

MEMORANDUM

TO: Board of Trustees

FROM: Indra Winquest
District General Manager

SUBJECT: General Manager's Status Report

DATE: October 13, 2021

This Status Report provides information on the following items which are attached:

- Utilities Performance/Asset Management Review – The consultant (Raftelis) provided the District with the Final Report (attached). The project is complete and Staff will be looking to implement recommendations as appropriate within the upcoming FY 22/23 budget development process.
- Mountain Golf Cart Path Project – A informational memorandum prepared by Director of Public Works Brad Underwood is attached which recaps the actions to date on this project. This is provided to address questions/concerns by members of the community and Board of Trustees.

INCLINE VILLAGE

**GENERAL IMPROVEMENT
DISTRICT**

**Utilities Management Review and
Asset Assessment**

Report / August 2021



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August 11, 2021

Mr. Brad Underwood
Director of Public Works
Incline Village General Improvement District
893 Southwood Blvd.
Incline Village, NV 89451

Re: IVGID Utilities Management Review and Asset Assessment

Dear Mr. Underwood:

We are excited to provide the attached Utilities Management Review and Asset Assessment to the Incline Village General Utilities District (IVGID). This report includes additional revisions in response to comments from three members of the IVGID Board of Trustees and is inclusive of previous revisions to the draft report based on staff input and additional data provided.

Providing utility services is a core activity of IVGID. The services help preserve the health, environment, and prosperity of the community. They are critically important. Providing these services efficiently and effectively ensures that customers get high value. It is commendable that you have commissioned this review to build upon an already strong foundation of services. We believe that it will help IVGID to have continued success in addressing the community's needs going forward.

The review evaluates IVGID's utility activities and identifies opportunities to enhance efficiency and effectiveness. It summarizes our analysis of staffing resources, organizational structures, technology, asset management, financial policies and procedures, and related areas to develop recommendations.

The District is fortunate to be staffed with people who care deeply about the community and are passionate about the environment and meeting customer expectations. There is a great deal of good work being done by District staff and the recommendations in this report are intended to build on and enhance these efforts.

We are confident that the recommendations in this report will provide a useful framework to address your current and future needs. Thank you for the opportunity to work with the IVGID.

Sincerely,



Seth Garrison
Project Manager

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Executive Summary

The Incline Village General Improvement District (IVGID or “District”) commissioned the Utilities Management Review and Asset Assessment to evaluate the management and operation of the District’s utilities functions and to identify opportunities to enhance efficiency and effectiveness. The recommendations in this assessment document build upon the District’s already high levels of service to customers, such as the excellent record of regulatory compliance, responsiveness to pipeline failures, and advanced asset management practices as compared to general industry practices. It also considers the District’s unique operating environment.

The assessment encompasses a review of utility activities, staffing and the structure of the organization, the condition of assets, and management, including the financial management of operations activities and capital investments. Raftelis leveraged both national and peer data to make benchmarking comparisons, as well as our experience working with over 1,200 utilities of all sizes across the country. Our comparisons include those made to other destination communities that feature outdoor recreation venues and that have seasonal population changes.

The District’s utilities operation provides a high level of service to customers and are generally efficient, particularly for a smaller utility. Smaller utilities often operate in a reactive-only mode with chronic underinvestment in staffing and physical assets. These are not characteristics of IVGID utilities. Asset management and maintenance, in particular, are strengths of the District. These functions are more advanced at IVGID than at many other comparable utilities, even many medium- and large-sized utilities. They are reflected in the condition of assets, the use of a Computerized Maintenance Management System (CMMS) to track maintenance activities, and a proactive replacement plan for many common assets. Another area of considerable strength is water quality. IVGID is one of less than about 50 public community drinking water utilities nationwide (out of more than 16,000) that has a water source of such high quality that it does not need to filter the water. While the bulk of the credit for the quality of the water source goes to mother nature and restrictive watershed policies, IVGID has a significant role monitoring water quality, implementing environmental programs, and educating people about protecting the resource. This waiver to filtration is very rare and highly valuable, allowing the District to avoid millions in capital cost and hundreds of thousands of dollars per year in operating costs that would be required to operate a filtration facility. In addition to the ability to avoid filtration, environmental quality is the major reason people live and pursue recreation in the area. Preservation of these resources should be a major consideration for IVGID. Staff appear to share this perspective. Based upon our interactions, staff in the utilities and Public Works Department as a whole are knowledgeable, professional, and passionate about providing high quality services and preserving the environment.

There has been a major transition in leadership at IVGID over the last few years with several new senior positions and new board members. New leadership is bringing new ideas and expertise, and in some cases, they have questioned past practices. While the appropriateness of some past practices, such as predominantly funding utility capital investments without issuing debt can be debated, uncertainty about future practices limits the efficiency and effectiveness of the organization. Uncertainty about capital investment makes it extremely difficult, for example, to budget and efficiently manage rate adjustments. Consistent and stable policies that are supported by the board and senior management are highly important to creating a successful utility.

The assessment includes 18 recommendations to improve utilities operations and efficiency, as shown in Table 1 below. Recommendations are numbered based upon order of discussion in this report. To assist with implementation, however, we have categorized these recommendations as high, medium, and low levels of priority for utility operations.

Table 1: List of Report Recommendations

Priority	Recommendation Number	Recommendation
High Priority		
	6	Build capacity in the Administration function.
	13	Establish sub-fund accounts in the chart of accounts for each utility within the Utility Fund.
	14	Review expenditures in the employee benefits, legal/audit/professional fees, and central services line items.
	15	Undertake a rate study for the water and wastewater utilities.
	16	Review and revise the District's fund balance policy.
	18	Review and revise the District's funding policy for capital projects
Medium Priority		
	2	Build public trust by creating a strategic communications plan.
	3	Build public knowledge about the value of IVGID's utilities operations.
	4	Reconsider the membership and role of the District's Audit Committee.
	5	Reduce the Utility Superintendent's direct reports.
	7	Cross-train other District staff to assist the Inspection Unit during summer months.
	9	Invest in a LIMS/WIMS system.
	11	Provide direction to staff regarding the leadership role of IVGID in the region with regard to environmental resources and conservation.
	17	Revise and update the District's policies and practices related to capitalization of assets.
Low Priority		
	1	Finalize a new strategic plan for the District as a whole including specific elements (and metrics) for recreation services and utilities.
	8	Invest in mobile technology (i.e., tablets) for field crews.
	10	Conduct succession planning for planned and unplanned departures.
	12	Explore options for the household hazardous waste site.

As indicated in the recommendations, by investing in public outreach and communications, revising and clarifying several financial policies, addressing organization structure and staff retention concerns, and increasing technology to enhance efficiency, the District will ensure its utilities operations continue to provide high value to residents for years to come.

Introduction

Background

IVGID has provided a variety of utility and recreational services to the residents of unincorporated Incline Village on the north shore of Lake Tahoe since its creation in 1961 and, later, to the community of Crystal Bay. Scenic Lake Tahoe and the surrounding mountains and forests make the region a destination for outdoor recreation and nature enthusiasts. The area has historically experienced seasonal population changes, with greater populations during peak tourism seasons in winter and summer. In recent years, the area has grown to include more year-round residents with greater service expectations and a heightened interest in ensuring transparent and efficient local government.

There has been a significant amount of senior staff turnover, including the key management positions of General Manager, Director of Public Works, Director of Engineering, and Director of Finance, as well as several new members on the Board of Trustees in the past five years. The leadership transition has understandably raised questions regarding previous practices. Changing expectations and more year-round residents has also generated more interest in IVGID activities and additional questions about previous practices. In parallel, IVGID is undertaking one of the largest capital projects in its history, the effluent pipeline project currently estimated at \$30 million. The District is subject to more scrutiny than at any time in its recent history, with evolving demands on services, financial reporting mechanisms, funding methods, and communications.

IVGID has responded by bringing in outside experts to look at various aspects of financial and management activities, past and present. They have also charged the District's Audit Committee, previously a subcommittee of the Board but now including public members, with detailed reviews of the Financial Reports. District management and staff are responding to questions about historical practices and working to build public trust and communication pathways. The goal is to be a transparent and high functioning organization. As a part of the desire for transparency and to ensure operations are well-run, the District hired Raftelis to review its water, wastewater, and solid waste utilities and to assess its asset management practices.

Methodology

Raftelis conducted a kick-off meeting on January 19, 2021, with the District's Engineering Manager (the project manager for this engagement) and the Contracts Administrator. The purpose of the meeting was to discuss the scope of the project, the District's objectives, and to finalize the project schedule. Raftelis then submitted a data request to collect background information and data on various organizational structures, operations, and staffing elements.

Documentation reviewed included:

- Organizational charts
- Staff position titles, salary ranges, and job descriptions
- Staffing levels by work unit
- Budgets
- Annual Financial Reports
- Performance/workload reports
- Prior financial studies by Moss Adams
- Board policies

After an initial review of the information provided, Raftelis conducted interviews with District senior staff from each division, including the General Manager, Utility Superintendent, Administrative Manager, Resource

Conservationist, Engineering Manager, Director of Finance, and Fleet Superintendent. In addition, Raftelis interviewed every member of the Board of Trustees. Follow up meetings and emails occurred with staff to clarify our understanding of the information provided, ask additional questions, and to discuss organizational structure and staffing options. Raftelis made additional data requests to support our observations and recommendations. In addition, Raftelis had the opportunity to visit major facilities, including the main office building, water and wastewater treatment facilities, and several, but not all, pumping and storage facilities.

A portion of the review included comparing quantitative and qualitative organizational and staffing information against benchmarking data from other utilities. We assessed organizational aspects against American Water Works Association’s (AWWA) benchmarks and the Effective Utility Management (EUM) framework. The EUM framework is a set of organizational, operations, and management guidelines for water and wastewater utilities universally endorsed by the major industry associations, including the Water Environment Foundation (WEF) and AWWA, as well as the US Environmental Protection Agency (EPA). A key reference was EUM’s Ten Attributes of Effectively Managed Water Sector Utilities (see Figure 1), as presented in “The Effective Utility Management Primer.”^[1] The Primer focuses on how to help utilities achieve outstanding performance by providing a framework for making practical and systemic changes to improve performance. Attributes describe desired outcomes and provide a set of reference points, guiding utilities to balance focus on all operational areas rather than one at a time. Raftelis intrinsically uses the EUM attributes as a framework and an important reference when performing utility assessments.

