 60 = 7,200 SF expanded to about 10,000 SF – keep circulation at back of building.

16. Pushing back Building toward the mountain?

17. Walking lanes inside Streets could be larger for egress corridors.

18. Foot Prints behind Admin Building – Solar + Employee Housing

19. Electrical or Sign Shop could go somewhere else; Streets facilities need to stay on site.

20. Fleet Break Room by themselves

21. Transit Break Room by themselves – Transit Office mostly they do not work out of here. This space is mostly ok.

22. Buses go out in waves – Goes 4 -6 each east to west

23. Driver, when shift is over, the driver cleans and washes it and puts is away for the night. Alternately they switch drivers with the next person.

24. 100 Cars/Day drive into Public Works today.

25. About half the Buzzard Park residents work on site.

26. Target Residents for additional housing on site would be for seasonal workers – Bus Drivers and Landscape.

END.

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JUN 28, 2018

Public Works Staff Interviews

Transit Department
Interview Notes

Interviewees: Mike Rose, Transportation Manager
Jordan Winters, Bus Supervisor

By: Mark/VMDA

RE: Master Plan Update Staff Interviews with Transit Department

General Transit Department Notes

This Department consists of about 75 people including "on-call personnel" and manages 34 Buses today (2 of which are temporary). The Buses will grow by 5 or 6 Buses to become 40+ by the best estimate and includes in-town and outlying routes. The outlying Bus Routes operate with 3 Buses in 10 minute loops. Currently Electric Buses are used on the shorter in-town routes and the Diesel Buses are used for the outlying routes.

Transit needs about 10 additional parking spaces for employees on this site.

A current challenge within Transit area is the Streets Department storing End Dumps, Blades, Snow Removal Equipment in 3 Bays which is intended for Transit Storage of 6 Buses, which should then be sufficient for the Transit Department.

1. Bus charging overnight will be needed for 12 Buses and on up to 40+ Buses as e-Buses overtake the Diesel fuel Buses.

2. The Heating System in the Bus Bays does not provide adequate heat and should be studied along with energy conservation efforts for loss of Bus Bay heat when large overhead doors are open. See narrative directly below.

3. Possible quick-action, vinyl overhead doors with vinyl windows could be installed at Bus Bays and at Wash Bay/Service areas to keep environmental heat in the Bus Bays & Vacuum/Service areas (in front of Wash Bay). The existing sectional overhead doors would be retained for security and opened in the morning and closed at night. During the work day, the vinyl doors would operate on a electric eye to open and close rapidly when a vehicle approaches and/or departs from one of these bays.

4. The open wall areas in and around the Vacuum/Service areas before the Wash Bay should be fully enclosed to allow more efficient usage and to protect from winter elements.

5. Due to Compressed Air Braking Systems for the Buses that are slow to start in cold weather, they run the Diesel Bus engines indoors with exhaust systems piped to the exterior without tempered make-up air. This causes major heat loss from the Bus Bays as well as excess diesel fuel consumption. A large air compressor is proposed to be on a timer overnight to pre-pressurize the diesel brakes to reduce fuel consumption, reduce the indoor idle time and to reduce heat loss from Bus Bays in concert with possible quick-acting vinyl overhead doors.

6. The overall notion of Transit is to reduce their carbon footprint in as many logical ways that can demonstrate a reasonable and efficient payback period.

7. The Fueling Station at the east end of the Bus Bays is shared with Fleet Maintenance and all Public Works vehicles and including Police and Fire Departments. A DEF (Diesel Exhaust Fuel) Fueling Station is needed to operate in concert with the other fuel types. The Fueling Station needs better lighting and more efficiency to serve vehicles faster at peak hours of fueling. Either more fuel storage or more frequent fuel deliveries will be needed in the future.

8. A storage area is needed for bulk cleaning supplies.

9. Unfortunately the roof of the primary Bus Bay Building is not vented for a 'cold roof' and slopes down over the south-facing overhead doors causing ice formations at door thresholds as well as ongoing snow removal maintenance and ice fall hazards. This will be studied along with expansion concepts.

10. Shop Security: There are too many unauthorized personnel who have access to the valuable tools, parts, etc. within the Transit Department. Cameras are needed along with a prioritized keying system for specific areas where some personnel are working alone at night.

11. It was noted that 5'-10' more Bus turning area from departing Buses heading out the south doors is needed which could further impact parking. To that end it was observed that a few feet could be gained on the south edge of the property in enough areas to accommodate more Bus turning as well as additional employee parking. This could include 3-4' high retaining walls to expand the surface areas along a lot of the south side of the property.

12. Mike offered a planning concept to build behind the length of the Bus & Fleet Maintenance Bays to allow most or all of the requisite equipment, buses and other vehicles to be covered in winter conditions while each Department functions normally with the expansion. It provides for driving lanes within the new structure as well as a one-way drive behind the new structure from west to east to complete the driving lane around the property free-flowing and efficient. This will be explored in our Master Plan Concepts.

END.

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JUN 27, 2018

Public Works Staff Interviews

Fleet Maintenance Department
Interview Notes

Interviewees: Jeff Darnell, Building Maintenance Supervisor Fleet Manager
Todd Scholl, Building Maintenance Supervisor Fleet Manager (Retired)
Sean Heade, Parts, Shipping & Receiving Purchasing & Administrative Specialist

By: Mark & Chris/VMDA

RE: Master Plan Update Staff Interviews with Fleet Maintenance Department

General Fleet Maintenance Department Notes

The Fleet Maintenance Department manages and maintains all Town of Vail Buses, vehicles and equipment with a Staff of about 12 people and need about 12 parking spaces each day along with requisite truck loading and loading for the volume of receiving from freight carriers and redistribution to other departments around Town.

They manage their parts purchasing and warehousing along with managing the Shipping & Receiving for most if not all Town Departments, which may be characterized as 'Centralized Purchasing'. The Parts & Shipping areas include Administration/Office for the Department which is adequate.

Their 'winter hours' are 19 hours from 5:00am to Midnight. Their 'summer hours' are 12.5 hours from 5:00am to 5:30pm.

They no longer perform engine rebuilds (they now pull and replace engines) but do all other Mechanical Work and Maintenance as well as Body Work, which has maintains a back-log of work scheduled. These Maintenance services for the Town vehicles are expected to be quick.

1. The town-wide Shipping & Receiving has been a default operation due to convenience and needs an additional 150-200 SF so as to allow the Fleet Maintenance Parts Inventory to remain secure and available to only authorized Fleet Maintenance personnel. These shipped goods received and redistributed are town-wide and wide ranging in size and volume and include janitorial supplies along with other high volume dispensable products for the Town.

   According to Greg Hall consideration should be given to "How can the Town expand Centralized Purchasing to serve the entire Town?"

2. The notion for expansion and inclusion of the items noted above is proposed to be by knocking out the non-bearing CMU wall between Parts & Streets and expand to the west. Removal of stairs in this area would be acceptable.

3. The Fleet Wash Bay (in front of the Vehicle Wash Bay also includes a Welding Bay.

4. Buses are brought in at night for maintenance for a quick turn-around.

5. No additional 'Pull-Through Bays' are needed by Fleet Maintenance; existing is adequate.

6. Improved lighting is needed in the existing Wash Bay; the Hotsie is still used along with Storage by Public Works.

7. Their single existing Restroom (lavatory & toilet) is overused as it currently includes use by the Streets guys. A 2nd Unisex Restroom is needed adjacent to the existing that includes lavatory, toilet and urinal to mitigate the current overuse. Fleet Maintenance Lockers are adequate. The male/female ratio is about 10:1. Showers do not get used so are not needed for consideration. Create a new janitorial area with water to the west of locker room as part of parts room expansion to make room for new bathroom.

8. Space and accommodation for additional Bulk Oil Storage is needed beyond the existing single 250 gallon & two 125 gallon tanks. This will require plumbing of 5 new overhead hose reels per bulk tank.

9. A single new Parallelogram Lift (about $100,000 plus installation) is needed (to lift Fire Trucks) in addition to the 2 existing lifts.

10. As e-Buses are planned for arrival in about 2 years new Electric Charges will be needed in the Maintenance Bays. A new Generator (440A, 3-Phase, 100 Amps per charge) will also be needed to charge Buses when Holy Cross Electric experiences power outages and possible blackouts, from time to time. They need to know "what all electric vehicles will mean to their future operations, equipment, training, etc.

11. The Fleet Maintenance Break Room is independent of the larger Break Room within the facility and is in need of a new refrigerator/freezer and a bit of reorganizing for more efficient use throughout the work days.

12. Fleet Maintenance does not see the need for a Work Out/Wellness Area for their Staff.

END.

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7
JUN 26, 2018

Public Works Staff Interviews

Kristen Bertuglia, Environmental Sustainability Manager
Interview Notes

Interviewee: Kristen Bertuglia, Environmental Sustainability Manager

By: Mark & Chris/VMDA

RE: Master Plan Update Staff Interview

General Discussion

The Public Works Department along with the Town plans to include sustainability improvements and upgrades in concert with the 20 Year Master Plan Update for the Public Works Department.

Kristen and her staff including Mark Hoblitzell (who wrote grant for Buses and electric battery storage locations) and Peter Wadden (storm water quality control/filters) are available to assist and consult with our Master Plan Update Team regarding community solar generated power, storm water quality control and other sustainability options for the Public Works site.

This assistance includes introduction to and collaboration with energy vendors, community system designers and funding mechanisms including Holy Cross Electric Association to join the Team.

Discussion of Current Sustainability Options: Kristen shared the results of the Town Event Truck that has been outfitted with a 2.5 KW (2 panels) system, which can produce 2 KW/Hour for each panel.

1. Put excess Electric Power into the Grid to reduce carbon emissions
2. Battery Bank on site (Yellowstone Park Service Buffalo Ranch is a good example of large battery bank storage in remote area.) Battery Banks can shave the peak usage loads for a 24 hour cycle, though the batteries themselves may be difficult to procure. Battery back-up banks are essential for buses particularly when power outages occur.
3. Bus Kilowatts per space needs to be developed by vendors/suppliers
4. New Flyer, Prottera, and Gillig are potential vendor options
5. 1.4 miles per KW seems to be the current standard for these buses (Estimated 650 x 32 - 20,800 KW for just the buses)
6. Power Purchase Agreement ("PPA") would allow Holy Cross Electric to buy our excess solar generated power at an agreed upon rate.

Discussion of Solar Power Generated:

1. Typical Solar Panel = 4' x 8' for 1 KWH/Day or 30 KWH/MO/Panel
2. 4 KW needs 28 SQ Meters of Roof

3. 4,000 SQ/MT/Acre = 500 KW per acre
4. 3,500 KW Panels System maximum x 850 KWH/YR = 2,975,000 KWH x .1 = $290,000/YR or $24,000/MO in electricity generated
5. The 20% rule does not exist for Towns – cap for Terra PPA (Power Purchase Agreement)
6. Publics Works Department uses about $26,000/YR or 30,500 KWH (This does not include Storage, Admin or Buzzard Park Apartments)
7. "Build Grant" may include Storage – "Lonal Grant" for $500,000 E-Bus Grant
8. Bus Costs – 500,000 for diesel / verse $750,000.00
9. Big Horn Sheep habitat area will prevent ground mounted solar panels in some of our site areas. Roof Top panels are preferred except where we are able to make use of ground mounted solar so if possible to put on the roof, this is better than putting it on the ground.

Potential Community Consultants/Providers:

1. Sunsense Solar
2. Active Energies Solar, LLC
3. Solar City (could be devolving with Tesla)
4. Holy Cross Electric Association

Action Items for Environmental Sustainability Manager:

In closing, the Master Plan Update Team is requesting assistance from the Environmental Sustainability group in the following aspects of support:

1. Procurement of Consultant and Community Solar Vendor to provide assessments of current and future usage for the PW site.
2. Preparation of benefit analysis for new water quality standards for waste and storm water for the PW site.
3. Procurement of Consultant to assess solar and battery storage applications compatible with the Bus products being purchased for the Town in 2020.
4. Assistance with waste diversion/recycle for the PW site.

END.

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7
AUG 2, 2018
George Ruther Interview, Director of Housing
Interview Notes

Interviewee: George Ruther, Director of Housing

By: Chris and Mark/VMDA

Re: Public Works Master Plan Update vis-à-vis Housing Needs

General Housing Department Notes for Public Works Site

The following site planning, project funding and housing development possibilities and strategies were discussed along with George referencing and providing a copy of the 2018 Workforce Survey Report:

A. Partner with a Housing Developer that is not necessarily with the Town of Vail to build open employee housing. Funding can be from a variety of sources. The following are known housing project statistics with interesting partnerships, funding sources and ownership patterns.

   1. Lions Ridge Apartments (Previously Timber Ridge Apartments) were developed on Town owned land with private developer to reduce Town risk and to get it built. They turned away from the I-70 corridor for sound attenuation. Parking for this project was an average of 1.4 vs 2 average parking spaces/unit.

      The cost of 114 Units all in for the 3-stories of wood frame construction with surface parking was $27MM exclusive of land cost on 5.24 acres. Low 600 to 900 SQ FT one and two bedrooms units with minimal offsite improvement costs.

   2. Buzzard Park was developed by the Town on Town owned land.

   3. Public/Private Partnerships can be productive with a variety of business plans based on who owns land, how long the developer manages for profit and length of time to turn back over to the Town.

   4. First Chair Apartments in Lions Head was developed by VRI on their own land. Parking for this project was an average of less than 1 parking space per unit.

   5. Vail Commons was built on Town owned land by private developer with commercial interests to offset infrastructure costs.

6. The Boarding House Telluride, CO has 14 to 16 Rooms with more common "everything space" and has been well-received by the seasonal resident employees.

7. 6 West Project in Edwards, CO is a modular housing project set for delivery in OCT/ NOV 2018 and includes a Community Center, Commercial Kitchen, a Movie Room and Fitness Area with indoor and limited outdoor spaces, hence the amenities.

8. With a more progressive Town Council who is "not doing business as usual" it may be possible to develop new zoning and community 'rules' that are outside the proverbial box:

    a. We do not have the option or the luxury of NOT building housing on the Public Works site,
    b. Increasing and optimizing density by downsizing housing units,
    c. Future housing cannot be for sale and must be rented for seasonal, FTE and transitional housing,
    d. Town of Vail housing must be designed to "fit the needs" in each instance.

