NorthWest Colorado Consultants, Inc.
Geotechnical / Environmental Engineering • Materials Testing

September 8, 2022

Willow Creek Pass Village Association
Steve Warnke
P.O. Box 1148
Clark, CO 80428

Job Number: 19-11514

Subject: Summary Report – 2022
Willow Creek Pass Village Road and
ROW Maintenance Program, Routt
County, Colorado.

Steve,

As requested by the Willow Creek Pass Village Association (WCPVA), NWCC, Inc. (NWCC) has prepared this summary report for the 2022 Willow Creek Pass Village Road and ROW Maintenance Program. This report outlines the proposed scope of work developed by NWCC, Wilderness Earthworks (WE) and members of the WCPVA in May and June 2022; the actual work completed at the project on a day by day basis in June 2022; actual costs incurred to complete the work; and recommendations for future roadway and ROW improvements for the next several years.

Proposed Scope of Work: Brian Len, P.E. of NWCC, Kris Lodwick of WE and Steve Warnke of WCPVA met at the site on April 11, 2022 to drive and observe the conditions along the subject roadways and to discuss and create a proposed scope of work and cost estimate for the 2022 Program to be completed in June 2022. Based on our site visit, discussions regarding the work completed during previous programs, the following scope of work and estimated budget for completing the work were prepared:

1) WE will mobilize to the site during the first part of June 2022
2) ROW Maintenance/Tree Removal: WE estimated that it would take 2 to 4 days to complete the ditch cleaning and tree removal from the roadside ditches located within the ROW and that are creating surface drainage and snow removal problems; maintenance of cobble check dams along Olive Street; and to inspect a few other culverts to determine if they need to be just cleaned or replaced. Estimated fees are for cleaning and inspection of the culverts, but does not include a fee for replacing the culverts. The majority of the ditch cleaning and culvert inspections/cleaning will be conducted along Olive Street, Frisco Place Cul-de-Sac, Greenbird Place, Saturn Court and Myrtle Court. WE estimated the total fee for completing the above work would be approximately **$5,200**.
3) Stabilize Roadway Surfaces: In an effort to stabilize the roadway surfaces which continue to pothole, ravel, and washboard, WE will be continuing placement of the recycled asphalt product

(RAP) along Golden Tide Place and Neptune Place. At the intersection of Longfellow Way and Willow Gulch Drive, a test section using recycled/crushed concrete product (RCP) will be constructed to evaluate the effectiveness of this alternative versus the RAP placement. The new test section and extensions of the test sections constructed last year will be constructed by placing, wetting and compacting approximately 3 inches of RAP, which consists of a mix of rotomilled asphalt and ¾ inch base coarse or the placement of 3 inches of RCP which is basically crushed/recycled concrete, after these sections of roadway have been regraded (potholes filled and compacted). The RAP and RCP will be imported from the Duckels Construction pit located west of Steamboat Springs. WE had estimated the total fee for completing the above work would be approximately **$21,700,** with WE fee being approximately **$12,000,** including the trucking to and from the pit, and the cost of the RAP and RCP purchased from Duckels would be approximately **$9,700.**

4) Blade Shape and Compact Roadways: This scope of work includes the reshaping, wetting and recompaction of all of the roadways prior to magnesium chloride placement. WE estimated their total fee for completing the above work would be approximately **$14,000.**

5) New ABC Placement: WE will add new/imported ABC to sections of the roadways that are lacking in sufficient ABC cover and pit run materials are exposed. The portions of the roadways requiring additional ABC would be determined after the roadways are shaped and rolled this spring and before work is initiated the first part of June. Based on our observations, it appeared that the majority of the ABC will be required in the areas that were disturbed by the installation of the Illuminate fiber optic cables last year. WE has estimated the total fee for completing the above work would be approximately **$25,000,** with WE fee being approximately **$14,000** including trucking, and the cost of the ABC materials imported from Elam being approximately **$11,000.**