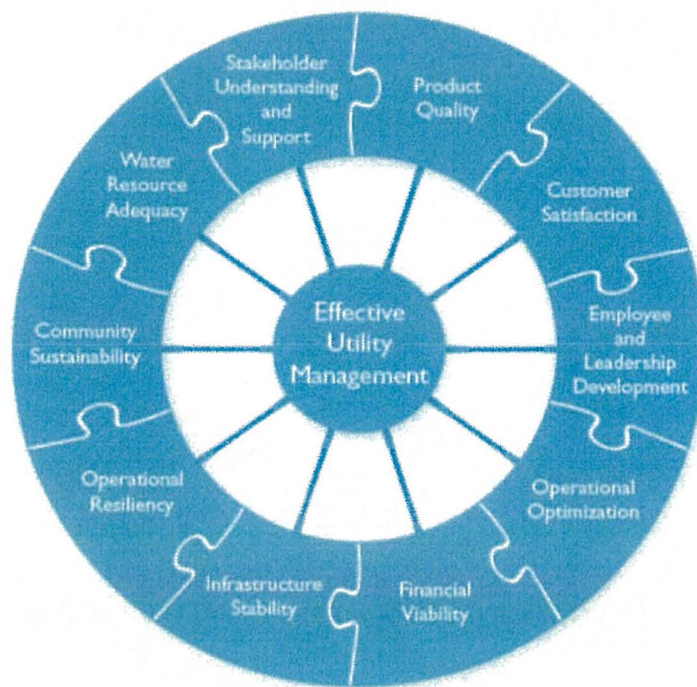


Figure 1: EUM’s Ten Attributes of Effectively Managed Water Sector Utilities

Raftelis selected benchmark organizations based on a variety of factors, including but not limited to size, geography, services provided, regulatory environment, labor environment, and climate. For this study, Raftelis identified seven peer utilities for comparison:

- North Tahoe Public Utility District (CA)
- South Tahoe Public Utility District (CA)
- Tahoe City Public Utility District (CA)

^[1] AMWA, APWA, AWWA, NACWA, NAWC, WEF and the US Environmental Protection Agency, June 2008

- Douglas County Water and Sewer Utilities (NV)
- Carson City Water and Sewer (NV)
- Mt. Crested Butte Water and Sanitation District (CO)
- Town of Eagle (CO)

Raftelis selected utilities based on their geographic proximity, services provided, and, to a lesser extent, similarity in size to IVGID. Members of the Tahoe Water Suppliers Association (TWSA) were suggested as peers because of their proximity to IVGID and their common use of Lake Tahoe as a water source, but the majority are too small and provide services too dissimilar to IVGID to be considered. Douglas County and Carson City were included due to their proximity even though Carson City is substantially larger than IVGID and Douglas County operates several separate water and sewer systems across their county. Raftelis considered several other “destination communities” in the western United States. Mt. Crested Butte Water and Sanitation District (MCBWS) is roughly one-fourth the size of IVGID but serves as a comparable ski resort community with characteristics similar to IVGID, namely seasonal populations and large snowfalls. The Town of Eagle, Colorado was also selected for its size and its outdoor sports-focused community. The town hosts the airport that serves Vail and Beaver Creek, two prominent ski resort communities. Table 2 lists the peer utilities and their summary statistics.

Table 2: Profiles of Peer Utilities

Utility	Services Provided	Total FTEs	Approximate Accounts	Water Volume (MGD)	Wastewater Volume (MGD)
Incline Village	Water, Wastewater	35.4	4,300	2.55	0.85
North Tahoe	Water, Wastewater Conveyance	22.47	3,900	1.07	1.08
South Tahoe	Water, Wastewater	104	14,100	4.84	3.15
Tahoe City	Water, Wastewater Conveyance	19.45	5,700	1.03	0.81
Douglas County	Water, Wastewater	22	3,500	1.5	0.3
Carson City	Water, Wastewater	52.4	17,800	8.38	4.93
Mt. Crested Butte (CO)	Water, Wastewater	15	830	0.33	0.27
Town of Eagle (CO)	Water, Wastewater	21.5	2,500	0.95	0.53

When comparing these utilities, benchmark comparisons are made in three categories: staffing, expenses, and utility rates. It is common during benchmarking exercises to compare data from industry surveys, such as the AWWA’s biennial *Utility Benchmarking* survey. However, the economies of scale in utility operations are very strong and the median respondent to the benchmarking survey is much larger than IVGID. Any comparison of IVGID to AWWA benchmark data must be caveated by noting that the AWWA response data is expected to indicate that IVGID would appear relatively inefficient, because of the economies of scale achieved by larger utilities. In many ways, peer comparisons are more relevant; although, all comparisons need to consider contextual and operating differences. The results of benchmarking comparisons must be viewed holistically with other data sources. They cannot be used in isolation.

Since its creation in 1961, the IVGID has provided a variety of municipal and recreational services to the residents of unincorporated Incline Village and Crystal Bay on the north shore of Lake Tahoe. Typically small communities that host greater populations during peak tourism seasons, the communities in recent years have grown to include more year-round residents with greater service demands and a heightened interest in ensuring transparent and efficient local government.

In the past five years, a group of vocal residents has raised questions regarding District management, oversight, and funding. In response, several new members were elected to the Board of Trustees. The District's Audit Committee, previously a subcommittee of the Board, was also expanded to include public members and has undertaken a detailed review of the Financial Reports. In addition, the District has experienced significant management turnover, including the key management positions of General Manager, Director of Public Works, and Director of Finance.

District management and staff is responding to questions about past practices and working to build public trust while undertaking one of the largest capital projects in its history, the estimated \$30 million effluent pipeline project. The District has been subject to more scrutiny than at any time in its recent history. There is new scrutiny on financial reporting mechanisms, funding methods, operations, and communications.

Utilities Operations

The IVGID Department of Public Works, through several divisions, is responsible for utilities operations including treatment and delivery of safe drinking water; the collection, treatment, and conveyance of wastewater; and, through a contract operator, solid waste services. There are five divisions within the Department of Public Works: Utilities, Administration, Waste Not, Engineering, and Fleet. Utilities operations activities occur within four of the five Public Works' areas, with the lone exception being Fleet, which supports all District operations functions. In general, when this report refers to "Utilities" it is referring to those functions funded through the use of the District's Utility Fund, rather than the specific branch marked "Utilities" on the Department of Public Works organizational chart. More specifically, the use of "Utilities" refers to those activities in support of the water, wastewater, and solid waste functions.

At the outset of the discussion of utilities operations, it is important to be clear as to the general findings of this review. The quality of utility operations at IVGID is to be commended. In particular, the manner in which the utility maintains and manages its assets is notable. For example, during Raftelis' on-site visit, the biosolids handling facility was inspected. Biosolids handling is very hard on equipment, and the facility appeared in new condition. We were surprised to learn that the facility had been upgraded eight to ten years earlier. This speaks to the level of maintenance and asset management. Other assets were in a similar state of repair. While there are certainly areas where greater efficiency can be achieved, Raftelis did not observe any significant wasteful uses of resources, obvious misallocations of staff, or other major issues. Visible assets were also in generally good shape; however, some have reached the end of their useful lives as is expected and should be replaced or rehabilitated. The effluent pipeline is an example. We would hold IVGID's utilities out as an example of how small utilities should be operated and maintained.

There are several recommendations in this report, but they are intended as incremental improvements rather than as corrective actions to address a major issue. They are focused more on the management of the utility rather than the activities by staff. These recommendations are intended to improve the utility's resilience, balance workloads, and best prepare the utilities for continued long-term success.

CORE SERVICES MATRIX

Because the Utilities Division operates in collaboration with other Public Works divisions and the entire District, the following table provides an overview of core services in the entire Public Works Department. It is not meant to be all-inclusive. Each division noted below operates under the supervision of the Director of Public Works.

Table 3: Department of Public Works Core Services

Division	Program Area	Activities
Utilities	Pipelines	<ul style="list-style-type: none"> • Operation, maintenance, and renewal/replacement of water distribution and sewer collection pipelines
	Treatment Plant	<ul style="list-style-type: none"> • Operations and maintenance of water and wastewater treatment plants
	Asset Management	<ul style="list-style-type: none"> • Inventorying and tracking of infrastructure assets and maintenance activities
	Maintenance/Electricians	<ul style="list-style-type: none"> • Providing maintenance and electrician services
	Laboratory	<ul style="list-style-type: none"> • Testing, documenting, and reporting on water and wastewater quality
	Snow Removal	<ul style="list-style-type: none"> • Snow removal from District facilities
Administration	Customer Service/Billing	<ul style="list-style-type: none"> • Preparing customer bills and researching questions to provide service to customers
	Meter Reading	<ul style="list-style-type: none"> • Reading customer meters to track accurate usage
Waste Not	Solid Waste/Recycling	<ul style="list-style-type: none"> • Management of the Waste Management contract for solid waste and recycling, and provision of household hazardous waste services
	Resource Conservation	<ul style="list-style-type: none"> • Educational outreach on environmental and sustainability topics
	Regional Leadership	<ul style="list-style-type: none"> • Executive Director of the Tahoe Regional Water Association
	Watershed and Resource Protection Efforts	<ul style="list-style-type: none"> • Working with other regulatory and community organizations to protect the environment and water resources
Engineering	Design	<ul style="list-style-type: none"> • Engineering new facilities and assets, and capital project management
	Inspection	<ul style="list-style-type: none"> • Inspection of new construction and backflow devices to ensure compliance with District standards • Administer District's Fats, Oils, and Grease (FOG) program
	Project Management	<ul style="list-style-type: none"> • Management of construction and other contract work done on behalf of the District
	Contracts	<ul style="list-style-type: none"> • Preparation, execution, and tracking of Public Works contracts
Fleet	Maintenance	<ul style="list-style-type: none"> • Maintenance to District vehicles and equipment

UTILITY ORGANIZATION STRUCTURE AND STAFFING

The District's utilities operation is a division of the Public Works Department, as shown in the figure below. The Public Works Director reports to the General Manager, who serves as the Chief Executive Officer under the Board of Trustees.

The Utilities Division (including the Utilities Superintendent and those staff that report through to the Utilities Superintendent) has 24.0 permanent Full Time Equivalent (FTE) employees as of early 2021. This does not include Public Works staff in other divisions such as Customer Service and Engineering that do work for the utilities; when these employees are added in, there are 35.4 total employees involved in utility operations. An organizational chart showing the organization of the Public Works Department is provided in Figure 2. The Utilities Superintendent, who reports to the Director of Public Works, oversees the utility operations for both water and wastewater. Treatment and Pipeline staff are dual-certified, meaning they work on both the water and wastewater utility systems. By having dual-certified staff, the District has greater staffing flexibility as a larger number of staff are available to ensure coverage on either system. While some members of the public often mistakenly consider utility staff to be unskilled workers, they are, in fact, technically trained professionals responsible for drinking water and wastewater operations and are entrusted with public health duties.

Utilities staff collaborate often with other Public Works Divisions including Administration, which provides meter reading and utility billing; Engineering, which provides design and project management assistance; Waste Not, which works on resource conservation, solid waste, and environmental programs; and the Fleet for acquisition and maintenance of vehicles and equipment.