9. Are Solar Energy Systems a "Project Expense" OR does its annual performance justify the expense? There may be 'pushback' and must be able to justify the financial payback.

10. Challenge previous assumptions e.g. "Family with kids and pets" (NYC style to fill a small niche) with non-traditional thinking. Housing mixes and styles of living will be explored, based on Seasonal and FTE Staff housing needs.

11. Vail Health Center has lost all but 20% of their parking spaces. The remaining parking spaces are now for critical need patients. They now use shuttles to manage parking during construction for three years. Maybe it should be permanent leading to a potential reduction in parking spaces for some types of work force housing?

12. Site access is a challenge to residents without conflict with industrial operations and bus traffic in concert with long daily hours of Public Works operations.

13. Housing on the Public Works Site: How do we build and justify the housing with ongoing municipal expenses to help control long term costs of housing to the Town?

14. Public Works Master Planning Assumptions & Review of Opportunities:

    a. Existing Administration Building may need to either be demolished and/or moved to allow more housing at east end of site. As a 5,000 SF Administration area for limited population of staff is not the best use of the existing building footprint.

    b. What are some opportunities that don't exist today, that may be available in the future? Who knows, maybe land values will become high enough to accommodate a below-grade parking.

    c. Utilize non-traditional approaches to the Public Works Master Plan Development.

    d. Parking can either occur beneath the restored wildlife corridor or the wildlife corridor can be displaced locally. The East Vail Parcel Critical Range goes from East Vail to

the Public Works Site and may be altered over time.

e. This is one the last chunks of land left so this might be the best place for housing.

f. Optimize Land Use because single story structures do not work on such valuable housing sites, particularly in this situation.

END.

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7
AUG 2, 2018
Ron Braden Interview Notes

Interviewee: Ron Braden, Information Services Director

By: Chris and Mark/VMDA

Re: Public Works Master Plan Update vis-à-vis Housing Needs

General Notes for Information Technology

1. Fiber Optics (and Cellular Towers) resides at the Public Works site and it comes into the Administration Building. The Fiber was developed here around 1997-98.

2. Fiber then goes to a closet in the middle of the Bus Barn and also to the upper level of the Facilities Building. Such Equipment Closets need to be about 4' x 6'. The new Fiber now goes back to the Village Transportation Center.

3. The new fiber would be in the Public Works Administration Building and come down Frontage Road and through Public Works site.

4. With Master Plan 20-Year Update, new fiber will then go back to the Municipal Complex. The Fiber currently in place is pre-2000 and is old because it wears out. We cannot do 10 Gig on the fiber as it only has 6 strands. When one strand is bad, so we are down to 5 strands.

5. A 288 count single mode fiber in 2" conduit would provide enough capacity for Housing and Public Works upgrades.

6. State of the Art Facilities should be provided for internet/social media/etc. for Buzzard Park which is the highest usage access point in town.

7. Cabling to the Buildings is cost neutral. There is a primary fiber feed to each building. Copper has a limit of 300 feet with typically 3 drops to each jack in the building.

8. IT Fiber comes to site, cellular carrier on site Crown Castle and these cannot move along with the equipment shed at the Southwest corner. Private Fiber is going out there and Century Link Fiber goes out there, we need to know where those are at. Cellular towers use fiber from Century Link.

9. Leonard Sandoval at Public Works should have plans from 2014 for routing.

10. CDOT Fiber runs along 1 70 to the Overhead 177.4 then over the berm to Public Works

11. Century Link Fiber on site – no Comcast fiber

12. Town of Vail Fiber must keep the line of sight to the Golf Course area.

13. New Data Center at West Vail Fire Station may get put into Public Works (800 SF).

14. "Meet Me Center" may be in Vail as well. The room at Public Works does not meet requirements of 600 SF which is a timing issue.

END.

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7
AUG 30, 2018
Greg Clifton, Town Manager
Interview Notes

By: Mark/VMDA

Re: Public Works Master Plan Update

The following major issues were discussed regarding the Town needs for the Public Works Site Re-Development capacity, project funding and most particularly housing strategies and solar energy applications.

The site capacity is also intended to accommodate additional storage and some operational needs from the Vail Recreation District and Fire and Police Departments. These items are critical to address the long-term needs of the Public Works and Transportation Department and to facilitate collaborative Town efforts for ongoing Housing Development and Utility Grade Solar infrastructure.

Housing Development and Utility Grade Solar Infrastructure Needs

This Master Plan Update is being embraced by Council and is in the hopper to budget with the understanding that the project must have a visible strategy for significant additional housing development and long term solar energy solutions.

It is critical to address and offset the Public Works site energy needs in concert with offsetting energy consumption for Town Snow-Melt Systems in order to live up to our commitment of becoming a sustainable community.

1. Discussion Points for Housing Development Needs:

    a. Housing is intended to be for the exclusive use of Town Employees.

    b. We must look way ahead and beyond our current housing needs.

    c. Though not ideal we need to retain the Buzzard Park Housing for the foreseeable future.

    d. We need to provide a variety of housing types for Town Employees with tenure.

    e. Bunker and Dormitory style housing works for seasonal employees and some singles; it appears we may need to provide *some* housing to accommodate some kids and pets.

    f. Live-Work Housing must be identified and included among the future housing types.

g. In general the Town is losing younger employees after 2-3 years. Therefore new and creative Housing Types are needed to assist in facilitation of employee retention.

h. Council is currently targeting Buy-Down Programs, Grants and Credits for entry level and seasonal employees.

i. The Public Works Housing component will be among and a strategic part of the "1,000 new units in 10 years commitment" made by the Town.

j. Due to the increased Housing, a new Transit Stop will be needed at the Public Works site.

k. Town Manager and Housing Director are simpatico with the responsible reduction of cars relative to the sizes and types of housing units

l. The recent Telluride, CO Public Works Housing Development project has proven to be successful though it had critics throughout the public review process for combining housing with buses and snow plows.

2. Discussion Points for Utility Grade Solar Infrastructure Needs:

a. Utility Grade Solar Infrastructure is needed to provide the offset costs for Public Works site needs as well as for Town Snow-Melt Systems. This directive is intended to bring Vail into the future as a more and more sustainable community as expansions of solar applications continue through the duration of this Master Plan Update and beyond.

b. The Town Snow-Melt issue and strategy will continue to be a lightning rod between the Council and Community.

c. Holy Cross Energy is the target for our Utility Grade Solar Infrastructure partner and has the leadership, desire and commitment to be a strong partner. Their forward movement, diversity and expanded services toward offsetting traditional power consumption are clear. HCE's mission statement is "to provide safe, reliable, affordable and sustainable energy and services that improve the quality of life for our members and their communities."

d. We will consider solar installations at roof tops, ground and free-standing mounted structures and other solar applications as each new and/or remodeled structure evolves. The applications at Public Works Buildings will likely serve their needs directly while other installations on site over time will address Town Snow-Melt and other Town utility offsets. Each step of new and/ or remodel development of structures and site development features will be analyzed for "where does it make sense?"

e. Kristen and Mark with the Town's Environmental Sustainability Department will be assisting in these evaluations of "how much energy for how many dollars".

f. The Town will seek collaborative partnerships (HCE), Grants and Credits in these ongoing and sequential Solar System Developments to dove-tail with the phases of development produced from the execution of this Master Plan Update.

END.

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7
SEP 10, 2018

Chief of Police Dwight Henninger
Interview Notes

By: Mark/VMDA
Re: Public Works Master Plan Update

The Vail Police Department was founded about 52 years ago and has grown to a Staff of about 27 in the 911 Regional Call Center plus about 40 with all other Vail Police Staff. Chief of Police Dwight Henninger is also the De-Facto Town Emergency Management Director.

It is expected the 65 will grow to about 70 within 10 years with another 5-6 temporary Police Staff. There is one full week of Police Officer Training twice a year. All Vail Police Officers are required to live within 45 minutes to insure response time.

Current Vail Police interaction with Public Works includes Fuel, Wash and Maintenance of Vail Police Vehicles along with the PW Impound Yard (which could be narrower and longer and be reduced and does not need to be a 'pull-through' yard.

Vail Police Needs at Public Works Site

1. Mobile Communications Unit that is about 40' and needs to be stored in a tempered space due to $100K in communications and electronic equipment being inside. This regional asset is currently stored at the West Vail Fire Station and needs to be relocated for Fire usage.
2. Temporary indoor Storage for a vehicle that needs to be impounded until a Search Warrant may be issued. This could be done in the Paint Booth if it meets the standards for security.
3. Rescue Vehicle (58,000 pounds) Storage that currently resides at the Avon Public Works Facility on a temporary basis.
4. Need secure Storage Lockers within Fleet Maintenance to secure vehicle Police Gear while being maintained and serviced.
5. Emergency Community Needs: Under emergency circumstances significant storage for drinking water, diesel and other fuels will be needed along with an Emergency Power Generator. In these times, Bus dependency for transportation could address emergency situations. The emergency power supply would allow water and fuel to be pumped without interruption.

Police Staff Housing Discussion

The existing Buzzard Park Apartments have only minimal sound attenuation at Party Walls and is a problem with various 'shift-workers' that are trying to sleep while Public Works activities are in full operation. Vail Police Staff housing does need to include kids and pets.

END.

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7
SEP 10, 2018
Vail Fire Chief Interview
Interview Notes

Interviewees: Mark Novak, Fire Chief

By: Mark/VMDA

Re: Public Works Master Plan Update vis-à-vis Vail Fire Department Needs

Discussion of Vail Fire Department Needs at Public Works

The interesting question is: "What does the state of firefighting look like in 20 years?"

The response is equally interesting and provides insight into the day-to-day activities of Fire personnel: "Better and safer (new and remodel) buildings will be constructed via improved building products and technologies along with safer and more stringent Fire, Life Safety and Building Codes."

Vail Fire personnel train continuously and provide an image and message of safety to the community that includes emergency medical, public awareness and continuous training as well as full response to all alarms. Surprisingly, Vail Fire personnel spend about 4% of their time each year fighting fires.

Their Target Arrival Time at a scene is 4 minutes (240 seconds) and is critical to meeting community expectations. (This is due in part to the fact that when fires do occur, fire growth is more rapid, the temperature is hotter and the products of combustion are more toxic than when a fire occurs in a "legacy" building.

Employee retention at Vail Fire is a huge need. About 35% of Vail Fire personnel live in the Denver and the front-range area and commute for their work days in Vail. This long-distance living is also growing into Buena Vista, Salida, Eagle and Gypsum CO. Vail Fire feels the attraction to future staff housing needs would include a functional home with personal storage and parking for mostly young families.

The following Public Works Site needs were discussed:

1. Vail Dispatch based in Vail Police Department has a Mobile Communications Unit that is about 40' in length and is a shared regional resource/asset. This MCU is currently stored at West Vail Fire Station as it needs to be stored in a tempered environment due to containing about $100,000 in value of communications equipment. The storage bay needed at Public Works would be about 14' x 48'.

Vail Fire needs their bay that the MCU is stored in for other Fire purposes.

2. Vail Fire has the original 30' long, old Ford cab-over Fire Pumper Truck that is also stored outdoors at Public Works. The idea is that this vintage truck may be restored as a part of Vail Fire's history. The storage bay needed at Public Works would be about 14' x 36'.

3. A 50' wide x 300' long concrete or asphalt surface for a combination of Fire Hose Testing and Extrication Training Area.

   Such Staff Training operations currently take place for a few days each, twice a year. This area would also need a Fire Hydrant and would be staged with 3 Fire Engines and an SUV on-site during these Staff Training Operations.

   An additional need could include a Staff Training for Smoke Rooms, etc. (this is not intended to be a 'live burn center'). Some more detail is needed to understand if this need would also be compatible with the '50' x 300' training pad' for expanded capabilities.

In summary, Vail Fire feels their opportunities at the Public Works site would be beneficial and cooperative for all beyond their fuel, wash and maintenance of their vehicle assets at Public Works, as follows:

1. Better quality housing for some segments of Vail Fire personnel
2. Storage and Training opportunities beyond existing capabilities
3. Would collectively assist in employee retention.

Additional input was provided regarding possible alternatives for consideration the current snow removal, trucking and snow dump/storage at Public Works, as follows:

1. Yes, increase the snow dump/storage volume by 50% while also staging a large blower to stack the snow higher and away from the electric power lines.
2. In lieu of trucking snow removal to Public Works, perhaps consider converting over time to using rotary plows that would blow the snow out of rights-of-way onto private front yards. This is a huge paradigm shift and would require community input but could, over time, free up the Snow Dump/Storage site for yet more housing, should the circumstances prevail.

END.

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7
SEP 4, 2018
Vail Recreation District Interview
Interview Notes

Interviewees: Mike Ortiz, Executive Director and Scott O'Connell, Director of Operations

By: Mark/VMDA

Re: Public Works Master Plan Update vis-à-vis Vail Recreation District Storage Needs

Discussion of Needs and Objectives for VRD

The Ford Park area is considered the VRD Base Camp. All their Golf Carts and vehicles are serviced at Public Works. About 95% of the VRD Shipping and Receiving comes direct to the VRD Golf Clubhouse.

Mike and Scott described the need for centralized storage for the specific uses of "Sports Storage" and "Athletic Field #6 Storage" (refer to attachment provided by Scott and Mike) which is a relatively small portion of their overall storage in and around the Golf Course, Lower Bench of Ford Park and others described in the noted attachment. This specific storage is requested at the Public Works site.

The current storage facilities for these items causes truck traffic and loading/unloading operations at the lower Bench of Ford Park, which is in conflict with the heavy pedestrian users of the Ford Park area.

Additionally at the Public Works site they need vehicle storage for 5 Ford F250 Trucks and a single 20' Trailer. These vehicles are responsible for serving the remote needs of 4 or so VRD Sporting Events each year such as bike, whitewater and running races that occur in and around Eagle County. This will free up parking and traffic at Ford Park which is now used by VRD and works against the eventual outcome of "making Ford Park vehicle free".

Additionally, the storage of 2 Fairway Mowers is needed at the Public Works site in the winter.

Their General Objectives are three-fold:

1. EFFICIENCY: Centralized Storage at Public Works for Sports and Athletic Field #6 Storage would allow more spacious and organized storage whereby inventory is readily available for exiting to events and returning these items directly after the events. This will cause more efficiency in critical personnel time than working out of the somewhat scattered and over-stuffed areas of current storage facilities to supply these events.