6) Magnesium Chloride Application: After all of the ROW maintenance is completed, additional ABC materials are placed and the existing roadways are reshaped and compacted, EnviroTech of Glenwood Springs, CO will place approximately 30,000 gallons of magnesium chloride (Roadsaver) along the roadway surfaces. WE was to provide the water truck, pump, and smooth drum compactor with operator required during this process. WE estimated their fee for completing the above work would be approximately **$41,000,** with WE fee being approximately **$11,000** and the cost of the Roadsaver placed by EnviroTech being approximately **$30,000.**

Actual Work Completed: The work for this project was started on June 7, 2022 and was completed on June 17, 2022. Channing Reynolds-Senior Field Engineer with NWCC was on-site to provide the construction quality assurance/project management services. Mr. Reynolds was able to observe and document the actual work completed, as well as obtain the delivery tickets for the RAP, ABC and Magnesium Chloride being imported and used at the site. A summary of the work completed on each date is provided below:

June 7, 2022: WE started to mobilize to the project site on this date. NWCC were advised the actual ditch cleaning work would proceed on the following day.

June 8, 2022: Mr. Reynolds drove the roadways with Kris Lodwick and WE staff to observe and document the proposed scope of work for this year. In addition , Mr. Reynolds inspected the 60" CMP under Beaver Canyon. Based on Mr. Reynolds observations, it appears that the pipe failure was increasing on the upstream end of the pipe. The equipment on-site consisted of one wheeled skid loader and one mini excavator.

Mr. Reynolds also noted that several improvements to the surface drainage conditions along the private properties, including ditches and culverts under the private driveways, along Saturn Court should be improved to reduce the associated surface runoff problems during the heavy spring runoff events. More specifically, the culvert under the driveway at 57715 Saturn Court is too deep and the culvert continues to be blocked, which then causes runoff from the ditch to run across Saturn Court causing erosion issues. This culvert should be raised at least 12 inches. Surface runoff from the lot located at 577785 Saturn Court is flowing onto Saturn Court. Improving the drainage conditions by regrading the ditches and possibly replacing the culvert under the driveway should be completed. The surface runoff flowing down the driveway at 57795 Saturn Court flows directly onto Saturn Court and wash outs along the cul-de-sac surface. Regrading of the driveway or the construction of a swale along the lower end of the driveway should be constructed to divert the water flowing down the driveway into the Saturn Court ditch adjacent to the driveway.

June 9, 2022: The equipment on-site consisted of four tandem axle dump trucks, one wheeled skid loader, one mini excavator, one motor grader/blade, one water truck, one roller/compactor and one front end loader.

Ditch cleaning was started on this date and the excavator and skid loader were to be used to start cleaning the ditches along Jupiter Place and Willow Gulch Drive, and then load the spoils into the dump trucks.

Thirteen (13) loads of RAP were delivered to the site from the Duckels Pit and the RAP was placed on Miners Dream Drive and Neptune Place. It should be noted that the RCP was not available at the pits in Steamboat Springs; therefore, additional RAP will used to stabilize the roadways.

June 10, 2022: The equipment on-site consisted of two tandem axle dump trucks, one wheeled skid loader, one mini excavator, one front end loader, one motor grader/blade, one water truck and one roller/compactor.

WE continued the ditch cleaning along Jupiter Place and Willow Gulch Drive.

Seven (7) loads of RAP were delivered to the site from the Duckels Pit and placed along Neptune Place and the Longfellow Way/Willow Gulch Drive intersection, as well as the extension of the Beaver Canyon Drive stabilized section.

We began to blade, shape water and compact along Golden Tide Place and other roadways along the east side of CR 129.

June 13, 2022: The equipment on-site consisted of one tandem axle dump truck, wheeled skid loader, motor grader/blade, water truck, roller/compactor and one mini excavator. A D3 dozer was mobilized to the site on this date but not used.

Twelve (12) loads of ABC (152.5 Tons) were delivered to the site from the Elam Bunn Pit and placed along Upper Beaver Canyon Drive and Neptune Place and a portion of Pueblo Drive. Motor grader was grading the previously placed ABC along the roadways on the west side of CR 129. Water truck was wetting ABC as it was being graded.