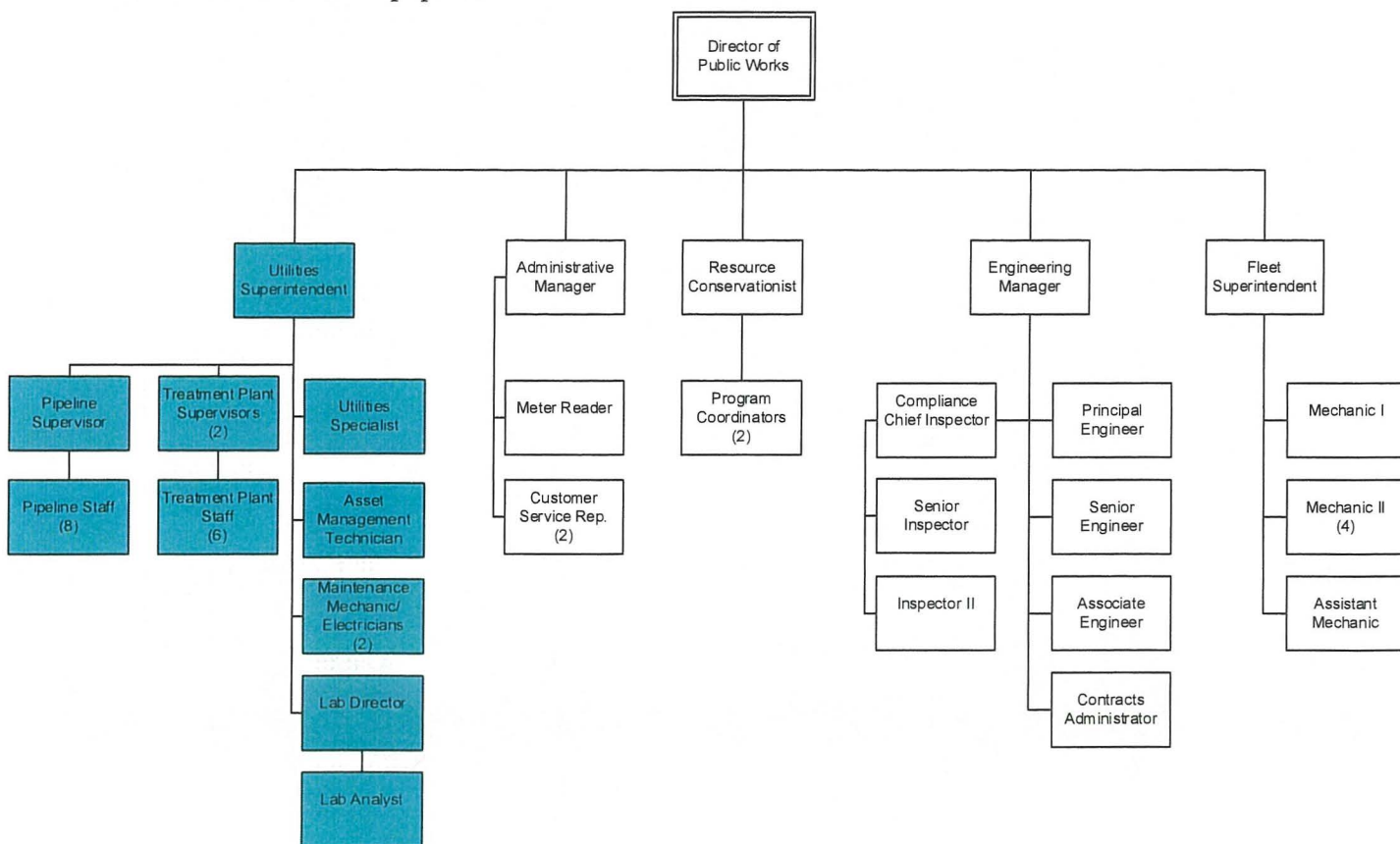


Figure 2: Public Works Department Organization Chart

UTILITY FUND BUDGET

The Utility Fund budget as filed with the State of Nevada for Years 2017-2021 is shown on the table below. The column to the far right shows the percentage of change over those five years. Operating revenues as a whole have increased by 7.2% while operating expenses have increased by 12.6% over the five-year period. That compares with an 8.95% rate of inflation over the same period using the Consumer Price Index. The largest cost drivers are Legal/Audit/Professional Fees, which have increased over 55%; employee benefits, which have increased 28.3%; and central services costs, which have increased over 21%. A review of FY 2020 actuals shows that \$144,930 (65%) of the \$221,815 spent on Legal/Audit/Professional fees was for legal costs. New costs of almost \$200,000 per year for insurance were also added in FY 2020.

Table 4: Utility Fund Budget by Category, 2017 – 2021

Category	FY 2017 Actual	FY 2018 Actual	FY 2019 Actual	FY 2020 Actual	FY 2021 Estimated	Percent Change FY 2017-21
OPERATING REVENUE						
Charges for Service	11,423,577	11,597,653	12,552,028	12,396,987	12,492,674	9.4%
Intergovernmental (TWSA) & Grants	127,535	150,356	123,301	0	31,000	-75.7%
Interfund	262,057	177,548	111,853	167,499	144,759	-44.8%
TOTAL	11,813,169	11,925,557	12,787,182	12,564,466	12,668,433	7.2%
OPERATING EXPENDITURES						
Salaries & Wages	2,480,611	2,505,990	2,632,951	2,869,747	2,771,404	11.7%
Employee Benefits	1,077,836	1,116,230	1,288,413	1,281,735	1,383,082	28.3%
Services & Supplies	1,922,802	2,179,628	2,003,301	2,115,024	1,728,141	-10.1%
Utilities	806,413	842,777	862,768	894,515	783,806	-2.8%
Legal/Audit/ Professional Fees	74,746	102,886	78,295	221,815	115,941	55.1%
Central Services Cost	324,400	297,000	308,600	353,700	392,709	21.1%
Defensible Space	97,045	95,229	100,000	97,876	100,000	3.0%
Insurance	0	0	0	185,410	197,331	100.0%
Depreciation/Amortization	2,945,922	2,973,631	3,153,809	3,367,361	3,485,000	18.3%
TOTAL	9,729,775	10,113,371	10,428,137	11,387,183	10,957,414	12.6%
NONOPERATING REVENUES						
Interest Earned	60,132	77,280	282,484	298,225	114,540	90.5%
Capital Grants	425,509	199,934	0	0	0	0.0%
Sale of Capital Assets	17,730	50,020	15,066	-19,184	6,070	-65.8%
TOTAL	503,371	327,234	297,550	279,041	120,610	-76.0%
NONOPERATING EXPENSES						
Interest Expense	154,186	140,463	126,351	111,838	96,914	-37.1%
Transfers In/(Out)	0	120,000	120,000	45,000	0	0.0%
CHANGE IN NET POSITION	\$2,432,579	\$2,188,957	\$2,650,244	\$1,389,486	\$1,734,715	-28.7%

Benchmarking

The District has allocated 35.4 FTEs to the utilities. Figure 3 presents the number of accounts served per FTE for the District and the peer utilities. Based on the District’s allocated FTEs, the District serves 121 accounts per FTE, which places it in the general range of most of the peers. Tahoe City (294 accounts per FTE) and Carson City (340 accounts per FTE) are notable exceptions, likely because they are larger organizations and don’t provide service in the same ways as IVGID. Moreover, neither North Tahoe nor Tahoe City provide wastewater treatment services, which negates a major labor requirement of other utilities like IVGID that do provide treatment.

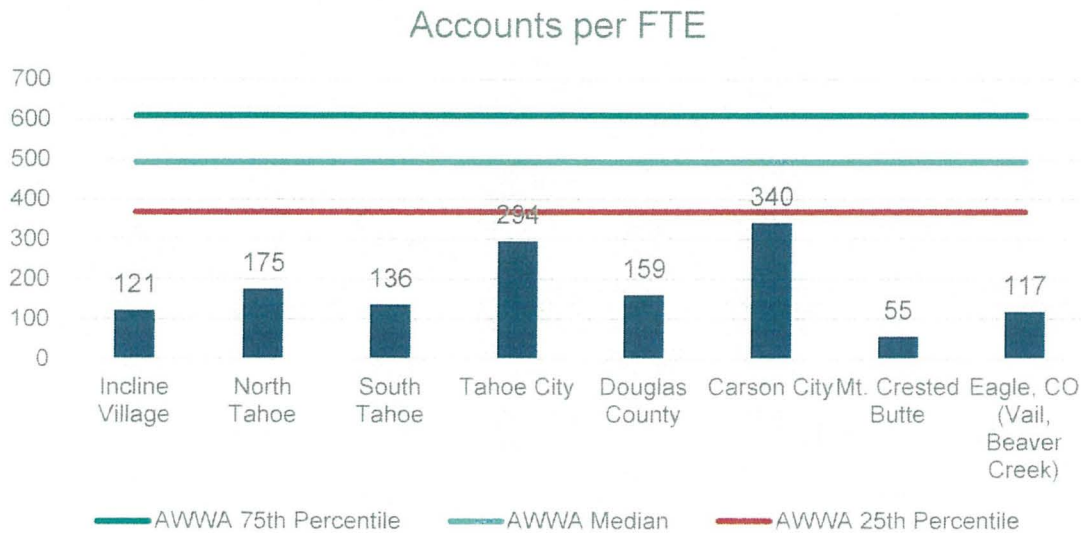


Figure 3: Accounts per FTE

Tahoe City allocates 19.45 FTEs to its utilities but excludes the eight FTEs in its Engineering and IT departments. It is likely that Engineering and IT spend a large portion of their time assisting the utilities. Tahoe City accounts for this through an overhead rate or an inter-fund transfer. Neither Tahoe City nor North Tahoe provide wastewater treatment service. Economies of scale also influence observed staffing rates. Thus, Tahoe City’s accounts per FTE rate may appear better than IVGID, but that conclusion cannot be drawn from the data, because of the factors just discussed. Carson City has the largest number of accounts among the peer utilities and the fact that it has the highest number of accounts per FTE is likely due to its economies of scale. The median, 25th percentile, and 75th percentile responses from AWWA’s benchmarking survey data are included in Figure 3. The number of accounts served per FTE in the AWWA data is much higher than observed in the peer utilities, though the median respondent to the AWWA benchmarking survey is much larger than any of the peer utilities.

A second metric used to measure staffing levels is million gallons per day (MGD) of water or wastewater produced/treated per FTE. Figure 4 shows that the District has the second-highest production of water per FTE among the peers, second only to the much larger Carson City. As in Figure 3, all of the peer utilities have production rates lower than the AWWA metrics. Note that the relative rankings between the peer utilities can change when efficiency is measured on an account or a production basis. The average water used per account, the mix of customers a utility serves, and even how leaky a water distribution system is can influence these relative rankings. The District serves 259 multi-family accounts, which are composed of 4,095 users. It is unknown to what extent peer utilities serve multi-family accounts, but it is for reasons such as this that benchmark metrics are also conducted on a production (i.e., per MGD) basis.

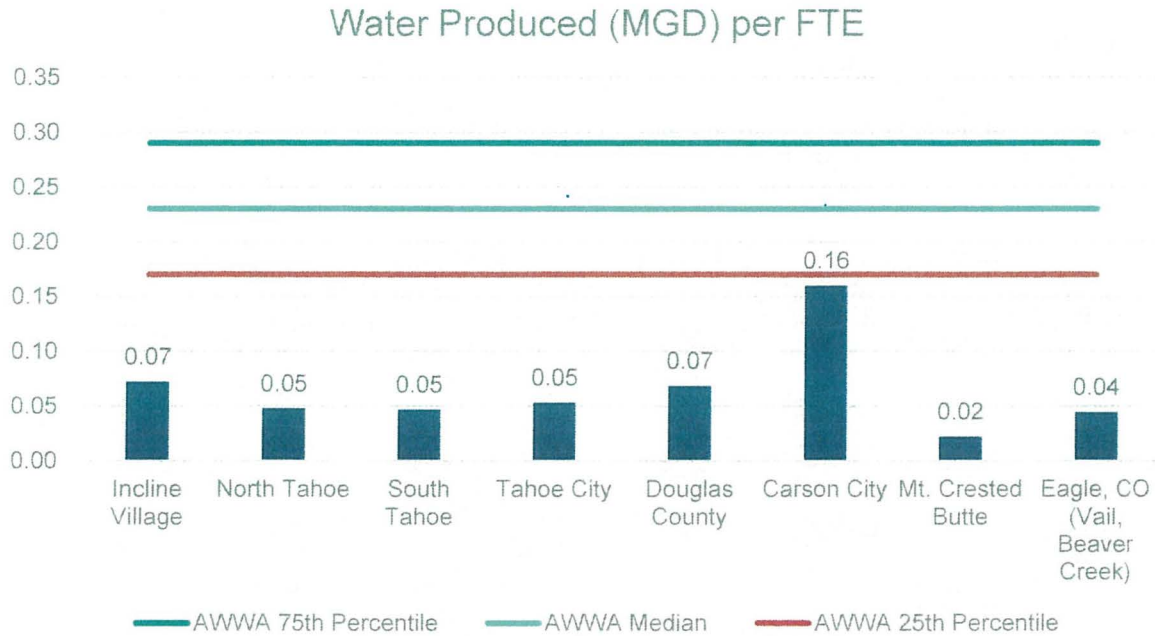


Figure 4: Water Produced (MGD) per FTE

Figure 5 presents the average volume of wastewater (MGD) collected per FTE. The District's 0.02 MGD per FTE is representative of the peer utilities. Carson City (the largest peer) again has the highest rate of production. Neither Tahoe City, which has the third-highest rate of production, nor North Tahoe operate a wastewater treatment plant, which inflates their productivity numbers.