This storage can also be 'tempered' as opposed to 'cold' storage which is unsafe for much of the equipment. The facility can also include overhead garage doors for direct loading and unloading as well as a mezzanine for lighter weight goods and equipment to maximize the volume and types of storage needs.

2. SECURITY: For the Storage requested at Public Works, there can be compartmentalized and secure bays in divided and lockable cages, therefore minimizing loss of equipment and sports gear.

3. SAFETY: VRD Storage areas are accessed every day of the year. By reducing vehicular and truck traffic and eliminating loading and unloading in the Ford Park area, visitor and pedestrian traffic will be safer.

   Many of the staff that conducts these operations are volunteers that understand less about truck maneuvers and loading/unloading than full-time staff.

   With the Storage Needs met at the Public Works industrial site the loading and unloading operations can be performed directly and safely with proper warehousing/storage access and design with racks and floor mounted containers.

The Staff of VRD feels that these opportunities at the Public Works site can allow for better growth, more efficiency in these areas and for accessibility and safety while improving Town assets.

END.

Vail Recreation District
2018 Storage Content

Golf Maintenance
Golf Equipment
Snow removal equipment
Parks and Golf Shed
Chemicals (Haz Mat Containers)
Fertilizers
Shop tools/small engine eqipment
Mechanical equipment and parts- Auto & Truck parts
Uniforms
Mobile Irrigation equipment and supplies
Paints
Golf Course Accessories/Small Irrigation parts
Flamable Cabinet
Oils & Lubricants

Co-Ed Bathroom has Janitorial

A-Frames and Safety Barriers
Old truss for Start/Finish
Scaffolding
Basketball backboards and ring (adj heights)
Volleyball Tiller Summer
Summer Tires
Shared Tractor

Exterior Storage Shed
Winter/Summer
Golf Equipment
Irrigation Material
Hand Tools
Driving Range nets
Greens Covers
Snow Fencing
Drainage Supplies
Signage Golf/Nordic
Brutus
Crumb Rubber

Main Pump House
Golf Equipment
Turf Covers
Roofing Material
Fertilization Material

Old Pump House
Course Asscessories
Benches, bike racks
Upstairs Signage

Public Works
2-Trucks in Winter
Trailer in Summer

Sports Storage
Lower Bench-
Homestead-All Race Equipment
Bike
Running
Whitewater
Nordic
Weights for Sports Fencing
Tents
Tables
Signs
Flags
Water Jugs
Arches
Chairs
Cones
Garbage Cans
Ramp for Kyyaks
podiums

Potato Celler-
Baseball Equipment
Tennis Nets

Golf Nordic
Race Equipment & Fat Bike Skis Snowshoes

#16 Golf Yard Storage
Sports fencing (PVC Material)
Go-Pro uses
SOS
VSSC
Pink Vail
EC School
Aerator/Slicer Parts
Spreader Parts
Trailer-winter

Tennis Administratio+G34:G86n
Youth Soccer Equipment
Uniforms
All Equipment that can not be frozen
Electronics and timing equipment
Gatorage Concentrate
Catch All Admin-Sports
Janitorial-winter only

Ford Park Sports Center
Prizes, Swag, cups (bag stuffing equipment)
Umpire Closet
Promoters Office
Safety Netting
Batting screens, bases, all softball eqipment, umpire uniforms
weights for goals

Retaining Wall East End
T-Post
Water Tubs

Red Sandstone
Basket ball, volleyball and soccer programming equipment
Volleyball nets and systems for quick setup
Referee stand
Small Soccer goals
Pickleball nets and accessories

Eagle Vail Fields
Sports Job Box

Homestake Peak
Designated Cage
Coordinate Club usage and provide storage
Youth Basketball, volleyball nets
Futsol, small sided soccer
Adult Flag Football
2-Utility Carts
Job Box
Hand Tools

HSP Garage
Gators
Misc outdoor equipment
hoses, painters, PVC goods
Field Mower 2018

Pickleball
Janitorial
Court Maintenance Equpment
Nets and Windscreens

Taj
2-Bay xtra deep Garage
Interior and Exterior
Goals (soccer/lacrosse)
Turf drag conditioners
sweeper
Winter Specific race equipment
Mowers x2
Mowing equipment
3-Utility vehicles
Field Prep equipment, paint & painters
Washer
Irrigation parts
Janitorial supplies
small employee area (microwave and Fridge)
Back pack sprayers and chemicals
gas and flamable cabinet
hand tools
Sports Center-Safety and Soccer Netting
Sideline Tarps

Gypsum (Gunion Property)
Trailer Storage (Not our land and difficult to access when needed)

Athletic Field #6
Corn Hole
Safety Netting
Tournament garbage cans and recycling cans
Volleyball nets and equipment
Rugby posts
Volleyball Tiller
Utility Cart
Fertilizer and seed
Liquid Chemicals
Shower Area-
Janitorial closet and storage (backstock)
Rugby storage(grills and tables) refridgerator
Portable goals and pads (1/3 of all storage in winter)
Hand tools
Upper Level-
box paint plus 5 gallon paint
Tennis Nets and windscreens (Tennis Center and Booth Falls)
Pickleball nets
Exterior-
Summertime x2 dumpsters (trash and recycle)
sand/top dress material
Rugby sleds
Becomes a "catch all" for general public disposing of trash material
Volleyball grill goes indoors in winter

Vail Recreation District
2018 Storage Content

Golf Maintenance
Golf Equipment
Snow removal equipment
Parks and Golf Shed
Chemicals (Haz Mat Containers)
Fertilizers
Shop tools/small engine equipment
Mechanical equipment and parts- Auto & Truck parts
Uniforms
Mobile Irrigation equipment and supplies
Paints
Golf Course Accessories/Small Irrigation parts
Flamable Cabinet
Oils & Lubricants

Co-Ed Bathroom has Janitorial

A-Frames and Safety Barriers
Old truss for Start/Finish
Scaffolding
Basketball backboards and ring (adj heights)
Volleyball Tiller Summer
Summer Tires
Shared Tractor

Exterior Storage Shed
Winter/Summer
Golf Equipment
Irrigation Material
Hand Tools
Driving Range nets
Greens Covers
Snow Fencing
Drainage Supplies
Signage Golf/Nordic
Brutus
Crumb Rubber

Main Pump House
Golf Equipment
Turf Covers
Roofing Material
Fertilization Material

Old Pump House
Course Asscessories
Benches, bike racks
Upstairs Signage

Public Works
2-Trucks in Winter
Trailer in Summer

Sports Storage
Lower Bench-
Homestead-All Race Equipment

Bike	Tents	Arches
Running	Tables	Chairs
Whitewater	Signs	Cones
Nordic	Flags	Garbage Cans
Weights for Sports Fencing	Water Jugs	Ramp for Kyyaks
		podiums

Potato Celler-
Baseball Equipment
Tennis Nets

Golf Nordic
Race Equipment & Fat Bike Skis Snowshoes

#16 Golf Yard Storage
Sports fencing (PVC Material)
Go-Pro uses
SOS
VSSC
Pink Vail
EC School
Aerator/Slicer Parts
Spreader Parts
Trailer-winter

Tennis Administratio+G34:G86n
Youth Soccer Equipment
Uniforms
All Equipment that can not be frozen
Electronics and timing equipment
Gatorage Concentrate
Catch All Admin-Sports
Janitorial-winter only

Ford Park Sports Center
Prizes, Swag, cups (bag stuffing equipment)
Umpire Closet
Promoters Office
Safety Netting
Batting screens, bases, all softball eqipment, umpire uniforms
weights for goals

Retaining Wall East End
T-Post
Water Tubs

Red Sandstone
Basket ball, volleyball and soccer programming equipment
Volleyball nets and systems for quick setup
Referee stand
Small Soccer goals
Pickleball nets and accessories

Eagle Vail Fields
Sports Job Box

Homestake Peak
Designated Cage
Coordinate Club usage and provide storage
Youth Basketball, volleyball nets
Futsol, small sided soccer
Adult Flag Football
2-Utility Carts
Job Box
Hand Tools

HSP Garage
Gators
Misc outdoor equipment
hoses, painters, PVC goods
Field Mower 2018

Pickleball
Janitorial
Court Maintenance Equipment
Nets and Windscreens

Taj
2-Bay xtra deep Garage
Interior and Exterior
Goals (soccer/lacrosse)
Turf drag conditioners
sweeper
Winter Specific race equipment
Mowers x2
Mowing equipment
3-Utility vehicles
Field Prep equipment, paint & painters
Washer
Irrigation parts
Janitorial supplies
small employee area (microwave and Fridge)
Back pack sprayers and chemicals
gas and flamable cabinet
hand tools
Sports Center-Safety and Soccer Netting
Sideline Tarps

Gypsum (Gunion Property)
Trailer Storage (Not our land and difficult to access when needed)

Athletic Field #6
Corn Hole
Safety Netting
Tournament garbage cans and recycling cans
Volleyball nets and equipment
Rugby posts
Volleyball Tiller
Utility Cart
Fertilizer and seed
Liquid Chemicals
Shower Area-
Janitorial closet and storage (backstock)
Rugby storage(grills and tables) refridgerator
Portable goals and pads (1/3 of all storage in winter)
Hand tools
Upper Level-
box paint plus 5 gallon paint
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Summertime x2 dumpsters (trash and recycle)
sand/top dress material
Rugby sleds
Becomes a "catch all" for general public disposing of trash material
Volleyball grill goes indoors in winter

6.3 Engineering Reports

1. Electrical
2. Mechanical
3. Structural
4. Traffic
5. Geotechnical

aec

Architectural Engineering Consultants, Inc.

Mechanical, Electrical, & Lighting Design Services
An Office with LEED™ Accredited Professionals

Mr. Victor Mark Donaldson & Chris Juergens
Victor Mark Donaldson Architects
0090 West Benchmark Road, Ste 207
Avon, CO 81620

August 29, 2018

Reference: TOV Maintenance Administration Redevelopment Electrical Site Observation
AEC #18030

Dear Mark & Chris,

We are providing the following electrical site observation to review what existing electrical systems are in place at the TOV Maintenance Administration buildings.

Executive Summary

This is an electrical site observation completed by Stanton Humphries with Architectural Engineering Consultants walking through with Adam Johnson, TOV Public Works. We are providing observations and comments for future rework, remodeling and additions to the buildings and site. The primary observations are,

I. Overhead pole utility power is routed around the north and west portions of the property. The power poles and utility transformers are located up the mountainside. Services to the buildings are adequate. It would be recommended to set utility transformers closer to the buildings and provide better utility access to transformers for maintenance and replacement in case of emergency.

II. Internal building electrical distribution is adequate throughout the Administration and Maintenance Buildings. Any opportunity to rework the existing incoming distribution and replace some of power distribution panels within the Maintenance Building should be pursued. Emergency power distribution is limited to a generator dedicated to the fleet fuel pumps.

III. Interior lighting at both buildings is primarily fluorescent lights with retrofit LED lamping. At the bus barn new LED lighting with motion controls has been installed. Lighting throughout the facilities are adequate. Lighting controls are primarily on/off switches with some motion control.

IV. Exterior lighting at both buildings is primarily wall and pole mounted fixtures with retrofit LED lamping. These fixtures are not cut off type and would not be considered Dark Sky compliant. Lighting controls are traditional photocell and timeclock controls.

Electrical Site Observation:

Met with Adam Johnson, TOV Public Works to walk through the site on Wednesday 8/8/18.

I. Utility Transformers and Incoming Services:

Adam and I walked the perimeter of the property to review the existing services in place. The utility has a set of overhead power pole lines run directly north of the property, up the mountainside, and at the west end of the property turning towards the south. These power lines feed the following transformers.

1. At the northeast corner of the property, up the mountainside, the utility has two transformers, one transformer feeding the TOV Administration Building and the second transformer feeding the housing directly north and east of the Administration Building. The underground incoming service to the Administrative Building is a 200 amp 120/208V 3P service fed with 250 MCM aluminum feeders. The transformer is approximately 250' away from the building.

2. Directly north of the Maintenance Building, up the mountainside, the utility has a pad mounted transformer fed from the utility poles. The service for the maintenance building is routed directly from this transformer down the mountainside into an electrical manhole outside of the building, then into the main electrical room. The service size is a 930 amps 277/480V 3P service fed with 3 sets of 500 MCM aluminum feeders. The transformer is approximately 275' from the building.

3. Directly west of the AT&T cell tower a third transformer feeds the cell tower and the TOV storage shed ("3 door shed") that is located towards the west end of the site. The service size is approximately 100 amps 120/208V 3P. The power panel set here feeds loads at the shed, exterior lighting and some block heater receptacles.

Utility transformers at northwest corner of property. These feed the Admin building and housing.

View from 2nd utility transformer feeding the Maintenance building.

It's unusual to have transformers located away from commercial properties. We normally locate transformers as close to the buildings as possible to minimize voltage drop. Utilities also have a policy to have ready access to their utility transformers incase replacement or maintenance is required. The existing utility transformer locations are not readily accessible, there's a rough jeep trail providing access.

II. Internal Building Electrical Distribution:

The Administration Building meter and main disconnect are located near the center of the north side of the building. The 200 amp 120/208V 3P disconnect has a short run of wire to the interior main power panel. The main power panel distributes to two other sub panels. The service and power distribution are adequate, the power panels are in fair to good condition.

Administration Building incoming service CTs and Main Disconnect

Administration Building Main Power Panel.

The Maintenance Building meter and main distribution center are located towards the west end of the building. The main electrical room at this location has a CT cabinet with splices feeding two 800 amp main distribution panels. One main distribution panel is in the main electrical room and feeds the greenhouse, two trash compactors and one unidentified load. The second distribution panel has three main switches, 400/3 barn boiler room, 400/3 Welding, 400/3 Old Gutter.

Maintenance Building incoming service splice at CTs

Maintenance Building Main Distribution Panel, one of two.

These main distribution panels feed the power panels throughout the Maintenance Building. Most panels are in fair shape, some poor and in need of replacement. The panels are located as far as 500' when you've run to the other end of the building where the fleet fueling station is. There would be a concern for voltage drop when running this long of a distance.

The incoming service is not heavily loaded. During any new construction any opportunity to improve the main distribution at the incoming service, add a service at the far end of the building and replace existing panels during new construction should be pursued.

There is one small generator set at the east end of the building to provide emergency backup power for the fuel pumps.