Ditch work was completed along Longfellow Way from Willow Gulch Drive, as well as along Neptune Place and Upper Beaver Canyon Drive. Front end loader being used to load spoils into dump truck that was dumping spoils at northeast corner of Golden Tide Place and CR 129.

June 14, 2022: The equipment on-site consisted of two tandem axle dump trucks, wheeled skid loader, full size wheeled loader, motor grader, mini excavator, D3 dozer, water truck and smooth drum roller/compactor.

Thirteen (13) loads of ABC (179.1 Tons) were delivered to the site from the Elam Bunn Pit and placed along Olive Street, Myrtle Court and Frisco Place. Motor grader was grading the placed ABC along the roadways on the west side of CR 129. Water truck was wetting ABC as it was being graded and then compacted with the smooth drum roller.

One load of RCP was delivered to the site from the Precision Pit in Milner and then placed and compacted within the soft spots situated in Upper Neptune Place with the D3 dozer.

Culvert cleaning and inspections were completed along Frisco Place and Olive Street. The existing culvert along Frisco Place was located and cleaned. Based on our observations, it appears the culvert is flat to adversely draining to the northwest and only drains during heavy runoff events. The roadway ditch along the northwest side of Frisco Place near the culvert is also nearly flat, causing the seasonal standing water in this area. The culvert under the driveway at 55810 is damaged and needs to be replaced.

Ditch cleaning was also be conducted Upper Olive Street.

Motor grader was grading of the placed ABC along all of the roadways, as well as grading/reshaping the existing base course materials along Upper Olive Street. Water truck was wetting ABC as it was being graded and then compacted with the smooth drum roller. All of the roadways were ready for application of the magnesium chloride.

June 15, 2022: The equipment on-site consisted of wheeled skid loader, motor grader, water truck, mini excavator, and smooth drum roller/compactor.

Twelve (12) loads of ABC (168.4 Tons) were delivered to the site from the Elam Bunn Pit and placed along Olive Street, Myrtle Court and Frisco Place. Motor grader was grading the placed ABC along the

roadways on the west side of CR 129. Water truck was wetting ABC as it was being graded and then compacted with the smooth drum roller.

Ditch cleaning and repair of the cobble check dams was completed along Olive Street.

WE completed the final fine grading, wetting and compacting all of the roadways in preparation of the placement of Magnesium Chloride, which is to begin on June 16th. All of the roadways appeared ready for application of the magnesium chloride.

June 16, 2022: The equipment on site for WE included one water truck and one roller/compactor.

On this date, EnviroTech started the placement of the magnesium chloride (Roadsaver) across the majority of the roadways, with the exception of Lower Beaver Canyon Drive, Olive Street, Frisco Place and Myrtle Court. The magnesium chloride was applied at a rate of 0.25 gallons/square yard. Approximately 12,864 gallons of Roadsaver was placed on this date.

WE watered the roadways, prior to placing the Roadsaver, using the water truck and then compacted them with smooth drum roller.

It should be noted that the magnesium chloride application over the RAP test sections did not appear to be working to stabilize the previously placed RAP.

June 17, 2022: The equipment on site for WE included one water truck and one roller/compactor.

On this date, EnviroTech completed the placement of the magnesium chloride (Roadsaver) across the subdivision roadways that did not receive any Roadsaver on June 16, 2022. A second pass of magnesium chloride was applied to portions of all of the main subdivision roadways bringing the rate of application to 0.50 gallons/square yard for these portions of the roadways. Approximately 17,512 gallons of Roadsaver was placed on this date.

WE watered the roadways, prior to placing the Roadsaver, using the water truck and then compacted them with smooth drum roller.

Cost Breakdown: The contractor's actual costs associated with completing this project, as well as the estimates provided by Wilderness Earthworks have been broken down for each of the line items discussed above.