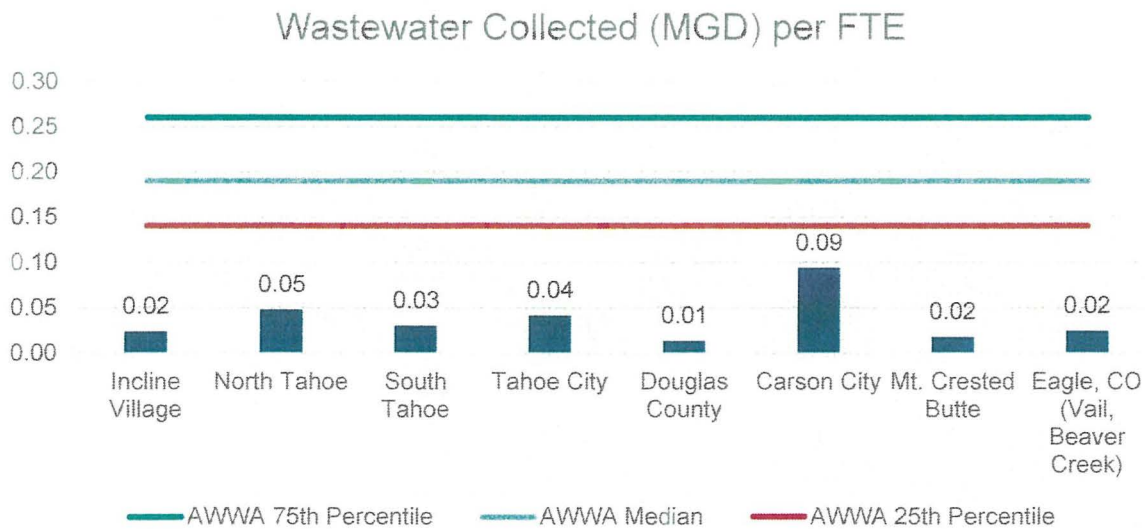


Figure 5: Wastewater Collected (MGD) per FTE

The District's staffing levels are influenced by the high levels of service it chooses to provide. One of the District's most valuable assets is its filtration exemption from the Surface Water Treatment Rule. The District's operations are

clearly influenced by this awareness, not just by working hard to ensure the high quality of water produced by its water plant but also by ensuring the proper functioning of its sewer system and helping protect the environmental quality of the region. The District operates in such a way that it can respond to any issue in its system within 30 minutes of detection. The District also conducts a robust Preventative Maintenance (PM) program, particularly in respect to its sewer line cleaning and inspection program. Given the service expectations of the District, it would be expected that the District would be more heavily staffed than most other utilities with lower performance expectations.

OPERATIONAL EFFICIENCY

Every utility would like to be more “efficient.” However, a utility’s efficiency (as measured by its costs) is largely determined by its operating environment and the levels of service it provides. Figure 6 below shows the annual operations and maintenance (O&M) costs per account of the peer utilities. IVGID is shown to be on the higher end of the range of peer utilities.

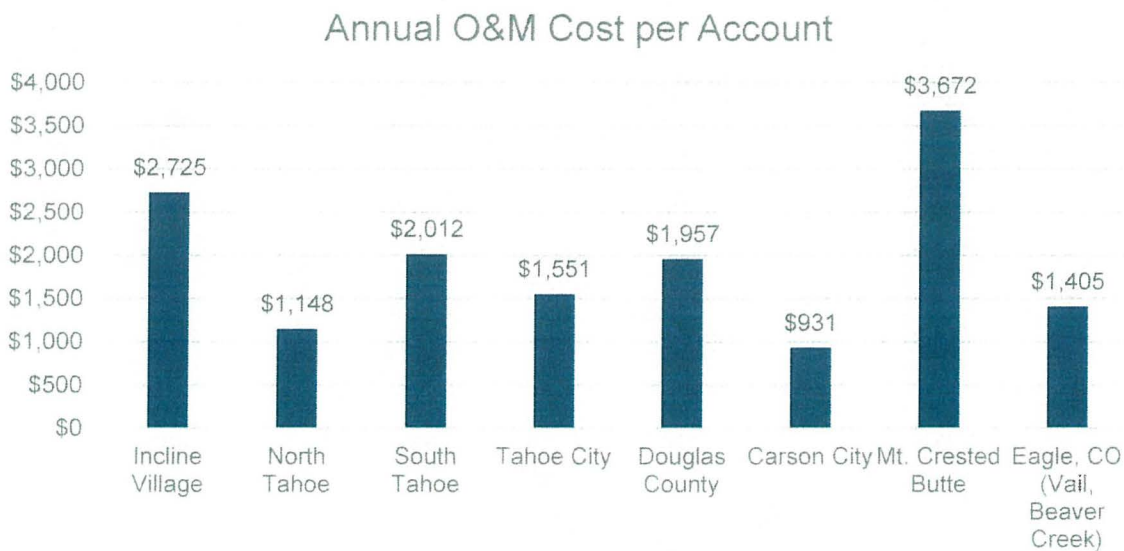


Figure 6: Annual O&M Cost per Account

Some may examine Figure 6 and feel that the results are indicative of inefficiency at the District, but when put into context, the results are to be expected. Reasons for this include:

- The District operates in a high-cost environment.** Cost of living indices are the best proxy for the relative prices that IVGID experiences. For instance, the Sterling cost of living model sets the average cost of living index value for the U.S. at 100. The index value for Reno is 116.2, or 16.2% greater than the U.S. average. The index value for Incline Village is 182.3, or 56.9% greater than the cost of living in Reno, and over 80% higher than the U.S. average. As a further comparison, Carson City is similar to Reno, with an overall index of 109.8. Incline Village is thus 66.0% higher than Carson City. Incline Village’s utilities index is also 9.8% less than Carson City’s. Ironically, the index for utilities in Incline Village is 86.1, nearly 14% less than the U.S. average and 10% less than Reno, meaning utility services are relatively affordable in comparison to other metrics in Incline Village.
- A limited number of contractors work in the area.** Larger metropolitan areas would have more qualified contractors available to bid for projects, helping to keep costs low. The contractors that do operate in the area operate in the same higher cost environment as the District.

- **The District owns and operates a very long wastewater effluent pipeline.** Nearly every other wastewater treatment plant in the world allows their treated effluent to simply gravity feed out of their plant to a nearby water source. The District, however, must pump their effluent up several thousand feet and deliver it via pipeline nearly 30 miles away.
- **The District provides water to the ski resort for snowmaking purposes and to other customers at high elevations.** One of the District's largest water customers is the Diamond Peak Ski Resort, which requires pumping water hundreds of feet up to serve them. Other customers are located at high elevations, which require additional pumping equipment and costs.
- **A small number of large water users skew the O&M cost per account upward.** Roughly 30% of the District's water usage is due to commercial customers, and a large portion of the commercial usage is consumed by just a few users, including the ski resort and golf courses. These usage profiles skew the cost per account metric upward.
- **The District provides high levels of service.** The District serves a customer base that is accustomed to a high service level. Moreover, the District operates in a manner that minimizes unforeseen events such as sewer overflows to protect the environmental health of Lake Tahoe, and thus protect the surface water filtration exemption the District operates under. Doing so requires the ability to quickly respond to reported events, an aggressive preventative maintenance schedule, and a sophisticated asset management program. Objective items that characterize the high levels of service provided by IVGID include: an excellent regulatory compliance record, responsiveness to pipeline failures, provision of enhanced services such as backflow device testing and AMR meter reading, and additional investments in asset management.

Another common benchmarking metric to evaluate operating costs is on a production basis, or annual O&M cost per million gallons (MG) of water produced. The industry benchmark compares water O&M costs per MG of water produced. However, as the District does not separate all water and wastewater operating costs (though many costs are separated), the metric used here is combined O&M costs (i.e., both water and wastewater) per MG of water produced, shown in Figure 7.

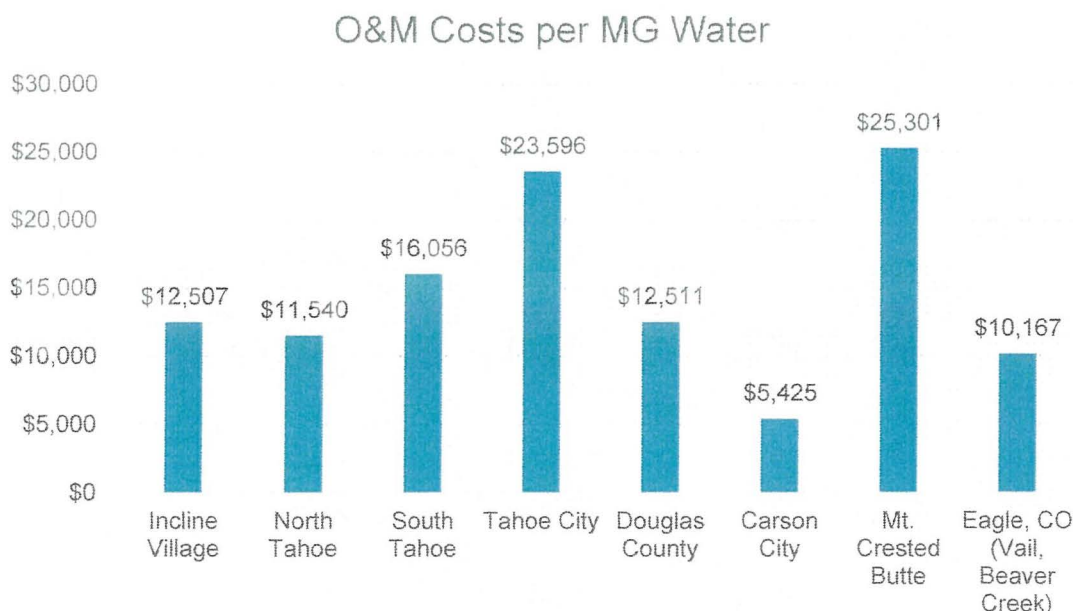


Figure 7: O&M Costs per MG Water

From a production standpoint, the District’s operating costs are in line with its peers, with only Carson City being significantly lower, and several peers being significantly higher. Moreover, the District is able to achieve this while providing high levels of service.

CAPITAL AND ASSETS

Measuring the capital investment of a utility can be done in two ways, through either annual debt service per account or through total capital spending per account. Benchmarking the debt service provides insight into a utility’s past capital decisions. Depending on the timing and the debt term, a utility’s debt service can be influenced by capital financing decisions up to 30 years ago. Total capital spending per account uses the most recent year available to compare capital spending between utilities, but with the caveat that capital spending is far more variable than O&M spending. Comparisons can be skewed by where utilities are in their capital replacement cycle. Figure 8 shows capital spending per account for the peer utilities. IVGID (at \$1,068 per account) is shown to be comparable to the peers which range from \$634 per account to \$2,161 per account. Mt. Crested Butte is a notable exception, spending over \$10,800 per account by conducting a major treatment plant refurbishment project.