Maintenance Building old gutter and disconnects

Maintenance Building typical power panel

III. Interior Lighting:

Interior lighting throughout the Administration and Maintenance Buildings are primarily a variety of fluorescent fixtures that have been retrofit with LED lamps. At the Bus Barn, east part of the Maintenance Building, new LED fixtures with motion control has been installed. Lighting control is primarily on/off switches with some lighting controlled with motion sensors. Lighting is adequate throughout the buildings.

Maintenance and Admin Building typical Fluorescent fixture retrofit with LEDs

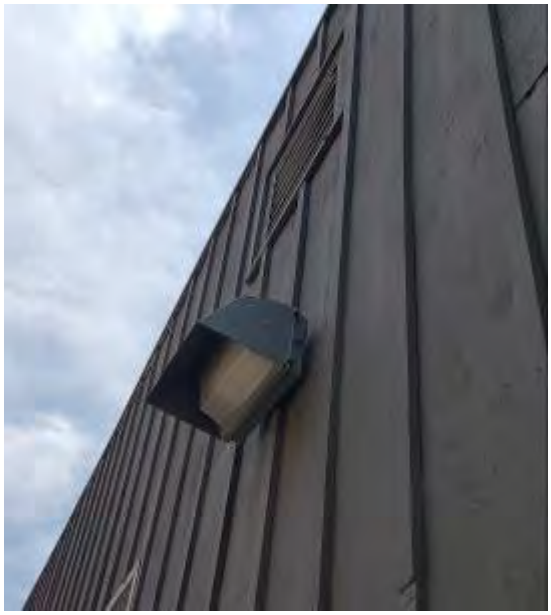
Maintenance Building industrial Fluorescent fixture retrofit with LEDs

Bus storage area LED lighting with motion sensor control.

IV. Exterior Lighting:

Exterior lighting at the Administration and Maintenance Buildings are pole and wall mounted area fixtures that are retrofitted with LED lamps. These fixtures are not cut off type and would not be considered Dark Sky compliant. These lights are controlled through traditional photocell and timeclocks.

Pole mounted LED fixtures at Site



Wall Mounted retrofit LED

Stanton O. Humphries, PE

RADER INC
ENGINEERING • COMFORT SYSTEMS
PO BOX 8610 • AVON, CO 81620 • Telephone 970-845-7910
Fax 970-845-7522 • E-mail drader@raderengineering.com

8/30/18

Mark Donaldson
Victor Mark Donaldson Architects
Box 5300
Avon, CO 81620
markd@vmda.com

RE: **Town of Vail Public Works and Transportation Maintenance Facility**
Mechanical Site Summary
Vail, Colorado

REI Job No: 18027.00

Dear Mark,

Please refer to the attached drawing (M-1 Mechanical Site Summary) for a summary of the existing gas, sewer, and water load requirements for the site. These estimates are based on our site observations, as well as evaluation of existing drawings for the various buildings. Note that no drawings were available for the Employee Housing Building. Also, note that the gas tabulation for the Bus Maintenance Facility includes the future 23,000 CFM make-up air unit for the Paint Booth, which has been designed, but not yet installed.

The values contained on M-1 can be used by the utility companies and/or civil engineers for site utility capacity evaluations.

Contact me with any questions or comments.

Regards,

Bryan J. Houle, PE

Attachments: M-1 Mechanical Site Summary

BUILDING	GAS		SEWER	DOMESTIC WATER		FIRE SPRINKLER		
	MBH	CFH	DFU's	WSFU's	GPM	HAZARD	DES. GPM	HOSE GPM
EMPLOYEE HOUSING	8,630	10,024	225	131	48	-	-	-
ADMINISTRATION	602	745	23	32	23	LIGHT	150	100
BUS MAINTENANCE	650	804	66	114	44	EXTRA	560	500
GREENHOUSE	903	1118	0	8	13	-	-	-

TOTALS	10,785	12,691	314	285	80

CFH	CUBIC FEET PER HOUR
DFU	DRAINAGE FIXTURE UNIT
GPM	GALLONS PER MINUTE
MBH	BTU/H x 1000
WSFU	WATER SUPPLY FIXTURE UNIT

RADER INC
ENGINEERING • COMFORT SYSTEMS
40690 HIGHWAY 6, SUITE E-1
P.O. BOX 8610 AVON, CO 81620
(970) 845-7910 (970) 845-7522

TOWN OF VAIL PUBLIC WORKS
MECHANICAL SITE SUMMARY

VAIL, CO

DATE: 8/30/18
JOB #: 18027.00
DRAWN BY: BJH
CHECKED BY: JDR
SCALE: N/A

M-1

August 17, 2018

Mark Donaldson
Victor Mark Donaldson Architects
48 East Beaver Creek Blvd
Avon, CO 81620

Re: Vail Public Works Master Plan Structural Assessment
Martin/Martin Project No: MS18.0933.S.01

Dear Mr. Donaldson:

Per your request, Martin/Martin visited the Vail Public Works Facility at 1309 Elkhorn Drive in Vail, Colorado. The purpose of our visit was to perform a visual observation of the structural condition of the building. In addition to observing the building condition, we reviewed the available existing building drawings. This report gives an opinion on the buildings condition.

Background

The existing property at 1309 Elkhorn Drive consists of six buildings: a maintenance facility, an administration building, a greenhouse and three storage sheds. At the time of this report there were only original drawings available for the greenhouse and additions to the maintenance facility. Based on the drawings that were available, additions were made to the maintenance facility in 1996 and 2002 and an addition was made to the administration building in 1997 (Figure 1 and 2).

Administration Building:
Eagle County records list 1978 as the original year of construction. Based on existing drawings and current observations the original building was constructed out of light frame timber. The building is used for office and conference space. There is a concrete retaining wall on the north side of the building retaining approximately eight feet of soil. The 1997 addition was built out of wood light frame construction with strip footings and spread footings. This addition added new offices, open offices and file storage.

Maintenance Facility:
Eagle County records list 1978 as the original year of construction. Based on existing drawings and current observations the original maintenance facility was constructed as a pre-engineered metal building. It was observed that two metal buildings joined in the middle of the bus parking bay indicating that the east side was an addition for which drawings are not available. There is a concrete retaining wall on the north side of the public works bay retaining approximately four feet of soil. There is a mezzanine level over the parts shop with offices, locker room and lunch room. The mezzanine is a slab on metal deck supported on joists and joist girders.

The 1996 addition was built out of a combination of structural steel and concrete masonry, while the roof is framed with metal joists and metal deck. The foundations system consisted of strip footings and spread footings. This addition added the fueling island, fueling bay, break room, bus wash, paint shop, chassis wash, weld shop, and extended the width of the bus parking.

The 2002 addition was built out of structural steel, the roof was supported with metal joists and metal deck. The foundation system consisted of strip footings and spread footings. This addition added the sign shop, electrical bay and increased the size of the fleet maintenance shop.

Greenhouse:
The greenhouse was constructed in 2009 with steel trusses and strip footings.

Storage Sheds:
The date of construction of the storage sheds is unknown.

Observations

Martin/Martin performed a visual walkthrough of all buildings on August 7, 2018. The condition of each building is described below:

Administration Building:
The majority of the existing structural framing was hidden behind hard gypsum board ceilings and wall finishes and was not visible. John King, Town Facilities Manager, reported that he has noticed some leaking in the past. This portion of the structure was not visible during our visit, but he reported that the wood structure was not damaged. The north side of the roof sloped toward the north without a gutter (Photo 1). The site slope on the north side of the building was sloping south, toward the building, this permits water to drain into the north foundation wall. The drawings from the 1997 addition show a foundation drain on the north side of the retaining wall. It is unknown if there is a foundation drain behind the existing retaining wall. However, there were no apparent signs of damage caused by water.

Maintenance Facility:
The majority of the structural framing for the metal buildings and additions was exposed. The structure for the 1996 and 2002 addition appeared to be built in accordance with the structural drawings. Each metal buildings appeared to have its own lateral system consisting of moment frames and tension only steel cross braces (Photo 2). There were locations in each building where one of the steel cross braces had been removed (Photo 3). There were also discovered locations where both cross braces had been removed (Photo 4). The lateral system for the 1996 addition appeared to be concrete masonry shear walls in each direction. The lateral load for the 2002 addition appeared to be resisted by the lateral system of the existing building as no additional bracing was provided in the 2002 drawings.

There was an existing concrete wall near the center of the structure that extended east/west from the sign shop to the paint shop. There was a vertical crack in this wall in the oil room. There was also an opening cut into this wall entering the weld shop from the fleet maintenance. There was a vertical crack above the opening and to the west of the opening. A portion of this wall appeared to have been removed in the 2002 addition for the expansion of the fleet maintenance.

The slab on grade was cracked at various locations throughout the building. The most noticeable of these cracks was at the transition in the bus parking between the stem wall for the original metal building and the slab of the 1996 addition.

At the mezzanine there was a noticeable hump in the locker room floor which is supported by slab on metal deck (Photos 5 and 6). Also, in the mezzanine there were cracks in the slab on metal deck at the break room that extended both north/south and east/west (Photos 7 and 8). The mezzanine slab on metal deck is supported by joists and joist girders, however the parts room directly below this area was not accessible at the time of our visit.

There was separation between gypsum board walls and ceiling in the south wall of the mezzanine office currently occupied by John King (Photos 9 and 10).

Greenhouse:
The structural framing was exposed and appeared to match the existing drawings and no damage was observed.

Storage Sheds:
Much of the structural framing was exposed and appeared to be in good condition and no damage was observed.

Drawing Review

The existing structural drawings made available by the Town of Vail indicate the following design loads:

Administration Building 1996 Addition:
- Original Building Code ..... 1994 Uniform Building Code
- Gravity Loads
  - Roof Live Load (Snow Load) ..... 100 psf
  - Typical Floor Load ..... 50 psf
  - Bearing Pressure ..... 3000 psf
- Lateral Loads
  - Basic Wind Speed (Fastest Mile) ..... 80 mph
  - Exposure C
  - Seismic Zone 1

Maintenance Facility 1997 Addition:
- Original Building Code ..... 1994 Uniform Building Code
- Gravity Loads
  - Roof Live Load (Snow Load) ..... 100 psf
  - Typical Floor Load ..... 50 psf
  - Bearing Pressure ..... 4000 psf
- Lateral Loads
  - Basic Wind Speed (Fastest Mile) ..... 80 mph
  - Exposure C
  - Seismic Zone 1

Maintenance Facility 2002 Addition:

- Original Building Code ..... 1997 Uniform Building Code
- Gravity Loads
  - Roof Live Load (Snow Load) ..... 100 psf
  - Mezzanine Floor Load ..... 125 psf
  - Bearing Pressure ..... 4000 psf
- Lateral Loads
  - Basic Wind Speed (Fastest Mile) ..... 80 mph
  - Exposure C
  - Seismic Zone 1

Greenhouse 2009:

- Original Building Code ..... 2006 International Building Code
- Gravity Loads
  - Dead Load ..... 8 psf + Structure Weight
  - Snow Load ..... 80 psf ground snow
  - Bearing Pressure ..... 4000 psf
- Lateral Loads
  - Basic Wind Speed (3 Second Gust) ..... 100 mph
  - Exposure C
  - Seismic
    - Short Period 0.2 Second Spectral Acceleration, S_S 0.286
    - Long Period 1.0 Second Spectral Acceleration, S_1 ..... 0.068
    - Group 1
    - Category ..... B
    - Soil Classification ..... D
    - R 3.5
    - Cd 3.0

Design Criteria

The new structure and areas of the existing building where the occupancy has changed will be designed for current building code requirements.

A. Building Code:
- New Construction ..... 2015 International Building Code with TOV Amendments
- Existing Construction .....2015 International Existing Building Code
- Risk Category..... II

B. Live Loads:
- Stairs, Corridors and Areas of Public Assembly ..... 100 psf (non-reducible)
- Offices ..... 50 psf (reducible) + 15 psf partition load
- Roof..... rooftop equipment weight

C. Snow Loads
- Town of Vail Minimum Flat Roof Snow Load..... 100 psf
- Ground Snow Load for Determining Drift Loads per SEAC Colorado Design Snow Loads..... 90 psf
- Snow Importance Factor, I_S..... 1.0

D. Wind Loads
- Basic Ultimate Wind Speed, V_{ULT} (3 Second Gust) .....115 mph
- Basic Allowable Wind Speed, V_{ASD} (3 Second Gust) .....90 mph
- Exposure Category C

E. Seismic
- Site Classification .....D(assumed)
- Short Period 0.2 Second Spectral Acceleration, S_S 0.254
- Long Period 1.0 Second Spectral Acceleration, S_1 ..... 0.072
- S_{DS}..... 0.271
- S_{D1}..... 0.116
- Seismic Importance Factor, I_e 1.0
- Seismic Design Category ..... B

Discussion

Site Hazards

The existing project site lies within a debris flow hazard zone and rockfall hazard zone. There is no documentation in the existing drawings to indicate that the existing buildings were designed to consider these hazards. In the event of future site expansion a geologist should be consulted to give recommendations to control rockfall and debris flow (Figure 3 and 4).

Existing Framing

The existing structural drawings for the administration building addition and the maintenance building addition indicate the correct design loads at the time of construction. Design loads for the original wood framed administration building and the original metal building maintenance facility are unknown and would need to be evaluated for any future additions.

A metal building historically is very efficient and likely does not have any additional structural capacity. Based on the design criteria of the existing drawings it does appear that lateral loads were considered in all additions. Although current wind loads indicate a higher wind speed, the applied design load is equivalent to the design loads used in the 1996, 1997 and 2002 additions. Therefore, additions could likely be made to the structure if they did not increase wind exposure. However, additions would add seismic mass and current seismic loads are two to three times higher than the original designs. This means modifications to the existing structure may trigger a code required upgrade to the lateral force resisting system.

At locations where it was discovered that tension only steel cross braces have been removed, the braces should be re-installed back to the assumed original condition.

Overall the administration building, maintenance building, greenhouse and storage sheds appeared to be in good condition.

Future Uses

The International Existing Building Code (IEBC) states that alterations where the gravity load increases by 5%, the load carrying capacity decreases by 5%, the lateral load increases by 10% or the lateral load carrying capacity decreases by 10% must be reinforced or replaced to meet the requirements of the current building code. Additionally, changes in occupancy must be designed to meet current building code requirements.