Mobilization

	Actual Costs	Estimated Costs
Wilderness	$2,000.00	$2,000.00

ROW Maintenance/Tree Removal

	Actual Costs	Estimated Costs
Wilderness	$8,197.50	$5,200.00

Stabilize Roadway Surfaces

	Actual Costs	Estimated Costs
Wilderness	$2,897.92	$12,000.00
Wilderness Trucking	$3,881.25	
Wilderness RAP (Duckels)	$9,015.90	$9,700.00
	$16,018.17	$21,700.00

Blade, Shape and Compact Roadways

	Actual Costs	Estimated Costs
Wilderness	$9,207.50	$14,000.00

New ABC Placement

	Actual Costs	Estimated Costs
Wilderness	$4,470.00	$14,000.00
Wilderness-Trucking	$2,760.00	
Elam - ABC	$8,625.53	$11,000.00
	$15,855.53	$25,000.00

Magnesium Chloride Placement

	Actual Costs	Estimated Costs
Wilderness	$8,622.50	$11,000.00
EnviroTech	$29,033.27	$30,000.00
	$37,655.77	$41,000.00

The total invoices for each of the contractors and NWCC are shown below.

Wilderness	$51,275.67		
Elam/Kilgore	$8,625.53		
EnviroTech	$29,033.27		
NWCC	$11,592.00		
Actual Total Fees	$100,526.47	Total Estimated Fees	$120,900.00

Future Roadway Improvements: Based on our observations made this past summer along the subject roadways and drainage features, we have prepared a list of recommended improvements to be completed within the roadways in the next 1 to 3 years. The recommended improvements are summarized below:

2023 Maintenance Program

1) Some minor ditch cleaning was completed along Diana Place this year; however, the cul-de-sac at the north end of Diana Place needs to be realigned and constructed with a gravel pavement section consisting of a minimum of 4 inches of CDOT Class 6 aggregate base course overlying a minimum of 8 inches of CDOT Class 2 ABC. BTK Surveys recently staked the 60 foot radius of the cul-de-sac, as platted. Based on our recent observations, it appears that greater than 5 feet of cut will be required at the north end of the staked cul-de-sac if the existing center of cul-de-sac grade is maintained or raised slightly to accommodate the new gravel pavement section. Based on the amount of cut required to construct the cul-de-sac, NWCC strongly recommends BTK Survey develop a site grading plan so that quantities for the cuts and fills can be determined and an accurate estimate can be provided by the excavation contractor(s). Prior to developing the site grading plan, the client should determine what elevation they want the finished pavement/gravel surface to be at within the new cul-de-sac alignment. The actual quantities of the cuts and fills will be based on the elevation provided by the client. If the elevation is not substantially raised, it appears the majority of the materials removed from the excavation will need to be hauled off site. NWCC strongly recommends the client contact representatives of any current or future construction projects, within the subdivision, to see if they would need these materials for fill on their sites. Reducing the haul off of these materials should reduce the cost of the overall project. Based on previous preliminary cost estimates provided by WE, NWCC estimates the cost for constructing the cul-de-sac to the correct dimensions and with a suitable pavement section will be on the order of $40,000 to $50,000; however, the quantity of the materials to be hauled off site could significantly change the estimate provided above.

2) The 60-inch corrugated metal pipe (CMP) situated beneath Lower Beaver Canyon Drive and west of CR 129 is failing and will need to be replaced or properly sleeved/lined. The base of the CMP has rusted and rotted out from the south end of the pipe to a point approximately 30 feet north into the pipe, which appears to be approximately 80 +/- feet in length. Approximately 1 to 2 feet of the bearing soils at the base of the pipe have scoured/eroded, as a result of the failure at the base of the pipe and the water flows in the pipe.