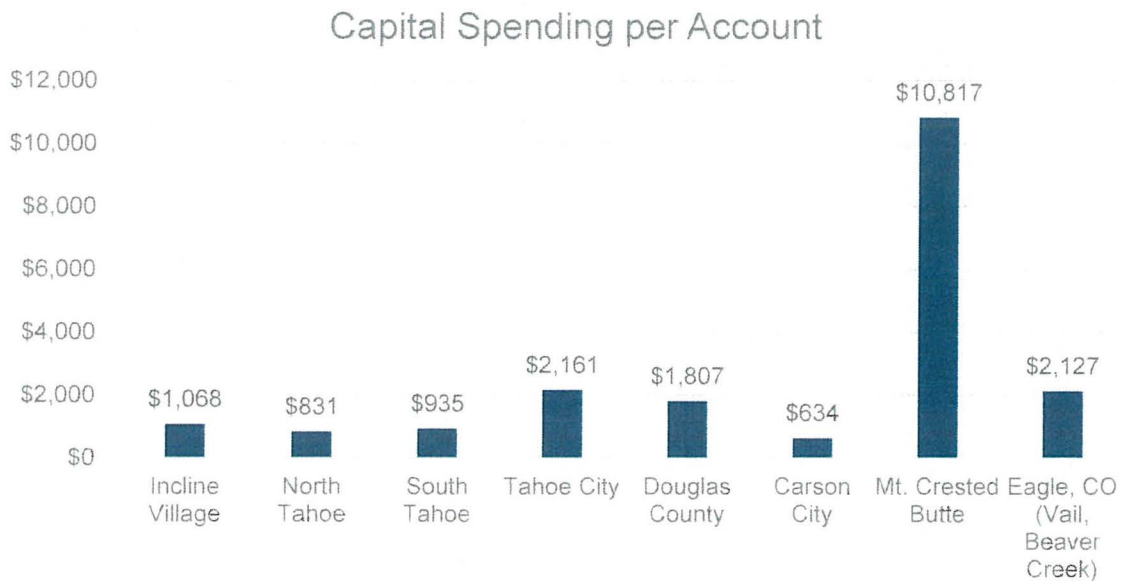


Figure 8: Capital Spending per Account

Raftelis conducted site visits in March 2021 to review the District’s facilities in-person. When reviewing a utility’s facilities, the team looks at a variety of factors, including:

- Age of assets
- Asset condition
- Operability
- Appropriateness of engineering design
- Safety

On the whole, the utility assets were observed to be well-maintained. Assets were observed to be in proper, operable order. Some assets had been upgraded/retrofitted as one would expect. It was clear that assets were being properly maintained, and Raftelis did not observe the sort of red flags that are typically seen at utilities that are dealing with challenges. One example of the District’s assets was its biosolids handling area at the wastewater treatment plant. Biosolids handling can be a harsh environment, which is usually evident on the equipment and facility. Upon

entering, the biosolids equipment appeared new, as if the District had just completed an upgrade. When asked, staff reported that the upgrade had occurred 8-10 years earlier.

The condition of the utility's assets is clearly a team effort, requiring the efforts and coordination of the entire operations staff, but one of the things that sets the District apart is the role of the Utilities Specialist. This is a position that typically does not exist at a small utility, where reactive-only maintenance occurs. It is another hallmark of the high level of service being provided to customers. The primary duty of the Utilities Specialist might be best described as "minor capital project delivery." Most of these minor capital projects could be considered major preventative maintenance. The execution of 60-80 of these projects each year is a large reason as to why the District's assets are in such good condition despite their age.

UTILITY RATES

Within this report, benchmark comparisons of operating costs, capital costs, and debt service costs are presented. Utility rates are a combination of those three major annual costs and usually represent a "smoothing" of those year-to-year costs (i.e., rates are usually not raised and lowered year to year to account for higher or lower capital programs, but rather reserves are allowed to fluctuate). Water, wastewater, and combined water and wastewater rates will be presented for residential customers at three representative levels of usage: no usage, 3,740 gallons (i.e., 500 cubic feet or 5 ccf), and 7,480 gallons (i.e., 1,000 cubic feet, or 10 ccf). The volume amounts were selected to match the volumes contained in the AWWA's biennial rate survey, and represent a somewhat typical consumption range for a single-family dwelling across the U.S. Even though the District does not bill in increments of gallons or tens of gallons, utility bills will be calculated as if the District and the peer utilities do (i.e., a customer that uses 3,740 kgal at \$1.00/1,000 gallons is billed \$3.74).

Figure 9 shows the calculated residential water bills at 0 gallons, 3,740 gallons, and 7,480 gallons for IVGID, the peer utilities, and the national median water rates for all surveyed utilities selling less than 20 MGD of water. The AWWA median bills tend to be lower than those of the peers at all usage levels. The other notable difference is that the bill at 0 gallons, which represents the monthly service charge, is much lower for the AWWA median than the peers. Several implications are made by the relative size of the AWWA bills as compared to those of the peers. First, the typical respondent to the AWWA survey is still likely larger than most of the peers and is likely to enjoy improved economies of scale compared to most peers. Second, the relatively small monthly service charge for the AWWA median compared to the bills at 3,740 and 7,480 gallons indicates that the AWWA respondents are recovering a greater percentage of revenues from volume revenues as opposed to fixed revenues. The peer utilities appear to be more reliant upon fixed revenues. Utilities that serve resort communities commonly rely on fixed revenues more than variable revenues due to the more transient and seasonal nature of the customers they serve.

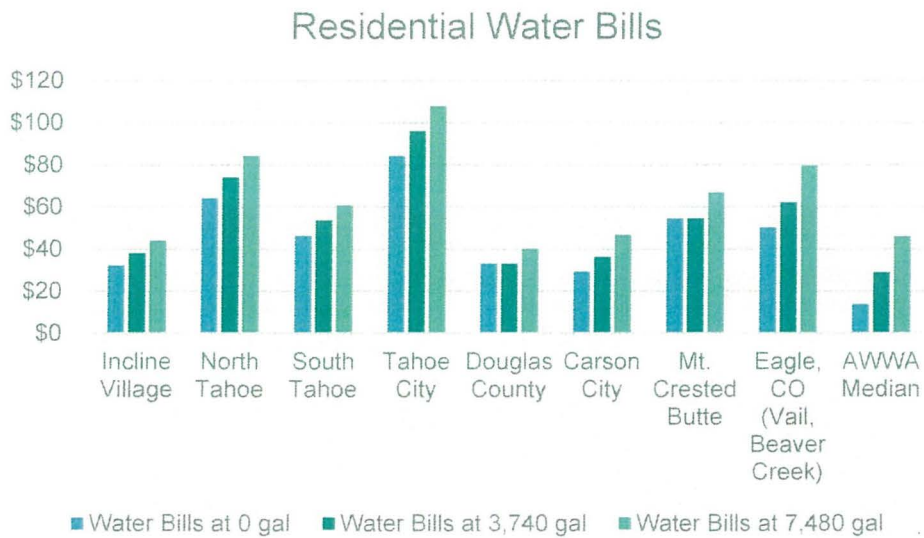


Figure 9: Residential Water Bills

Figure 10 shows the residential wastewater bills at the same usage levels of 0, 3,740, and 7,480 gallons. IVGID’s wastewater bills appear within the range of the peers. Notably, each of the other peers charges a flat fee for wastewater service with no volume charge, unlike IVGID which does charge a volume rate. Again, the AWWA survey data shows that the typical survey respondent is more reliant on volume revenue than the peers, which recover no volume revenue. It should be noted that Tahoe City’s and North Tahoe’s wastewater bills are for conveyance only. Tahoe City’s and North Tahoe’s wastewater customers are charged a second, separate bill for the cost of treatment by the treating agency which is not included in this graph.

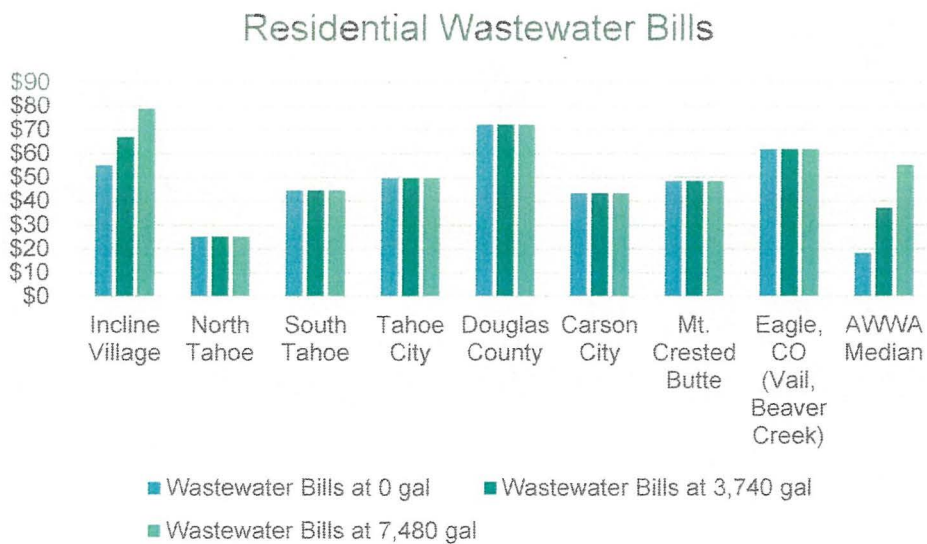


Figure 10: Residential Wastewater Bills

Figure 11 presents the combined water and wastewater bills for IVGID and the peer utilities at the three usage levels. When water and wastewater bills are combined, IVGID and the peer utilities have surprisingly similar bills. Carson City has the lowest combined bill, again perhaps taking advantage of their economies of scale compared to other peers. Perhaps the most notable difference between IVGID and the other peers is the relative steepness of the combined bills as usage increases from 0 to 7,480 gallons. IVGID's combined bills grow with increased usage faster than the peers, due in part to the fact that IVGID is the only utility among the peers that charges a volume rate for wastewater usage. The AWWA survey data continues to show median bills that are lower than the peer utilities yet grow at a faster rate as usage increases.

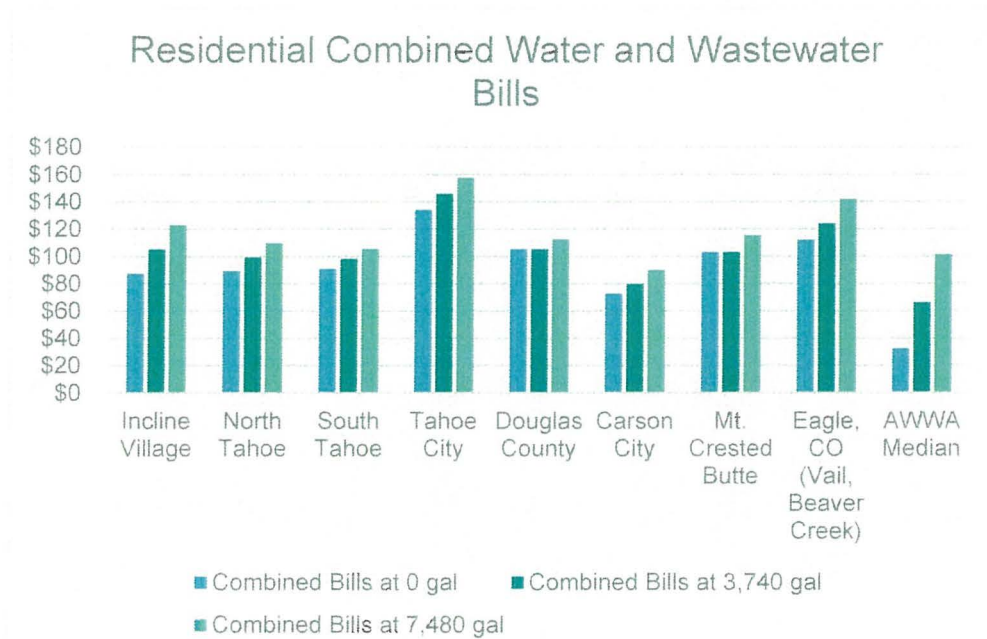


Figure 11: Combined Residential Bills

While current rates are in line with other jurisdictions, as shown above, the level of Change in Net Position (e.g., amount of revenues exceeding expenses) for the Utility Fund has dropped significantly over the past four years. For this reason, the District should undertake a comprehensive rate study as soon as possible. This is discussed further in Recommendation 14 below.