Limitations

This investigation was limited solely to a visual observation and a walkthrough of the existing buildings at 1309 Elkhorn Drive in Vail, Colorado. An in-depth evaluation of the entire building was not performed, and no structural members or framing systems were analyzed other than those specifically mentioned in this report. This report is based on conditions of structural elements that were readily observable at the time of investigation. No invasive testing, materials testing, or inspections were performed. Martin/Martin does not accept responsibility for structural deficiencies not evident during an evaluation of this type. The descriptions and/or recommendations contained in this report are for discussion purposes only and not intended for construction.

Sincerely,

Karl Mertens, PE
Professional Engineer

Sean Molloy, PE
Principal

Related Photographs and Figures

Figure 1: Building Room Layout

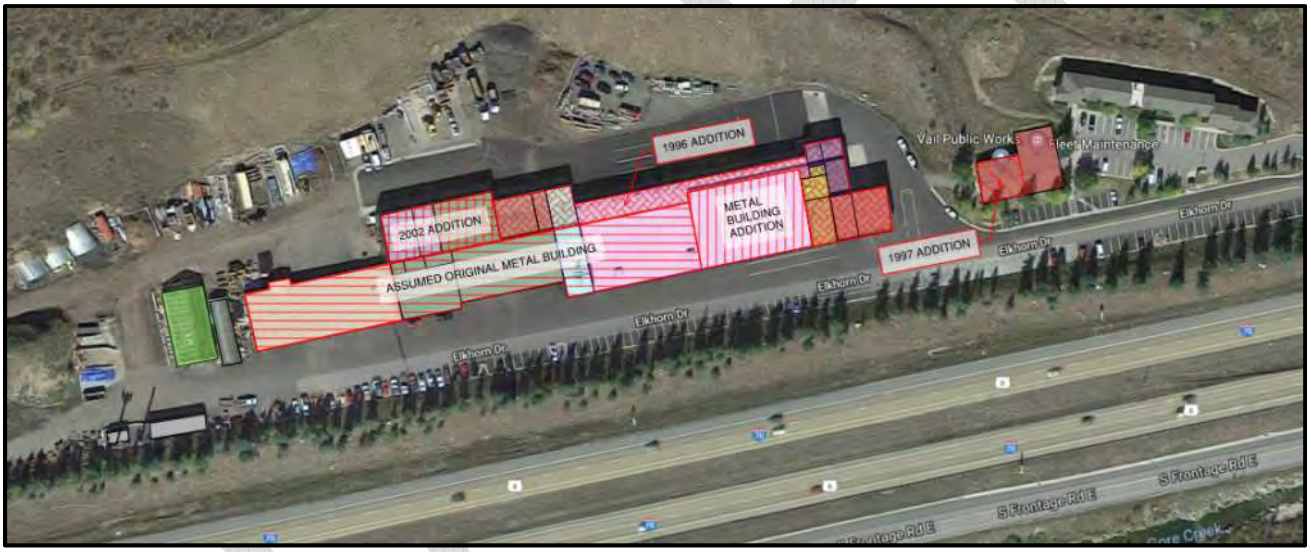


Figure 2: Building Addition Map

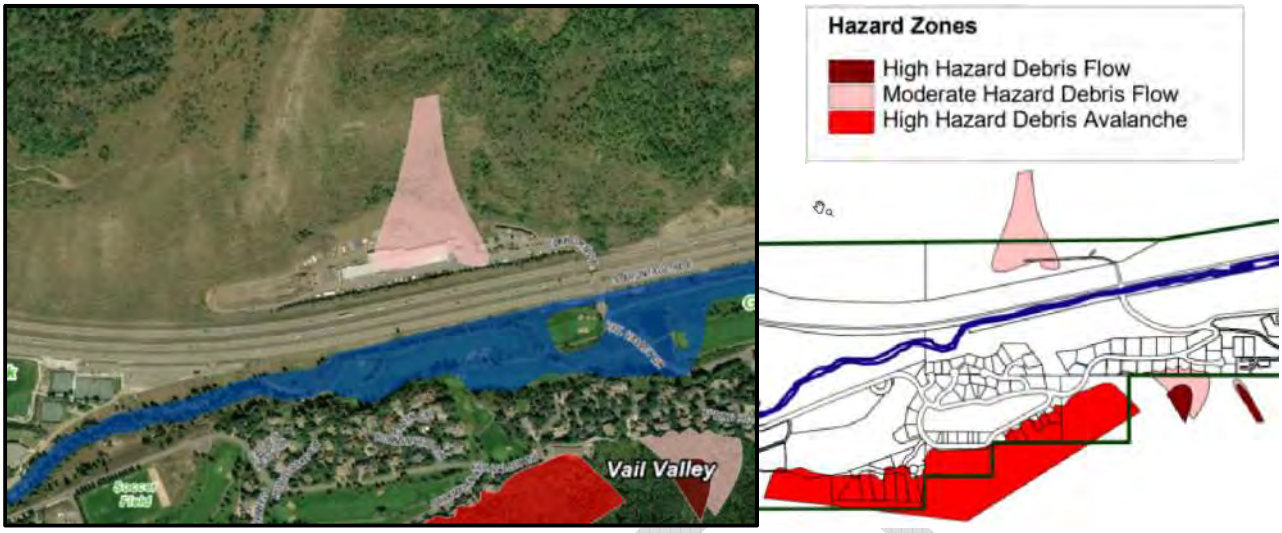


Figure 3: Debris Flow Hazard Map

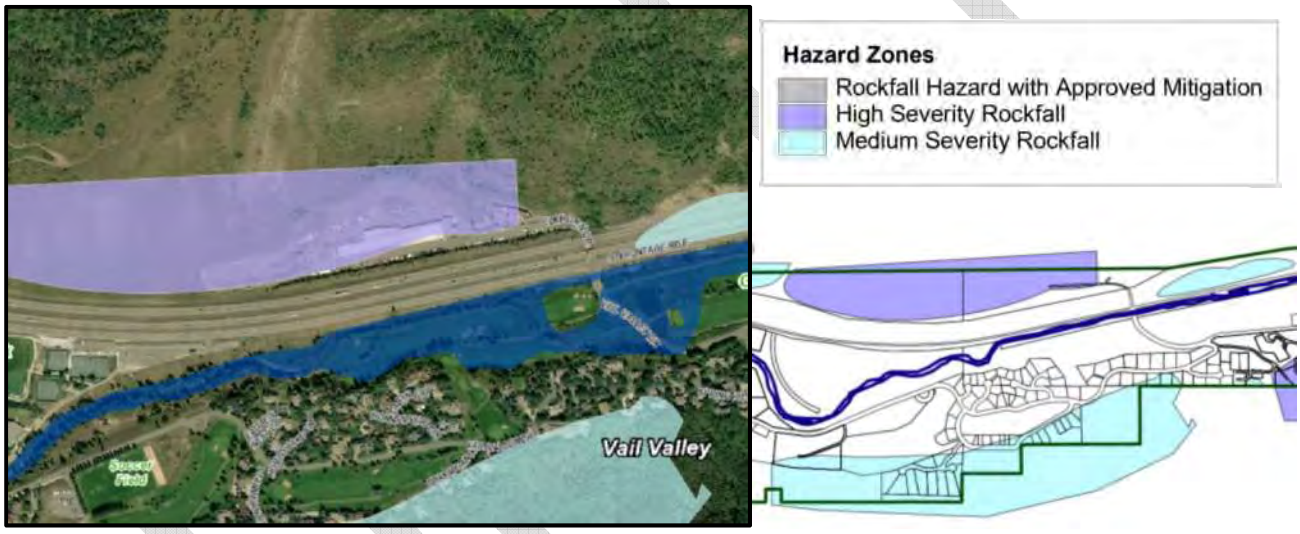


Figure 4: Rockfall Hazard Map

Photo 1: North Side of Administration Building Looking South

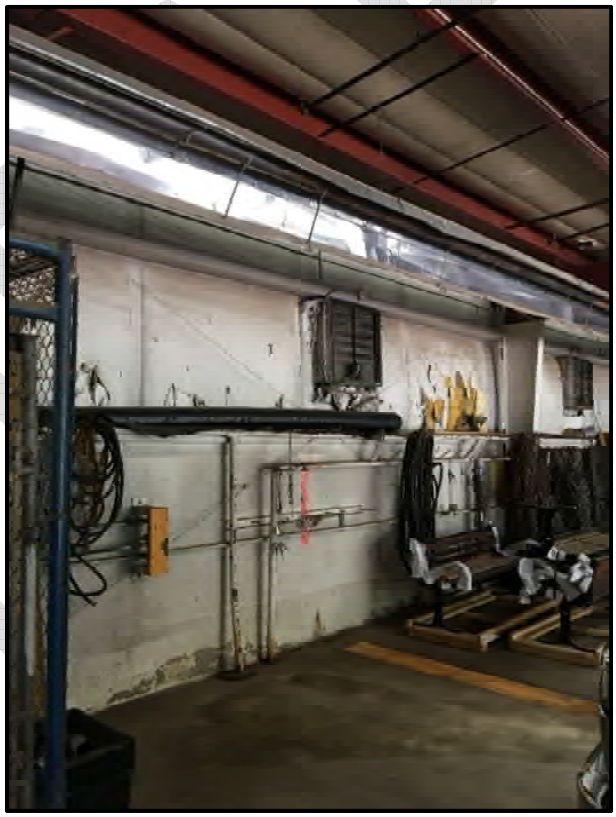


Photo 2: Tension Only Steel Cross Brace

Photo 3: Tension Only Steel Cross Brace Missing Tension Tie

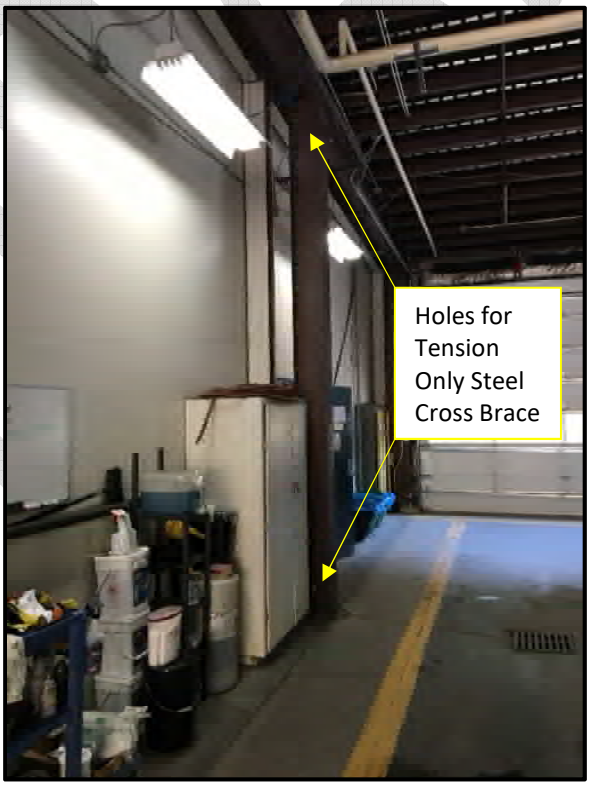


Photo 4: Missing Tension Only Steel Cross Braces

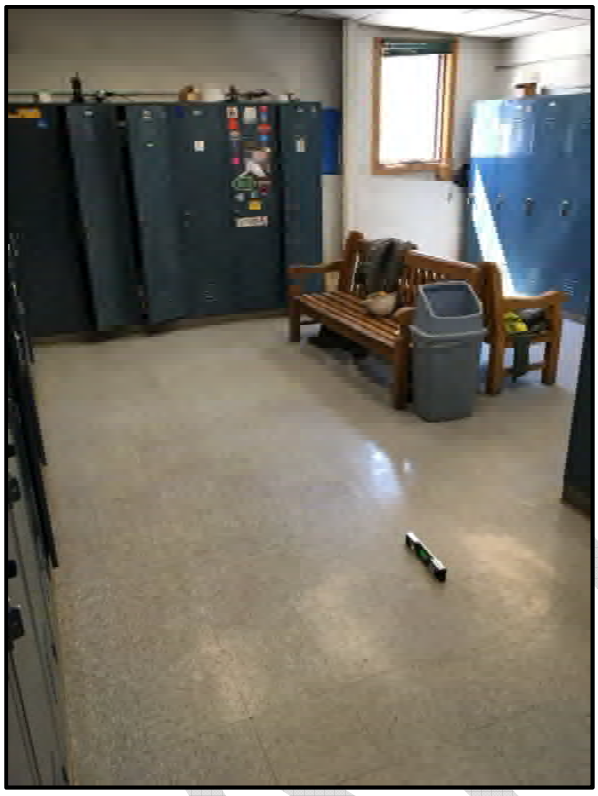


Photo 5: Hump in Mezzanine Locker Room

Photo 6: Hump in Mezzanine Locker Room

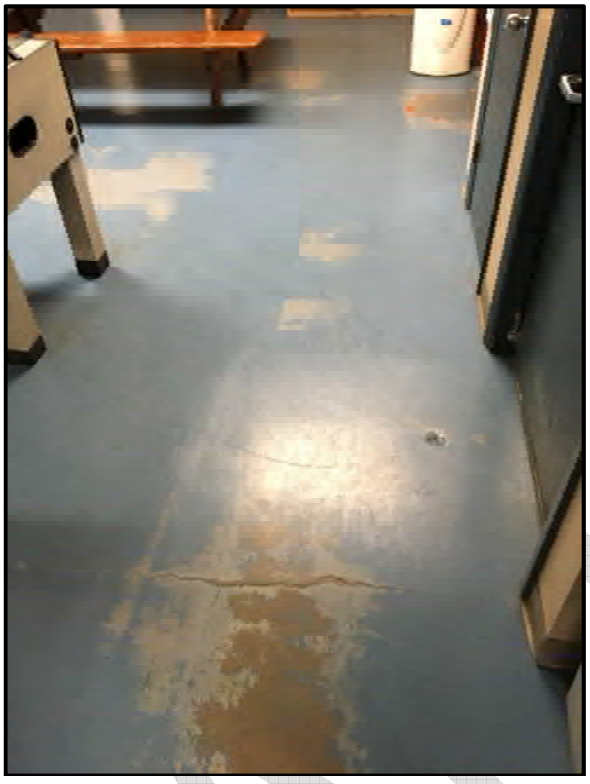


Photo 7: Cracking in Mezzanine Slab on Metal Deck at Break Room

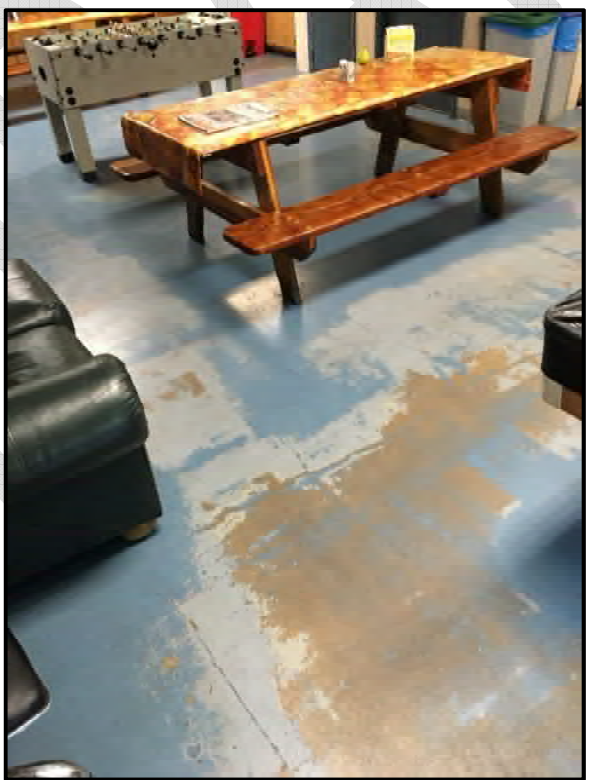


Photo 8: Cracking in Mezzanine Slab on Metal Deck at Break Room

Photo 9: Crack Between Ceiling and Wall in Mezzanine Office

Photo 10: Crack Between Ceiling and Wall in Mezzanine Office

MEMORANDUM

TO: Mark Donaldson

FROM: Greg Schroeder

DATE: February 18, 2019

SUBJ: Vail Public Works – Traffic Status – INTERNAL DESIGN TEAM MEMO, NOT FOR AGENCY SUBMISSION