   NWCC strongly recommends that the CMP pipe be replaced or sleeved/lined in 2023. It should be noted that imminent failure of the pipe and the roadway embankment over the pipe will most likely occur very rapidly once the CMP totally fails. It appears the remaining section of pipe and soils overlying the pipe are currently bridging the roadway; however, increased erosion below the pipe may result in a total pipe collapse, which will cause the overlying embankment materials to fail. Based on the structural condition of the pipe, NWCC recommends the existing CMP be replaced with a new HDPE culvert pipe. This alternative will most likely require the roadway be closed for a period of time since an open cut will be required to place the new pipe. Based on our

review of previous estimates provide by WE, NWCC estimates the cost for replacing the 60-inch CMP pipe with a new 60-inch pipe will be on the order of $45,000 to $55,000. Another feasible alternative to replacing the existing pipe would be to place a new 48 or 54-inch HDPE pipe inside the existing pipe and then grout the anulus between the pipes and between the new pipe and underlying bearing soils. Based on our recent discussions with WE, NWCC estimates the cost for sleeving/lining the existing pipe will range from $25,000 to $30,000. It should be noted that costs for the piping materials has increased dramatically over the last two years and will most likely continue.

3) NWCC strongly recommends that the sections of roadways in which the RAP test sections were constructed (Lower Beaver Canyon Drive, Neptune Place, Miners Dream Drive and Longfellow/Willow Gulch) be monitored over the next 6 to 10 months to determine if the placement of the RAP in these areas is performing adequately and the amount of potholing and wash boarding has been reduced. If this method of stabilization/reconstruction appears to be working, then NWCC recommends that the placement of the RAP materials be continued along the roadways. We still recommend that RCP be placed in lieu of the RAP, if it is available next year. It should be noted that very little RCP was available this year and the RCP that was delivered to the site was used to try and stabilize the seasonal problems with the roadway surface at the end of Neptune Place.

4) NWCC believes that continuing settlement of the Illuminate trenches within the roadways will may still occur. NWCC recommends that these areas be evaluated next spring after the snow has melted. In addition, several of the Illuminate boxes and wooden shoring have been installed directly in the existing drainage ditches. The drainage conditions should be evaluated next spring during the snowmelt to determine if these boxes and shoring are having adverse impacts on the existing drainages and determine if they may need to be moved or stabilized differently.

5) NWCC recommends continuing the practice of reshaping and compacting the roadways with a smooth drum roller after they are regraded in the spring and summer.

6) NWCC recommends that the WCPVA continue with a maintenance program similar to the one that was completed this year. NWCC recommends that new/additional Class 6 ABC, RAP or RCP (if available) be added to the roadways, as necessary and that the roadways get regraded, compacted and have magnesium chloride applied every year.

Future Maintenance Programs

1) The existing asphalt aprons at the intersections with CR 129 at Lower Beaver Canyon Drive, Neptune Place and Miners Dream Drive are fair to poor condition and will most likely have to be replaced within the next 2 to 3 years. Based on our conversations the Routt County Road and Bridge Department, it appears that CR 129 will most likely be chip sealed at these approaches within the next 5 years and the County does not intend on overlaying CR 129 for 10 to 15 years. NWCC recommends that these aprons be reconstructed with reinforced concrete or a full depth asphalt section.

2) The adverse surface drainage conditions within the cul-de-sacs located at the western ends of Neptune Place and Saturn Court continue to deteriorate and are most likely causing the pumping and deflection in the roadway areas. Cleaning or regrading of the ditches is very difficult based on the number of existing driveways and buried utility lines within these areas. Therefore, NWCC believes that it may be more feasible to increase/raise the grade at the center of the cul-de-sacs so that surface drainage from the adjacent properties is directed around the cul-de-sacs rather than across them. NWCC recommends that the raising of the cul-de-sacs occur within the next 1 to 3 years. NWCC also recommends that the drainage condition improvements noted above (June 8, 2022) for the driveways along Saturn Court be completed by the homeowners or their contractors.

If you have any questions concerning this report, or if we may be of further service, please contact this office.

Sincerely,
NWCC, INC.

COLORADO LICENSED
BRIAN D. LEN
25750
PROFESSIONAL ENGINEER

Brian D. Len, P.E.
Principal Engineer