Analysis and Recommendations

The analysis and recommendations detailed below identify specific and actionable recommendations that can be implemented to strengthen service delivery under three topics areas: 1) District-Wide Recommendations, 2) Utility Operations, and 3) Utilities Financial Condition and Management.

District-Wide Recommendations

The District has dedicated professional staff who are committed and who pride themselves on providing high levels of service. This was evident based on data collected, inspection of assets, and our interviews and interactions with staff. Several staff expressed a true passion for serving the community and ensuring sustainability of its high-quality natural resources. Many long-time utilities staff understand the District's unique assets and operating environment in the Lake Tahoe Basin, which is unlike utility operations elsewhere due to geography and specific environmental requirements. Less than 50 utilities out of approximately 16,000 public community water systems nationwide have source water clean enough to be unfiltered.¹

In recent years, District staff has been the subject of increased scrutiny and even accusations by the public with regard to operating efficiency and financial practices. The public here, as in many places nationwide, demands a high level of accountability and transparency to ensure proper stewardship of its resources. Several senior managers have left the agency, resulting in a loss of historical knowledge, learning curves for new staff, and concerns about the future by other staff.

The newly redefined Audit Committee, along with the new Director of Finance, have done considerable work to strengthen financial practices. If the District is truly to move forward and increase public trust, however, it is important that Board members serve their primary purpose: to provide strategic direction for the organization. The Board and staff are on the same team and should be partners in the provision of excellent service to the community. Disagreement and discussion are normal and healthy elements of board interaction, but once policies and practices are enacted, there must be unified support for them. This will show that the District is truly "One District, One Team" as its logo states, as well as show accountability to the public.

While the scope of this review was focused on the Utilities Division of the Public Works Department, there were some District-wide issues which impact the operation of the IVGID utilities that merit comment. Raftelis would be remiss if it did not call to attention the District-wide issues that have a significant impact on the operation of the utilities.

Recommendation 1: Finalize a new strategic plan for the District as a whole including specific elements (and metrics) for recreation services and utilities.

The District's strategic plan expired in 2020 and the General Manager has an update that is ready to go before the Board soon. An updated strategic plan ensures everyone is "rowing in the same direction" and provides a framework upon which departments can build strategies and specific goals. Ideally, a strategic plan should be the result of a

¹ The U.S. Environmental Protection Agency reports that there are 54,064 Community Water Systems (CWS) serving 263.9 million people in the U.S. Of the 54,064 CWS, roughly 16,000 are public systems, and of the total number of CWS, 11,403 systems (serving 178.1 million people) rely on surface water as a source.

facilitated meeting to ensure consensus and agreement by the Board on the District's top goals and strategies to achieve them.

Staff should create a limited number of metrics for each strategy to show progress. These measures should then comprise the key reports being provided to the Board to show ongoing progress and achievement as related directly to the strategic plan. By ensuring a focus on key things that matter, the organization makes forward progress in the most efficient manner. The district utilizes NEXGEN asset management software to prepare work orders, manage asset inventories, prioritize maintenance, and generate many reports. Staff should ensure that the Board is not overwhelmed with non-essential information. It should receive metrics of most value: those most supportive in showing progress toward strategic goals and activities.

Effective management and oversight of utilities requires clear, consistent policy direction from the District's elected officials and a strategically focused workplan that is consistently followed. The direction of, and expectations for, the organization have changed, and staff must be given workplans and policies in order to meet these new expectations. Finally, there is considerable need to agree upon communications mechanisms and content that would build public trust and move the District forward.

Recommendation 2: Build public trust by creating a strategic communications plan.

It is important to build trust to ensure residents know the District is being governed and managed well, is financially compliant and transparent, and that staff is held accountable for results. By investing in a comprehensive communications plan, the District can acknowledge past issues and communicate the many steps being taken to move forward and continuously improve. It can also market to the community the value of District services and ensure transparency of available performance and financial information. Finally, it will assist in improving staff morale by recognizing their work and achievements. There is much good news with regard to the Utilities operations and this should be shared with the public.

Recommendation 3: Build public knowledge about the value of IVGID's utilities operations.

District staff provide a high value service with regard to the operation of its utilities. However, few outside of District staff are familiar with the operations and their complexity. It is important to educate by sharing this information with the Board, other staff, and the public through educational outreach, open houses, and tours. By sharing the extent of the utility operations and the District's role in environmental sustainability in the region, the District can build support for its role.

Recommendation 4: Reconsider the membership and role of the District's Audit Committee.

While the role of the Board and its committees are not expressly the subject of this review, how the District handles the finances and management of the utilities does have a direct bearing on their success. Therefore, Raftelis is providing our recommendations on membership and role of the District's Audit Committee.

The District adopted Board Policy 15.1.0 in May 2020 to redefine the role and structure of its Audit Committee. The Audit Committee is comprised of five voting members, two Board-appointed Trustees and three Board-appointed qualified At-Large (public) members. Per the Policy, the role of the District's Audit Committee is:

...to assist the Board of Trustees fulfill its responsibilities in accordance with Nevada Revised Statutes, District Policies, Practices, Ordinances, and Resolutions by providing oversight over the District's financial reports, the system of internal controls including the internal audit plans and report, and the independent external auditor's assessment of financial statements.

The Government Finance Officers Association (GFOA), the international resource for governmental accounting guidance, states the role of the Audit Committee to be as follows:

Three main groups are responsible for the quality of financial reporting: the governing body, financial management, and the independent auditors. Of these three, the governing body must be seen as first among equals because of its unique position as the ultimate monitor of the financial reporting process. An audit committee is a practical means for a governing body to provide much needed independent review and oversight of the government's financial reporting processes, internal controls, and independent auditors. An audit committee also provides a forum separate from management in which auditors and other interested parties can candidly discuss concerns. By effectively carrying out its functions and responsibilities, an audit committee helps to ensure that management properly develops and adheres to a sound system of internal controls, that procedures are in place to objectively assess management's practices, and that the independent auditors, through their own review, objectively assess the government's financial reporting practices.²

This role mirrors that expressed in the IVGID policy. However, the GFOA differs with IVGID on membership of the Audit Committee. In GFOA's publication, "Audit Committees: An Elected Official's Guide," GFOA states:

The members of an audit committee should *all* be members of the governing body for two principal reasons. First, one of the core responsibilities of the legislative branch of government is to oversee the executive branch (including its financial management). As a rule, a core responsibility *cannot* be delegated. Second, the credibility of the audit committee (and hence its effectiveness) inevitably will depend on both its *real* and *perceived* authority. The process of delegation inherently weakens both by opening a gap between the audit committee and actual decision makers.

While all members of the audit committee should be members of the governing body, it does *not* follow that any and all members of the governing body automatically should be eligible to serve on the audit committee. As mentioned previously, one of the key benefits of an audit committee is that it should provide a forum in which the independent auditors can candidly discuss audit-related matters with members of the governing body *apart from management*. This benefit would be lost, of course, were someone from management to serve as a member of the audit committee. Therefore, no member of the governing body who exercises financial management responsibilities should serve as a member of the audit committee.³

The intent of establishing an Audit Committee, as expressed by GFOA, is to serve as "a practical tool for ensuring that the governing body periodically considers internal control and financial reporting and deals with both in a timely and appropriate manner. The existence of an audit committee also ensures and facilitates regular, direct communication between the independent auditors and the governing body, which is essential to the effectiveness of the audit process."⁴ This guidance was raised to address past practices in which the annual external and "independent" auditor would be contracted by, and report solely to, the Manager or Director of Finance who could then allegedly influence contents of the audit prior to review by the governing body. The Audit Committee's role

² Best Practices: Audit Committees, Government Finance Officers Association, <https://www.gfoa.org/materials/audit-committees>

³ Audit Committees: An Elected Official's Guide, Stephen J. Gauthier, Government Finance Officers Association, Chicago, Illinois, 2006, page 19.

⁴ Audit Committees: An Elected Official's Guide, Stephen J. Gauthier, Government Finance Officers Association, Chicago, Illinois, 2006, page xii.

is to speak candidly as policymakers directly with the external auditor, in the absence of internal management influence, regarding the accuracy of the audit and staff's cooperation in its preparation.

While the IVGID Audit Committee policy states that, "It is the responsibility of the Committee to provide independent review and oversight of 1. Financial reporting, 2. Internal controls, and 3. The independent audit of financial statements," concurring with GFOA, the fact that public members are on the Committee and that meetings are held in a public forum runs counter to the intent of an Audit Committee to provide a chance for policymakers and the independent auditors to speak candidly.

Per GFOA's advice above, best practice is for Audit Committees to consist solely of members of the governing board, ideally two members which would not result in a quorum that invokes public meeting requirements. In this way, two members of the Board of Trustees, preferably those with some financial expertise, could speak openly and directly to the independent auditors regarding the audit process, management cooperation, and findings prior to audit issuance.

The IVGID Audit Committee as it currently operates is more akin to a Finance Committee than an Audit Committee. In a Finance Committee, a regular monthly public meeting is agendaized and held to review various financial matters affecting the enterprise. Often, Finance Committees are comprised solely of members of the public appointed by the Board who are assisted by a staff liaison, usually from the Finance Department. The role of a Finance Committee is to provide public input and feedback to the Board regarding financial issues.

The work being done by the Audit Committee in assisting the District with review of policies and ensuring accuracy in financial reporting has great value if executed properly. Policy 15.1.0. states, "The Audit Committee Charter shall be reviewed periodically with recommended changes submitted to the Board of Trustees for approval." We would concur and suggest the District revisit the membership and role of the Audit Committee.

Utility Recommendations

The following sections present our assessment of utility operations and efficiency, including organizational structure and staffing.

ORGANIZATION STRUCTURE AND STAFFING

How a utility chooses to staff itself is a function of the levels of service it provides and what activities it chooses to outsource. Comparing the staffing levels of a group of utilities is useful in identifying outliers but cannot account for various decisions that result in those staffing levels. For instance, a utility may choose to contract out sewer cleaning and inspection activities, while another utility may choose to perform those activities in-house. Other utilities may rely on outside engineering resources to a greater or lesser extent. The District's Water and Wastewater Utilities are contained within, and enmeshed throughout, the District's Department of Public Works. Numerous positions, namely within Engineering, serve both utility and non-utility functions.

Broadly speaking, the District appears to be able to recruit and retain sufficient staff, particularly as it relates to front line crews and operators. Such staff do not appear to have rapid turnover, and wages appear to be sufficient to attract candidates. Staffing in the District's utilities is lean given the activities undertaken; while a reduction in staffing is always possible, it would likely necessitate a reduction in programs and services as well as a long-term risk of increased infrastructure failures.

However, there are key specialized staff whose departure or retirement could pose an operational risk to the District and may present challenges in filling those roles given the needed expertise. Examples of such staff include the Utility Superintendent, Utilities Specialist, Asset Management Technician, Inspectors, Administrative Manager, and Lab Director. The need for succession planning is discussed below.

Utilities employ a variety of organizational structures across the industry based upon how they choose to organize their job functions. There is no single accepted or “proper” way to do so. Larger utilities frequently divide their organization into major functions of water treatment, wastewater treatment, water distribution, and wastewater collection. Smaller utilities such as the District often exhibit less specialization. Figure 12 presents the water and sewer utilities organizational chart.