This memorandum summarizes the status of the traffic engineering investigation to date.

Traffic Counts: Turning Movement Counts (TMCs) were taken at the intersection of South Frontage Road and Vail Valley Drive/Elkhorn Drive on December 13, 2018. Counts were performed from 6:30am to 8:30am (morning) and from 3:00pm to 5:00pm (evening). A copy of the count data is included.

South Frontage Road: South Frontage Road is a roadway under CDOT jurisdiction and is classified as F-R per the CDOT *State Highway Access Code* (SHAC). The posted speed limit is 45mph, and the Town and CDOT do have variable speed limit signs in the vicinity that do change the speed limit during events.

Auxiliary Turn Lanes: Per the SHAC, auxiliary turn lanes are triggered based upon traffic volumes, safety and operational conditions. The threshold for an eastbound left turn deceleration lane at the S. Frontage Road and Elkhorn Drive intersection is 10 vehicles per hour (vph) or greater. The threshold for a westbound right turn deceleration lane is 25vph or greater. The threshold for a southbound right turn acceleration lane is 50vph or greater.

Per the existing traffic counts, there were 11vph during the morning and 13vph during the evening for the eastbound left turns. Therefore, the existing volumes warrant an eastbound left turn deceleration lane based upon existing conditions. The lane needs to be 435' long, which includes a 13.5:1 taper segment.

For the westbound right turn lane, there were 1vph during the morning and 2vph during the during the evening for the westbound right turns. These existing volumes do not trigger a right turn deceleration lane.

For the southbound right turn lane, there were 18vph during the morning and 26vph during the during the evening for the southbound right turns. These existing volumes do not trigger a southbound right turn acceleration lane.

The southbound left acceleration lane may be warranted by safety and operational concerns. Based upon the low turning movement volumes, this lane is not warranted. However, operational changes, substantial turn volume addition, and/or future accident rates may warrant this lane in the future.

CDOT Access Permit: CDOT requires that an access permit be submitted when an access will be increased by 20% of its volume, if there is a change of land use, or if there are identified safety problems. The existing volume of Elkhorn Drive per the December counts is 32vph for the morning and 47vph for the evening. Based upon these volumes, an increase of greater than 6vph would trigger the 20% threshold for the submittal for an Access Permit.

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Turn Lane Construction Timing: Based upon the existing volumes, an eastbound left turn deceleration lane is warranted now. However, the requirement for the timing of construction of a turn lane will be when an access permit is submitted. This could be when the 20% threshold is triggered or earlier.

Additional Capacity on Site: The public works facility is proposed be replaced with a larger structure, but is not anticipated to increase traffic volumes, as the additional structure size will allow many of the onsite vehicles to be parked inside of a garage rather than in a parking lot. We understand that the overall vehicle trips will not change per the Town's operational plans. These operational specifics should be discussed with CDOT, as typically CDOT looks at the facility's building and yard size as its metric for the determination of trip generation. Additionally, they will require an anticipated Year 2040 public works operations which are likely to increase over time.

Future Phases: 4 total phases have been identified, as listed below:

Phase	Description	Approximate Traffic Volume Increase	Anticipated Improvements Needed *
1	Construct new public works facility	No Net increase in Traffic	Construct Eastbound Left Turn Deceleration Lane
2	Add 12-24 new housing units	Additional 5 to 8vph for 12 units Additional 9 to 14vph for 24 units	None
3	Add 40 more housing units	Additional 13 to 20vph for 40 units	Construct Southbound Right Acceleration Lane or Mini Roundabout
4	Add 56 more housing units (80 new units, and removal of 24 units)	Additional 18 to 27vph for 56 units	None

*** These anticipated improvements are for planning purposes only. A final CDOT traffic analysis is required to validate these findings.**

Trip Generation Rates: For the purpose of this memorandum, two different trip generation rates were utilized.

- Traffic turning movement counts were conducted at the Timber Ridge and Lions Ridge Apartments on December 1, 2018. A derived rate was utilized based upon the number of housing units and the traffic volumes. These rates represent the lower of the ranges shown above.
- National rates from the *ITE Trip Generation Manual, 10th Edition*[1] were used to estimate the traffic volumes for the proposed housing units. These rates represent the higher of the ranges shown above.

Next Steps: The improvements described above are considered preliminary and are subject to the completion of a final CDOT traffic analysis. McDowell Engineering can complete the phased traffic study upon a final phased plan.

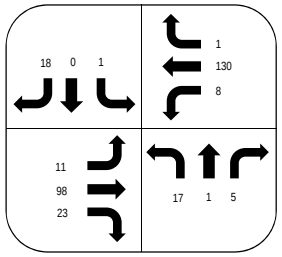
[1] ITE (Institute of Transportation Engineers) Trip Generation Manual, 10th Edition, 2017

Intersection: S. Frontage Road & Elkhorn/Vail Valley Drive
Location: Vail, CO
Traffic Data Collection Date: Thursday, December 13, 2018
Weather: Clear, Cold

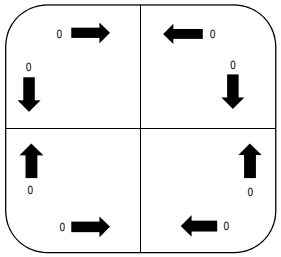
Time	S Frontage Road Eastbound															S Frontage Road Westbound														
	Left					Thru					Right					Left					Thru					Right				
	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik
6:30 AM	3	0	0	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	6	1	0	0	0	1	0	0	0	0
6:45 AM	3	0	0	1	0	5	2	0	0	0	2	1	0	0	0	1	0	0	0	0	4	1	0	0	0	0	0	0	0	0
7:00 AM	3	2	0	0	0	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	0	0	0
7:15 AM	5	2	0	0	0	9	2	0	0	0	5	0	0	0	0	2	0	0	0	0	7	1	0	0	0	0	0	0	0	0
7:30 AM	2	1	0	0	0	14	1	0	0	0	8	0	0	0	0	1	0	0	0	0	12	2	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	32	2	0	0	0	5	1	0	0	0	3	0	0	0	0	27	0	0	0	0	1	0	0	0	0
8:00 AM	6	0	0	0	0	37	2	0	0	0	2	0	0	0	0	2	0	0	0	0	47	1	0	0	0	0	0	0	0	0
8:15 AM	2	0	0	0	0	9	1	0	0	0	5	2	0	0	0	2	0	0	0	0	40	1	0	0	0	0	0	0	0	0
Total	24	5	0	1	0	117	12	0	0	0	31	4	0	0	0	11	0	0	0	0	149	8	0	0	0	2	0	0	0	0
Peak Hour Total	10	1	0	0	0	92	6	0	0	0	20	3	0	0	0	8	0	0	0	0	126	4	0	0	0	1	0	0	0	0
Peak Hour Total	11 vph			0 pph		98 vph			0 pph		23 vph			0 pph		8 vph			0 pph		130 vph			0 pph		1 vph			0 pph	

Time	Vail Valley Drive Northbound															Elkhorn Drive Southbound														
	Left					Thru					Right					Left					Thru					Right				
	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik
6:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0
7:00 AM	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
7:15 AM	1	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0
7:30 AM	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0
7:45 AM	4	1	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0
8:00 AM	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0
8:15 AM	4	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Total	17	2	0	0	0	0	2	0	0	0	9	1	0	0	0	0	1	0	0	0	0	0	0	0	0	21	12	0	0	0
Peak Hour Total	15	2	0	0	0	0	1	0	0	0	4	1	0	0	0	0	1	0	0	0	0	0	0	0	0	9	9	0	0	0
Peak Hour Total	17 vph			0 pph		1 vph			0 pph		5 vph			0 pph		1 vph			0 pph		0 vph			0 pph		18 vph			0 pph	

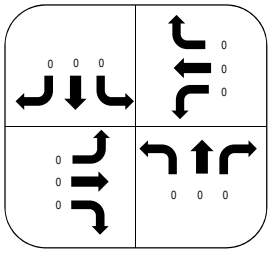
Total Peak Hour Vehicle Traffic at Intersection	313	vph
Total Peak Hour Peds/Bikes at Intersection	0	pph
Total Peak Hour Traffic (All Modes) at Intersection	313	pph
Percentage Peak Hour Trucks at Intersection	8.9%	%
Peak Hour Factor	0.75	



Peak Hour Data (Cars,Trucks, & Buses)



Peak Hour Pedestrian Data



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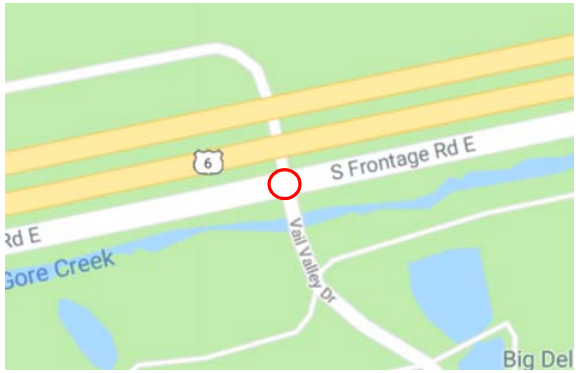


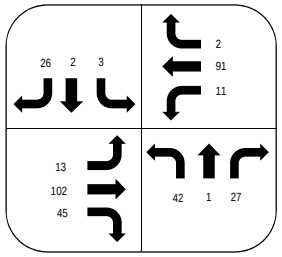
Vicinity Map

Intersection: S. Frontage Road & Elkhorn/Vail Valley Drive
Location: Vail, CO
Traffic Data Collection Date: Thursday, December 13, 2018
Weather: Clear, Cold

Time	S Frontage Road Eastbound															S Frontage Road Westbound														
	Left					Thru					Right					Left					Thru					Right				
	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik
3:00 PM	4	0	0	0	0	18	1	0	0	0	5	0	0	0	0	4	0	0	0	0	35	1	0	0	0	2	0	0	0	0
3:15 PM	5	0	0	1	0	21	1	0	0	0	8	0	0	0	0	4	0	0	0	0	19	2	0	0	0	1	0	0	0	0
3:30 PM	3	0	0	0	0	32	1	0	0	0	11	1	0	0	0	3	0	0	0	0	13	1	0	0	0	2	0	0	0	0
3:45 PM	5	0	0	0	0	23	2	0	0	0	10	0	0	0	0	1	0	0	0	0	22	1	0	0	0	0	0	0	0	0
4:00 PM	3	0	0	0	0	23	1	0	0	0	6	0	0	0	0	1	0	0	0	0	32	3	0	0	0	0	0	0	0	0
4:15 PM	1	1	0	1	0	19	1	0	0	0	17	0	0	0	0	6	0	0	0	0	17	2	0	0	0	0	0	0	0	0
4:30 PM	2	0	0	0	0	13	1	0	0	0	10	0	0	0	0	1	0	0	0	0	15	1	0	0	0	0	0	0	0	0
4:45 PM	3	0	0	0	0	17	1	0	0	0	2	0	0	0	0	4	0	0	0	0	24	1	0	0	0	1	0	0	0	0
Total	26	1	0	2	0	166	9	0	0	0	69	1	0	0	0	24	0	0	0	0	177	12	0	0	0	6	0	0	0	0
Peak Hour Total	12	1	0	1	0	97	5	0	0	0	44	1	0	0	0	11	0	0	0	0	84	7	0	0	0	2	0	0	0	0
Peak Hour Total	13 vph			1 pph		102 vph			0 pph		45 vph			0 pph		11 vph			0 pph		91 vph			0 pph		2 vph			0 pph	

Time	Vail Valley Drive Northbound															Elkhorn Drive Southbound														
	Left					Thru					Right					Left					Thru					Right				
	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik	Car	Trk	Bus	Ped	Bik
3:00 PM	8	1	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2	0
3:15 PM	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	9	0	0	0	0
3:30 PM	14	1	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
3:45 PM	11	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	9	0	0	0	0
4:00 PM	5	0	0	0	0	1	0	0	0	0	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
4:15 PM	11	0	0	0	0	0	0	0	0	0	5	0	0	0	0	1	0	0	0	0	0	2	0	0	0	7	1	0	0	0
4:30 PM	15	1	0	0	0	0	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	1	0	0	0
4:45 PM	27	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Total	97	3	0	0	0	1	3	0	0	0	34	1	0	0	0	5	0	0	0	0	1	4	0	0	0	39	2	0	2	0
Peak Hour Total	41	1	0	0	0	1	0	0	0	0	26	1	0	0	0	3	0	0	0	0	0	2	0	0	0	25	1	0	0	0
Peak Hour Total	42 vph			0 pph		1 vph			0 pph		27 vph			0 pph		3 vph			0 pph		2 vph			0 pph		26 vph			0 pph	

Total Peak Hour Vehicle Traffic at Intersection	365	vph
Total Peak Hour Peds/Bikes at Intersection	1	pph
Total Peak Hour Traffic (All Modes) at Intersection	366	pph
Percentage Peak Hour Trucks at Intersection	5.2%	%
Peak Hour Factor	0.88	



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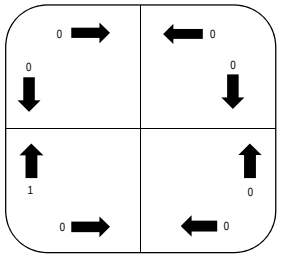

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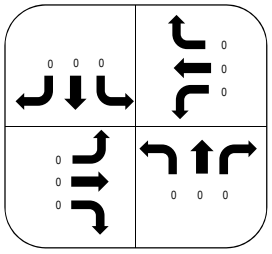

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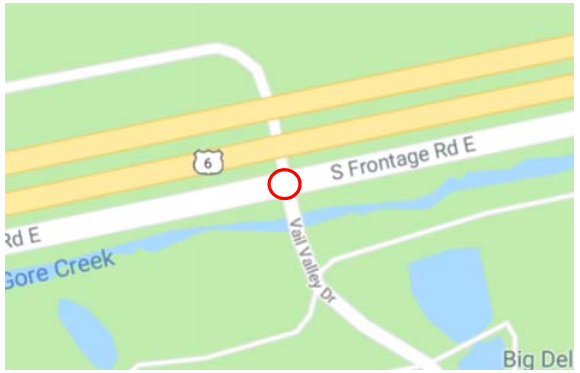

Vicinity Map

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GEOLOGIC HAZARDS REVIEW
PROPOSED TOWN OF VAIL
PUBLIC WORKS FACILITY DEVELOPMENT
1309 ELKHORN DRIVE, VAIL
EAGLE COUNTY, COLORADO

PROJECT NO. 18-7-606

NOVEMBER 6, 2018

PREPARED FOR:

VICTOR MARK DONALDSON ARCHITECTS
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TABLE OF CONTENTS

PURPOSE AND SCOPE OF STUDY

This report presents the findings of a geologic hazards review of the proposed development of the Town of Vail Public Works Facility, 1309 Elkhorn Drive, Vail, Eagle County, Colorado. The purpose of our study was to assess the potential impacts of geologic hazards on the proposed development at the project site. The study was conducted in accordance with our proposal for geological engineering services to Victor Mark Donaldson Architects dated September 26, 2018.

A field reconnaissance of the project site was made on October 3, 2018 to observe the geologic conditions and collect information on the potential geologic hazards present at the project site. In addition, we have reviewed relevant published geologic information and looked at aerial photographs of the project area. Colorado Rockfall Simulation Program (CRSP) analysis was performed to assess potential rockfall paths, velocities, energies, and bounce heights for mitigation design. This report summarizes the information developed by this study, describes our evaluations, and presents our findings.

PROPOSED DEVELOPMENT

The proposed development is in the preliminary design phase. Our understanding is that the existing Town of Vail Public Works facility will be remodeled and additions made to the north side of the building. It is proposed that the existing cut slope on the north side of the parking/drive area to the north of the existing building will be modified and the cut extended into the hillside to create additional space in the parking area. The existing snow dump area is proposed to be expanded to the west.

SITE CONDITIONS

The project site consists of developed and vacant land located at 1301 Elkhorn Drive, north of Interstate 70, at the southern base of the Vail valley side. The project site is made up of two parcels of land covering a combined area of 20.96 acres. The White River National Forest borders the site to the north. The site is just north of Interstate 70 as shown on Figure 1 and about 1 mile east-northeast of Vail Town Center. Elkhorn Drive ends within the property. Steep

slopes of the Vail valley side rise to the north. An old ditch/berm feature and un-maintained two-track road follows the north property line above the existing cut slope.

The site lies mostly on gently sloping terrain down to the south at the transition to the higher elevation south-facing, steep valley side. The proposed development site lies at an elevation of between around 8,260 and 8,340 feet. The source zones of potential rockfall at the site lie at an elevation of between around 8,630 and 8,860 feet. The source zones of potential rockfall are within the White River National Forest boundary. The existing topography is depicted by the three-dimensional surface on Figure 2. The slope across the proposed development site is about 2 to 5 percent in the lower parking and existing building area and around 50 percent in the existing cut slope area. To the north of the project site, directly above the proposed development area, the south-facing valley side has a fairly uniform slope of about 65 percent. Vegetation on the south-facing valley side is native grass, cactus, and scrub oak. Vegetation in the debris fan area consists of native grass and weeds with scattered scrub oak, and scattered sage brush.

The old ditch/berm feature does not appear to be maintained. The ditch/berm structure is currently relatively free of debris. Scattered rocks of up to 2½ feet in diameter are present along the entire ditch/berm.

PROJECT AREA GEOLOGY

The main geologic features in the project area are shown on Figure 3. This map is based on regional mapping by Kellogg and Others (2003) published by the United States Geological Survey.

The project site lies along the axis of the Laramide-age north-south trending Spraddle Creek Fold. Formation rock in the area consists of the Pennsylvanian-age Minturn Formation middle member (Pmm), the Robinson Limestone Member (Pmr), and the lower member (Pml). The lower member consists of arkosic conglomerate, sandstone, siltstone, and shale that is pinkish-gray to grayish-brown. The Robinson Limestone Member is a fossiliferous medium to thick bedded marine limestone interbedded with light tan arkosic pebbly sandstones, siltstones, and shales. The middle member consists of arkosic conglomerate, sandstone, siltstone, and shale that is pinkish-gray to grayish-brown. The bedding dip of the formation rock in the vicinity of the

project site is variable and ranges from around 20 to 25 degrees toward the east to 40 to 60 degrees toward the west (Kellogg and Others, 2003).

Surficial deposits in the area include upper Pleistocene-age Pinedale glacial till (Qtp), middle Pleistocene-age Bull Lake glacial till (Qtb), and recent landslide deposits (Qlsy). The Pinedale glacial till consists of sub-angular to sub-rounded gneiss cobbles and boulders in a light tan sandy matrix that is unsorted and unstratified. The Bull Lake glacial till consists of material similar to that of the Pinedale till but also contains sandstone, conglomerate, or limestone cobbles and boulders derived from the Minturn Formation. The recent landslide deposits consist of debris deposited by recent landslides that is unstratified and unsorted. The landslide to the northeast of the project site is active and is a deep rotational slide with shallow soil slumping near the surface (Kellogg and Others, 2003).

Kellogg and Others (2003) also state that rockfall is a geologic hazard in portions of the quadrangle, especially in areas below steep slopes and cliffs formed by the Robinson Limestone Member of the Minturn Formation.

The recognized rockfall deposits described by Kellogg and Others (2003) can be observed on this site. The slopes above the property where these processes initiate have measured slope angles ranging from 60 to 100 percent. Heavy rains at this location can be accompanied by rockfall. Rockfall deposits were observed adjacent to and on the property.

GEOLOGIC HAZARDS ASSESSMENT

Geologic hazards potentially impacting the project site consist of rockfall, debris flow and potentially unstable slopes. Rockfall from the outcrops above the site on the valley side appears to be moderate to high risk. There is a small debris basin and associated channel upslope of the east part of the proposed development, north of the existing berm. The existing berm/channel outlets along the western edge of the existing Public Works office building. The potential for unstable slopes appears to be low to moderate and mainly at the existing cut slope to the north of the existing parking/roadway area. We should review the grading plans for the project once they

have been developed and perform additional stability and rockfall analyses as needed for the areas of proposed new development.

RECOGNITION

There is evidence of a rockfall hazard at the property. This hazard involves loose rocks along the slope rising above the property to the north and fractured blocks of Minturn Formation exposed in cliff faces and ridges above the site. Evidence of the extent of the hazard within the property may have been obscured by the existing development. We reviewed historic aerial photographs of the property dating back to 1999, the oldest aerial photographs readily available for the site.

Several rocks were found in the area along the existing berm and un-maintained two-track road to the north of the existing cut slope. These rocks ranged in size from around 1 to 4 feet in all dimensions and mainly consisted of angular limestones and sandstones of the Minturn Formation.

IDENTIFICATION

The majority of the rockfall evident adjacent to the property comes from rolling and bounding loose rock. The initiation force may be a combination of loss of support for the loose rock due to precipitation events, freeze thaw cycles, chemical weathering (disintegration of the rock mass), and plant and animal influences. Wind also may be a contributing factor. Other rockfall may result from planer or toppling failures within the large rock masses with open fractures. Based upon the apparent erosion of soil supporting loose rock during heavy rainfall, destabilization of the loose rock could occur during times of high precipitation.

EVALUATION

Evaluation of the project site for rockfall included field observations, terrain analysis, aerial photograph interpretation, and rockfall simulation modeling using the Colorado Rockfall Simulation Program (Crsp3D version 2012.12.12.23.37). The evaluation focused on three zones defined within the area. These included:

1. Rockfall Source Zone
2. Rockfall Paths
3. Rockfall Runout Zone

A map showing potential rockfall hazard areas is presented in Figure 2. The potential hazard consists of a rockfall source zone, a rockfall runout zone, and an area of potential rockfall paths between the source zone and the runout zone. The project site is located in the potential runout zone as shown on Figure 1.

Rockfall Source Zone

The majority of rocks presently posing a hazard to the proposed development are located at the rock outcrop located approximately 560 feet up the slope and along the ridge to the northwest of the proposed development area about 400 to 1000 feet up the slope. The source zones are primarily intact sandstone, conglomerate, and limestone that exhibit varying degrees of weathering and fractures.

There are loose rocks littering the slope below the outcrops that have rolled to their present location. In our opinion, most of these lower, loose rocks do not pose a significant rockfall hazard. This is due to their lower location on the slope. It is unlikely that these lower, loose rocks will develop significant kinetic energy should they roll down the slope. The exception to this is the loose rocks in the vicinity of the outcrops that can be dislodged and are higher up on the slope. There is one very large boulder above the middle of the proposed development at around elevation 8,436 feet that appears currently stable.

Rockfall Paths

The mechanism of rockfall at this location involves rolling, toppling, and/or sliding of loose rock from the source zone. Once moving, the rock rolls and bounces through the rockfall path zone until it stops in the rockfall runout zone. The rockfall path zone above the proposed development area extends from the base of the slope to the ridge and outcrop above. Rocks roll, topple, and/or slide varying distances from the source zone. Some rocks are stopped in the source zone after initial movement. Other rocks stop varying distances down the slope. The rocks that stop movement in the source zone and on the slope lose speed and kinetic energy through contact with the ground surface, other rocks, vegetation, or a combination of these. It is likely that some rocks have rolled and bounced through the rockfall path zone, impacting the flatter ground at the base of the slope. We are unaware of direct evidence that rocks have

impacted the existing facility, however, the grading north of the west end of the facility has cut into the deposit formed in part by falling rock.

Rockfall Runout Zone

The rockfall runout zone evaluated for this study is defined as the area of ground at the ditch/berm and two-track road and south into the area of the proposed development. This area has been impacted by falling rock in the past as can be observed by the boulders adjacent to the ditch/berm. In our opinion, the existing ditch/berm feature should not be considered effective rockfall mitigation for the proposed development.

Rockfalls will decelerate, lose kinetic energy, and eventually stop in this zone. Velocities of potential rockfalls are decreasing significantly at this location. This has significant advantages when considering mitigation options. These options are discussed in following sections.

CRSP MODELING

The Colorado Rockfall Simulation Program (Crsp3D version 2012.12.12.23.37) was used to assist in our assessment of the potential rockfall risk to the proposed project and to develop rockfall dynamic information that may be used to assess the feasibility of rockfall mitigation. Crsp3D is a computer program that simulates rockfall tumbling down a slope and predicts the probability distribution of rockfall runout, velocity, bounce height, and kinetic energy. The program takes into account slope profile, rebound and frictional characteristics of the slope, and rotational energy of the rocks. The program was not designed to identify rockfall hazard but to determine mitigation techniques where the hazard has been identified. The program is a tool commonly used in analysis and mitigation of rockfall hazards.

We have simulated rockfall at the project site using Crsp3D. Our calibration of the model to site conditions began with observations of rockfall conditions at the site as described in previous sections of this report. We created a model that reflects the types of rocks found adjacent to the property that we believe resulted from rockfall events. The model was further refined by measurements of the slope and of loose rocks found within the rockfall source zones, rockfall path zones, and rockfall runout zones. Our model was back-calculated from the conditions at the

site. The conditions at the property provide reasonable criteria for generating rockfall models that we believe represent the actual rockfall conditions.

The purpose of modeling the rockfall events at the site is to evaluate engineering properties of the rockfall events that can be used in developing alternatives for mitigation of the potential rockfall hazard. These properties include velocity, bounce height, and kinetic energy of the rocks. Feasibility of rockfall mitigation concepts can be evaluated from these properties.

Model Input Information

A surface derived from a 2018 LiDAR survey of the area was used to input terrain information into Crsp3D. Model output probability distributions were calculated based on 99 independent rockfall trials of sphere-shaped rocks, randomly varied between a 3.10 and 8.00-foot diameter. These blocks are similar to rocks ranging from a 2,500-pound rock that is approximately a cube with a side length of 2.5 feet and a 44,000-pound rock that is approximately a cube with a side length of 6.44 feet. The rock block sizes are based on observations of rocks found in the runout zone at the project site and the approximate spacing of fractures in the source zone.

Model Output Information

The results are presented in Table 1. We analyzed the results of our rockfall model at one point, the crest of the ditch/berm and along the lower edge of the two-track trail above the proposed development area, see Figure 4. We also calculated the rockfall dynamic probability distribution at this location. The engineering results of the modeling are given in the following table for a 2% exceedance probability. The bounce height is to the centroid of the rock block. The rockfall dynamic probability distribution may be used to assess the feasibility of rockfall mitigation.