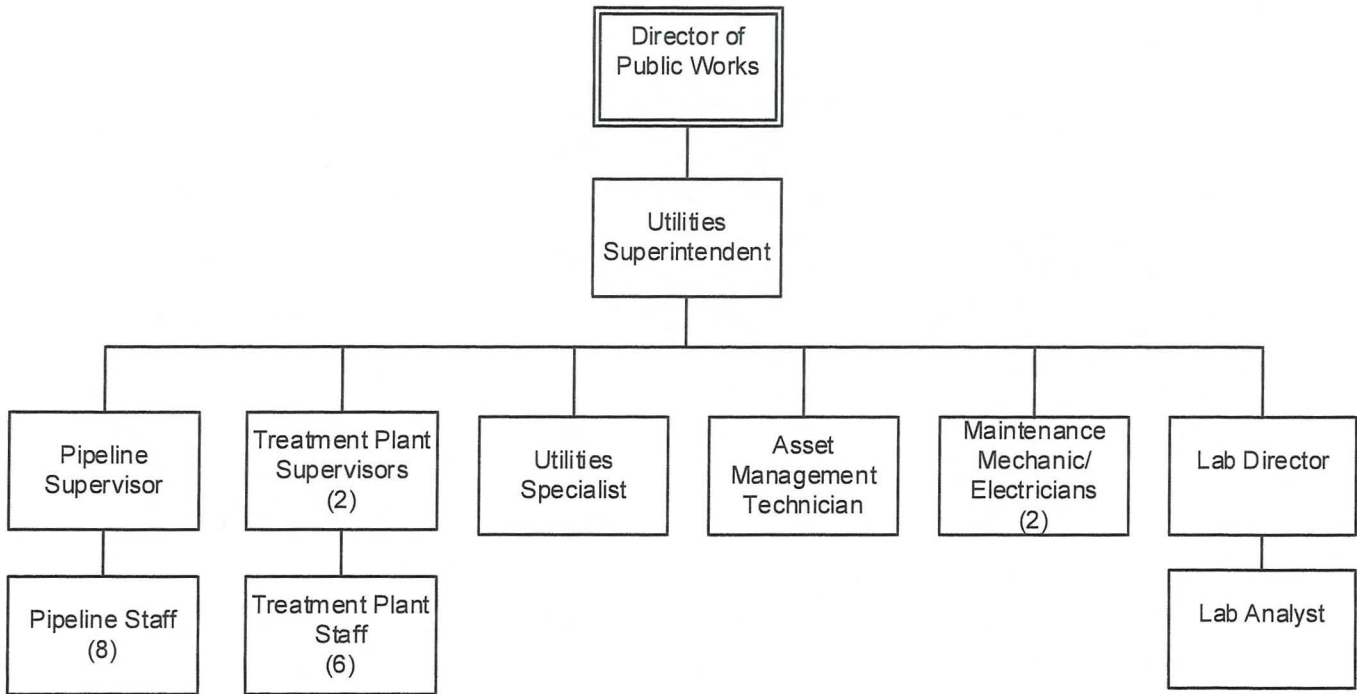


Figure 12: Water and Sewer Utilities Organizational Chart

The District’s major division of staff into either “Treatment” or “Pipeline” groups is not uncommon for a utility of its size. The Pipeline crews work on both water and sewer pipes, and the Treatment crews operate both the water and sewer treatment plants. The Pipeline group is led by a single Pipeline Supervisor, while the Treatment group is led by two Treatment Plant Supervisors.

The Treatment Plant Supervisors appear to operate in a co-leadership position. First, they are assistant supervisors that report directly to the Utility Superintendent. Second, one ostensibly leads the Monday to Thursday shift, while the other leads the Tuesday to Friday shift. They thus work in tandem three of the four days they are on duty. Third, one favors the water system while the other favors the wastewater system, but their authority and responsibility remain cooperative. It would be intuitive to designate one supervisor as the “water treatment” supervisor and the other the “wastewater treatment” supervisor. However, the labor and attention required by the wastewater plant is much greater than that required by the water treatment plant, so the utility lacks this logical division of labor between the two supervisors. Staff report that the current arrangement generally works, and that the supervisors have a sufficiently cooperative relationship. However, this arrangement, while flexible, can blur lines of authority and responsibility.

The organization chart has two electrician positions, which is unusual for a utility the size of IVGID. During the creation of this report, Raftelis learned that the District was converting one of the two electrician positions to a Supervisory Control and Data Acquisition (SCADA) specialist, which Raftelis supports.

Utility Superintendent

The Utility Superintendent, when including current vacant positions, has at least eight direct reports, which is larger than the usual three to five direct reports recommended for effective supervision. The Utility Superintendent was also one of the few individuals who appeared to be overburdened with job duties. Raftelis’ site visit coincided with the hiring of the new Director of Public Works. The Utility Superintendent and the Engineering Manager had been splitting the duties of the Director until that point, so it is likely that these added duties influenced Raftelis’ observation of the Superintendent’s workload.

Recommendation 5: Reduce the Utility Superintendent’s direct reports.

The ideal span of control is considered three to five direct reports. Based upon the District’s organizational chart, the least disruptive change is to move the electrician positions. A satisfactory location for the electricians may be to report to the Treatment Plant Supervisors, as seen in Figure 13. The advantage to this configuration is that the treatment plants likely require the bulk of the electricians’ work. The disadvantage to this configuration is that the pipeline staff might not find the electricians to be as responsive to their concerns.

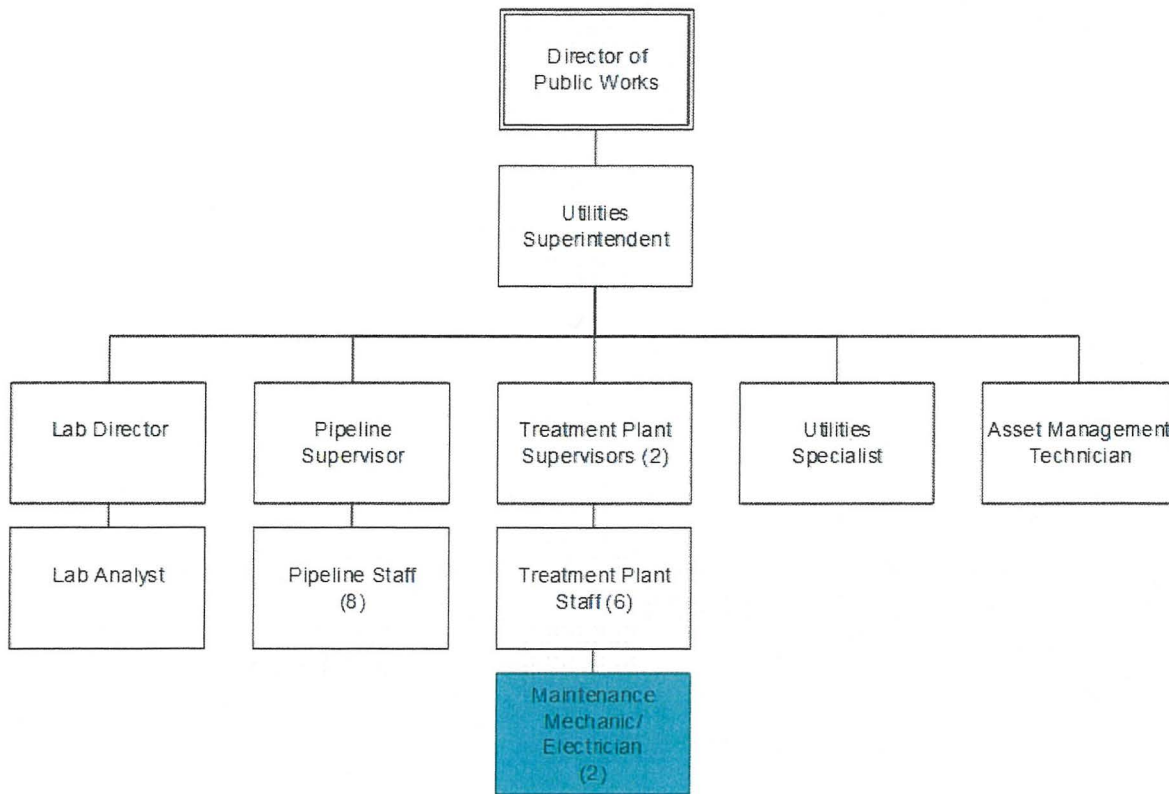


Figure 13: Option 1 to Reduce Utility Superintendent Reports

An alternative location for the electricians would be to have them report to the Utilities Specialist, as seen in Figure 14. Given the Utilities Specialist’s active communication and coordination with both the Pipeline and Treatment Plant Supervisors and the Utilities Specialist’s project delivery efforts, supervising the electricians may be a natural fit. Relocating the electricians would reduce the Utility Superintendent’s span of control to six direct reports, which

is still high, but the remaining direct reports fit the profile of who should be reporting to the Utility Superintendent based upon the size of the utility. The electricians, Utilities Specialist, and Asset Management Technician could be informally combined as an Asset Management and Maintenance group.

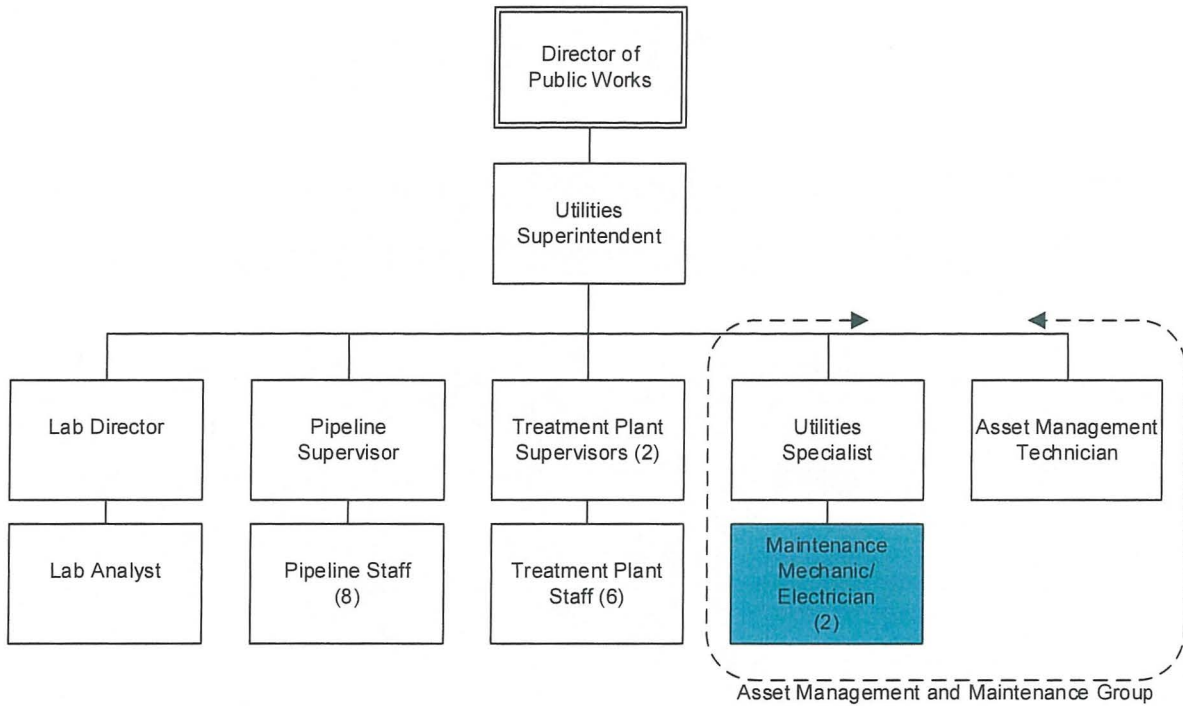


Figure 14: Option 2 to Reduce Utility Superintendent Reports

A more substantial re-organization would be to add a Deputy Superintendent between the Superintendent and Supervisors, as seen in Figure 15 below. The Utilities Specialist would continue to report to the Utility Superintendent along with the Asset Management Technician and Lab Director. The advantage to this arrangement is that it would reduce the supervisory burden of the Superintendent, may provide for a more natural structure for succession planning for the Utility Superintendent, and may provide more structure/oversight for the “co-supervisory” role of the Treatment Plant Supervisors. The disadvantage to this arrangement is that it could blur the job duties of the Utility Superintendent and may “under-burden” the Superintendent. The Utilities Specialist is a valuable role to the District in that it facilitates many of the utility’s renewal and replacement capital projects. Moving the position to a more supervisory role may reduce the role’s effectiveness in project delivery. Alternatively, rather than moving the Utilities Specialist, a new position of Deputy Utilities Superintendent could be created. This alternative would not deter the Utilities Specialist from capital project delivery.