Table 1

Engineering Results from CRSP

Point Evaluated	Velocity ft/s (m/s)	Bounce Hight ft (m)	Kinetic Energy ft-lb (kJ)
Point 1	22 (6.7)	2.5 (0.8)	350,000 (470)

ROCKFALL RISK EVALUATION

Rockfall is an active geologic process in the lower part of the Vail valley side to the north of the project site. Without long term observations, it is not possible to develop recurrence probabilities for rockfalls from the source zones at the project site with high levels of confidence but seems reasonable to infer that rockfalls from these source zones are infrequent. The Crsp3D modeling shows that if a rockfall were to occur during a reasonable exposure time for the proposed development, it is possible that the rockfall would reach the proposed development areas shown on Figures 2, 3, and 4.

Based on our current understanding of the rockfall potential, we characterize the risk that a rockfall will reach the proposed building areas to be moderate to high. If a rockfall were to hit the proposed buildings, the consequence would likely be severe and could cause major structural damage and harm the building occupants, and the feasibility of rockfall mitigation should be evaluated.

ROCKFALL MITIGATION CONCEPTS

There are three approaches to rockfall mitigation that are typically used within the area.

1. Meshing, bolting, and/or shotcreting of the entire rock outcrop in the source zone.
2. Stabilization or scaling of individual rock blocks in the source zone.
3. Installation of a rockfall barrier/catchment area (rigid MSE wall, soil berm, or flexible fence) in the runout zone.

The rockfall source areas are beyond the property boundary to the north. We do not know if the White River National Forest would allow mitigation of the loose rocks within the property. Stabilization methods for the entire outcrop could include anchored mesh and/or shotcrete stabilization. Stabilization methods for individual rock blocks in the source zone could include cable lashing, bolting, and scaling.

Stabilizing the entire rock outcrop in the source zone would likely be the most intrusive and expensive option. The shotcrete and/or mesh would be highly visible from below, and would

require a large amount of stabilization material. Due to the large area of outcropping rock in the source zone, this option does not appear to be feasible.

Stabilization of individual rock blocks is more cost effective than stabilizing the entire rock outcrop. This option mitigates the release of large rocks from the source zone but does not mitigate the release of smaller rocks due to severe weather, animal traffic, or rodent undermining. Due to ongoing natural erosion and animal traffic, this mitigation would need to be evaluated annually to adapt to the natural changing conditions. Individual stabilization typically costs between 5% and 50% of the cost of stabilizing the entire rock outcrop based on the amount of individual rocks needing to be stabilized. Based on our field observations it is estimated that the cost of initial individual rock block stabilization at this site will be between around $400,000 to $800,000.

Rock scaling at this site does not seem feasible due to the existing development (including Interstate 70) downslope from the source zone.

In our opinion, a practical protection method would be an MSE wall or a flexible rockfall barrier and catchment area extending above the proposed development, in the area of the existing ditch/berm and two-track road, just to the north of the proposed cut-slope. This protection method would be around 1,000 to 1,500 linear feet. MSE walls typically cost between $35 and $40 per square foot of wall (length x height), or between around $210,000 and $360,000 for this site. A soil berm could be constructed with imported and/or on-site excavated material with a near vertical up slope face such as stacked boulders. The cost of the soil berm would depend on excavation costs and the availability of on-site material.

A flexible rockfall barrier can be located approximately at the northern property boundary which should not impact the property to the north. The installation cost of a flexible barrier is typically around $110 per linear foot or between around $110,000 and $165,000 plus material and grading costs for this site. The flexible fence option will provide better protection from large and small rocks for the proposed buildings than stabilization of individual rock blocks, and will likely remain relatively maintenance free for several years after installation. The flexible barrier will likely be visible from the proposed development, but much less from the surrounding

community. A range of colors of flexible barrier are available to help minimize the visual impact of the fence.

RECOMMENDATIONS

Based on the CRSP analysis and our observations at the site, rockfall mitigation is recommended. In our opinion, a flexible rockfall barrier (Option 1) or MSE wall/soil berm (Option 2) with a catchment area uphill of it located in the area of the existing ditch/berm and two-track trail will be an effective mitigation. A flexible rockfall barrier will have the lower amount of visual impact and will require a limited amount of space to construct. The modeled energies and bounce heights for a 2% exceedance probability from the source zone are around 350,000 foot-pounds (470 kJ) and 2.5 feet (0.76 m), respectively. The modeled energies and bounce heights associated with rockfalls from these zones are presented above in Table 1. Based on these modeled energies and bounce heights, the barrier would need to be around 7 feet (2.11m) tall with a strength of 420,000 ft-lb (570 kilojoules). We recommend that a 3 meter (9.9 foot) tall Geobrugg GBE-1000A-R system (or equivalent) or suitable MSE wall or soil berm with catchment area designed by a qualified civil engineer be installed along the existing two-track road, for mitigation of the potential rockfall at the site. A soil berm with catchment area may also reduce the risk of damage due to debris flow at the subject site. If a flexible barrier option is chosen, the existing berm should be extended by approximately 200 feet to the west to intercept possible debris flow paths and the outlet improved so as to not direct flow toward the existing public works office building or existing employee housing building. This berm should be designed by a qualified Civil Engineer to account for design debris flow volumes and velocities.

LIMITATIONS

This study was conducted according to generally accepted geotechnical and engineering geology principles and practices in this area at this time. We make no warranty either express or implied. The conclusions and recommendations submitted in this report are based on our field observations, aerial photograph interpretations, published regional geology information, the currently proposed development plan, and our experience in the area. Our analysis was

conducted to model a reasonably accurate indication of rockfall behavior at this location. The results are thought to be representative of conditions observed at the property and the slope and ridge above. Variations in the model resulting from additional observations and information should be expected. This report has been prepared exclusively for our client and is an evaluation of the geologic hazards and their potential influence on the proposed development. We are not responsible for technical interpretations by others of our information.

H-P KUMAR

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Reviewed by:

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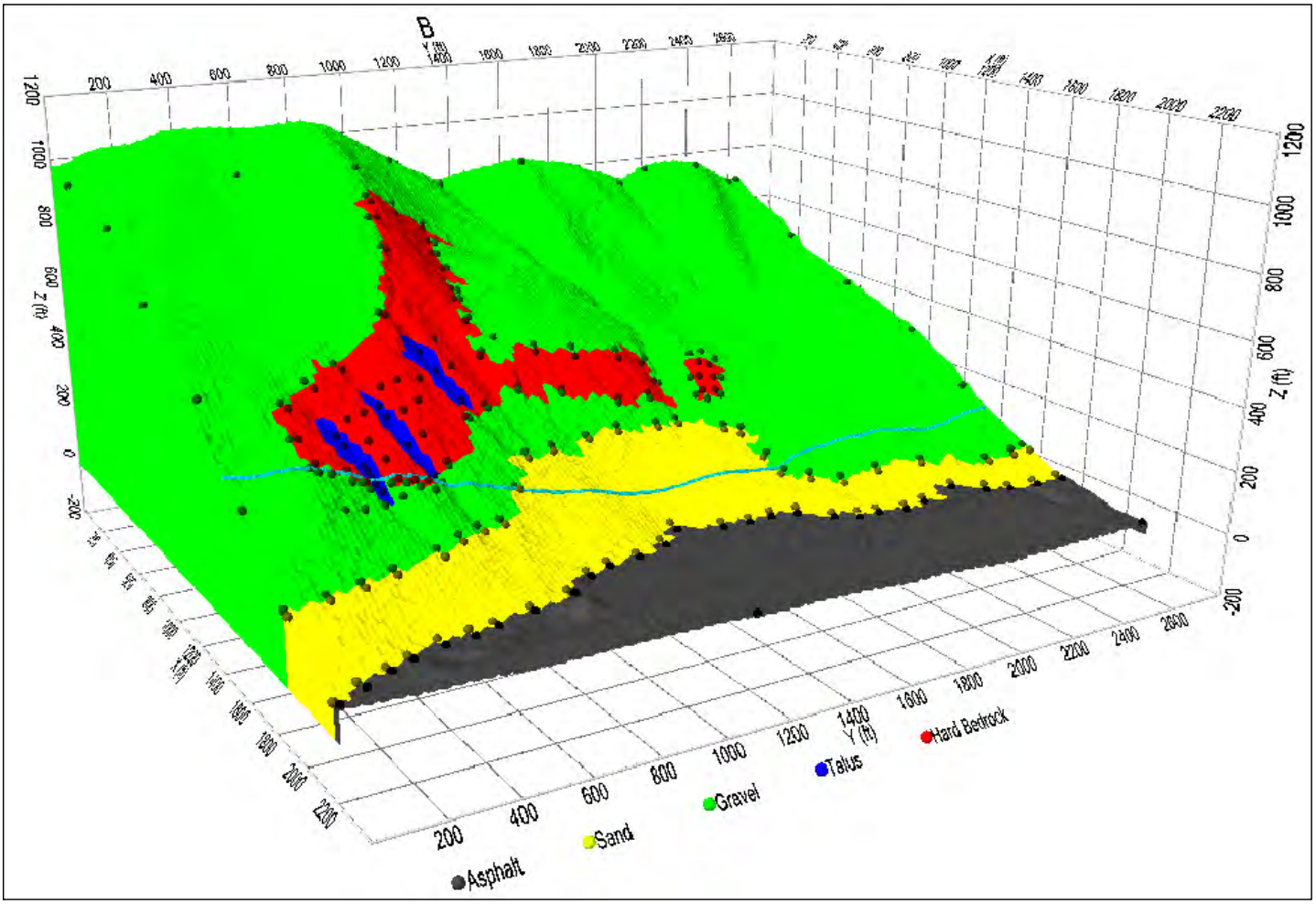
18-7-606	Kumar & Associates	Project Site Location	Figure 1



Source

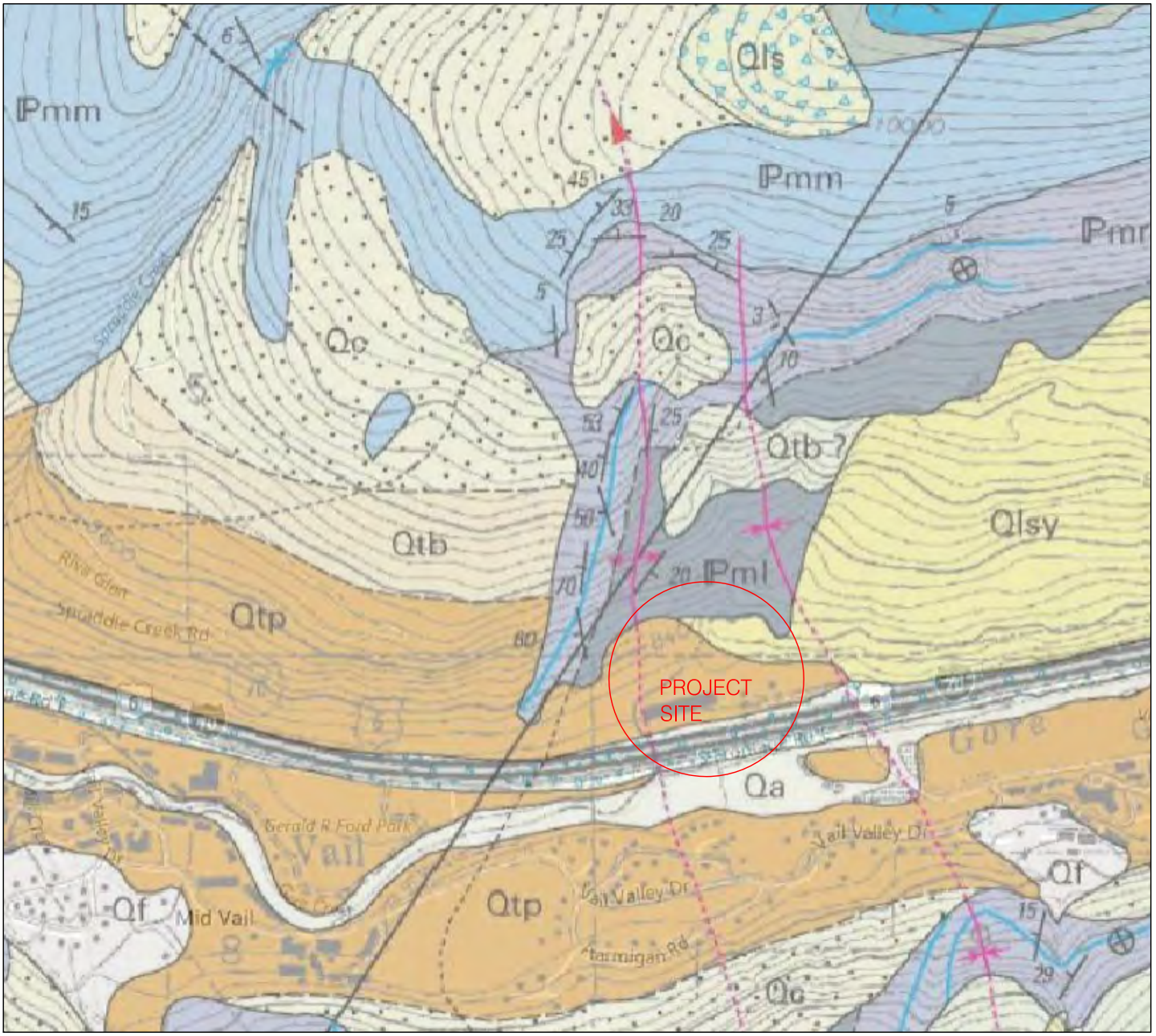
(Upper)

Paths

(Lower)

Runout

18-7-606	H-P≋KUMAR Geotechnical Engineering | Engineering Geology Materials Testing | Environmental	ROCKFALL MATERIALS AND ZONES	Figure 2



APPROXIMATELY $\frac{1}{2}$ MILE

Qa - Alluvium
Qc - Colluvium
Qf - Fan Deposits
Qtp - Pinedale Till
Qtb - Bull Lake Till
Qlsy - Recent Landslide Deposits
Qls - Landslide Deposits
Pml - Lower Member Minturn Formation
Pmr - Robinson Limestone Member Minturn Formation
Pmm - Middle Member Minturn Formation

18-7-606	H-P KUMAR Geotechnical Engineering | Engineering Geology Materials Testing | Environmental	PROJECT AREA GEOLOGY	Figure 3

18-7-606	Kumar & Associates	Site Plan	Figure 4