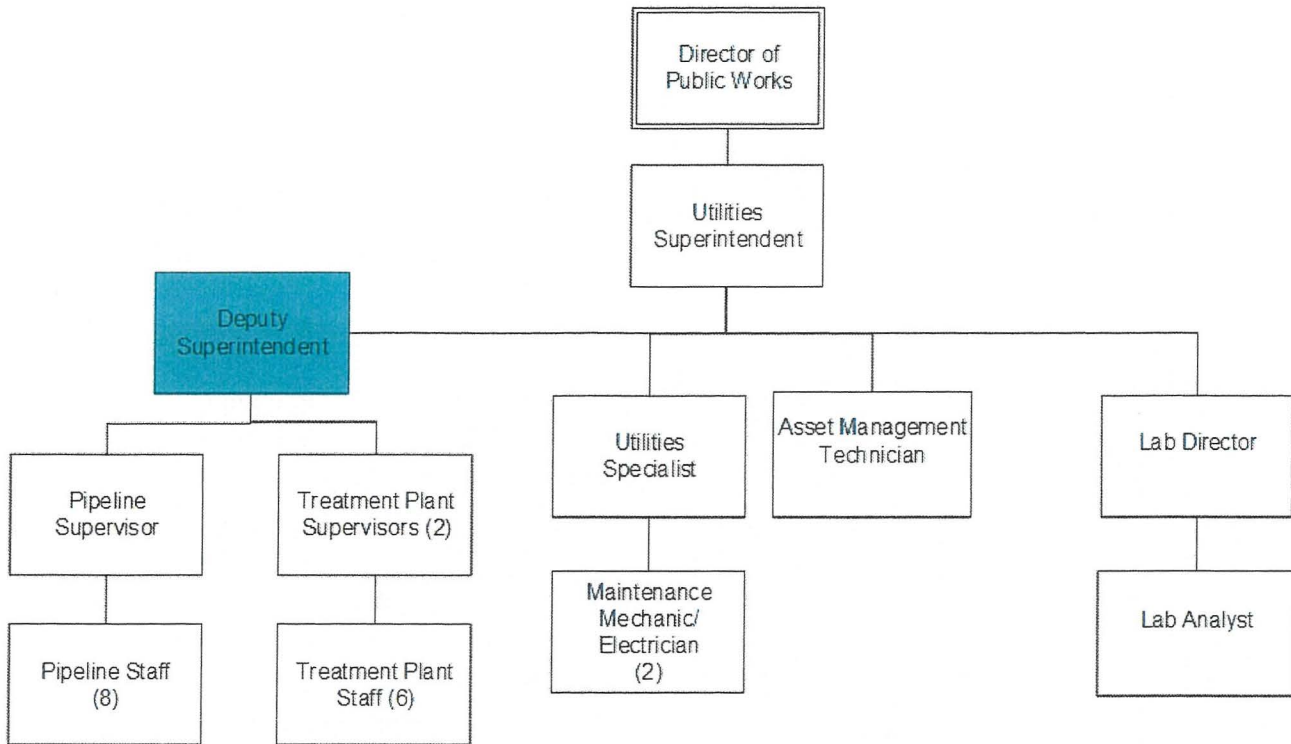


Figure 15: Option 3 to Reduce Utility Superintendent Reports

Administration Division

The Administration Division of Public Works, while located outside of the Utilities Division, plays a critical function for the utilities by ensuring meters are read and bills are prepared. It manages the meter-to-cash cycle as depicted in Figure 16. The Division consists of one Administrative Manager, one Meter Reader, and two Customer Service Representatives. Until recently, one Customer Service Representative was part-time, but this was increased to full-time when the unit began administration of solid waste citations. The Administrative Manager reports directly to the Director of Public Works

The Division manages approximately 4,250 utility accounts and bills for water and wastewater. Payments from customers are collected online or in person using check or credit card. The District has a monthly billing cycle and bills are prepared in-house but printed and mailed by an outside vendor. Transactions are exported from the Division to the District’s Accounting unit for entry into the financial system. Exception reporting – identifying bills with unusually high or low usage for a cycle – is done manually by reviewing the accounts. The meters are read using Automatic Meter Reading (AMR), sometimes known as “drive-by” meter reading, a technology that allows a vehicle equipped with a receiver to drive through neighborhoods and read the meters as the vehicle passes by. The District’s meter reading process takes approximately two days per month for reading and one to recheck misreads. This is an abnormally long reading period, based on the number of meters. Staff report that the meter reader also fixes easy-to-address meter issues to increase the read rate during each meter reading cycle. Taking this approach accounts for the additional reading time. When not reading meters, the meter reader position handles shut-offs, turn-ons, and assists customers with leaks. According to the Administrative Manager, there are not many delinquent accounts.

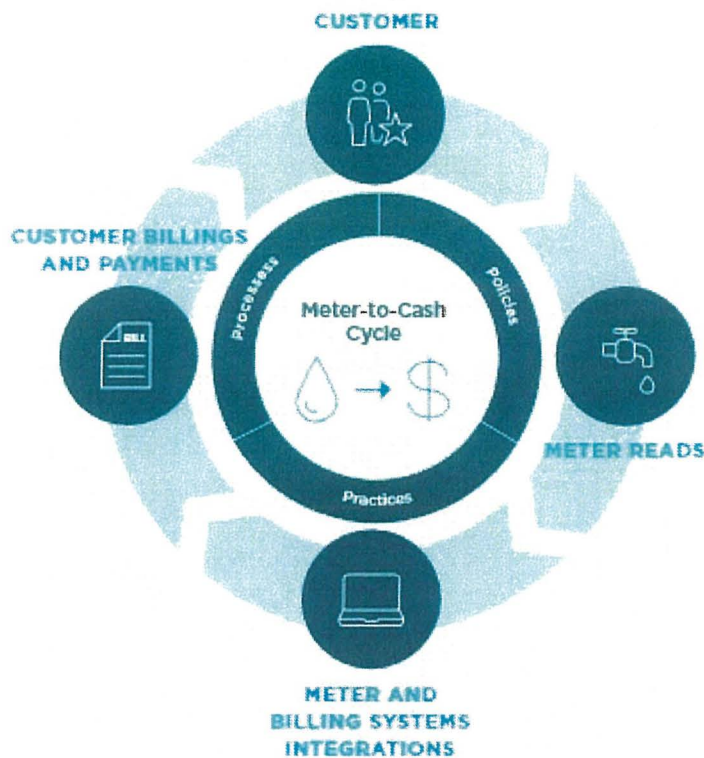


Figure 16: Meter-to-Cash Cycle

The primary concern for this unit is coverage and backup. There is no backup for the Administrative Manager position, and no career path for the Customer Service Representatives (CSR). The Administrative Manager has prepared detailed daily and monthly checklists for staff and can perform their duties, but there is no other person in the organization that has the knowledge to perform her duties. When a CSR is out of the office, the Administrative Officer must perform their tasks, including simple tasks such as doing deposits or answering the phone. When the Administrative Manager is out, many activities must be put on hold.

Again, there is no backup for the Administrative Manager position and no career path for the CSRs. There has not been sufficient downtime to fully cross-train CSRs for each other's tasks and nobody to learn the Administrative Manager's tasks. If the Manager is out for a period of time, there are concerns that critical functions can't proceed. In addition, there has been some turnover at the CSR level as they become trained but move to a higher-paying position when one becomes available in the District or elsewhere. This is extremely detrimental to the District as it reportedly can take up to a year for a CSR to get fully up to speed.

Recommendation 6: Build capacity in the Administration function.

To reduce risk of critical functions not occurring, a position should be added between the Administrative Manager and the CSRs, as seen in Figure 17. This would provide necessary backup for the Manager's position as well as creating a potential career path for CSRs to move into. Should the Manager become ill or suddenly depart the agency, the District would be in a very bad position. This new position could potentially be used to provide additional capacity and backup assistance for the District's Asset Management Technician position.

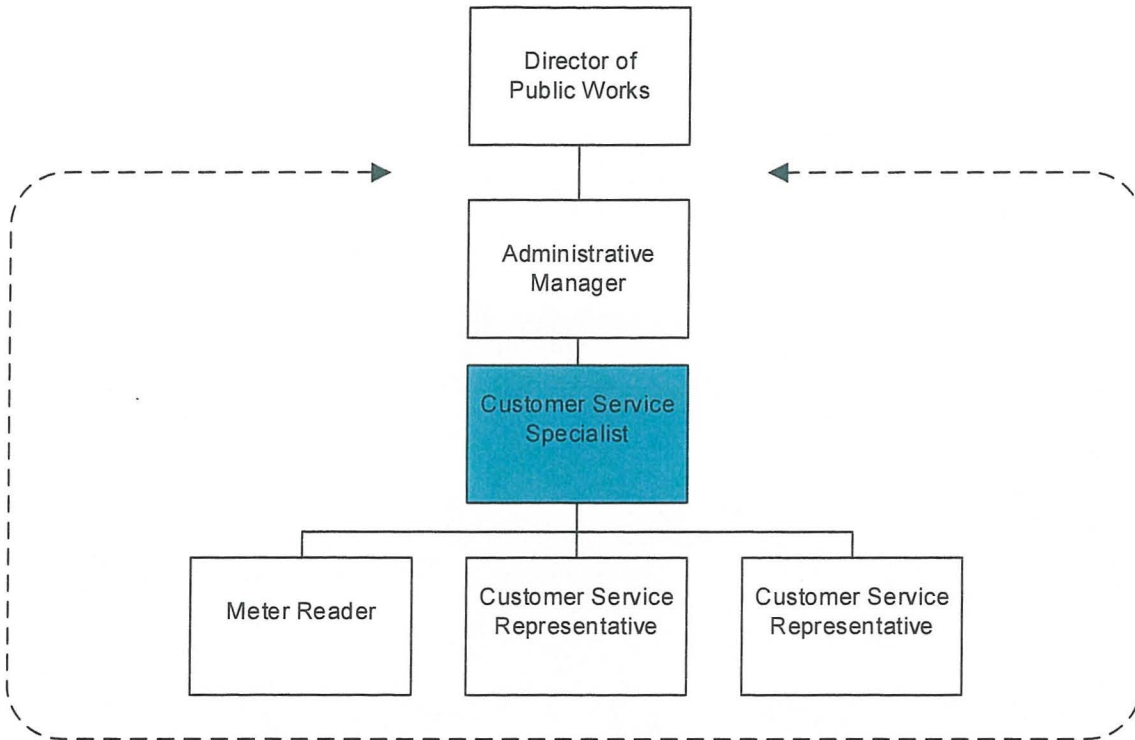


Figure 17: Proposed Administrative Division Organization

The District should also consider broadening the role of the Administrative Manager and Administrative Division. The Administrative Division of Public Works currently performs—almost solely—work for the Utilities Division, with some time spent on solid waste activities for the Waste Not Division. The Department of Public Works has no general administrative assistance as a whole. If capacity were added to the Administrative Division as recommended above, consideration should be given to broadening the role of the Administrative Manager to assist the Director of Public Works on general Department needs such as budget and performance reporting, software integrations, Department-wide tasks and meetings, or other related functions. This would be extremely valuable in ensuring greater transparency to the public and reporting Department progress toward District strategic goals. However, without additional assistance, the Administrative Manager would not have the capacity to perform these additional duties.

Inspections

Like the Administrative Division, the Engineering Division within the Public Works Department works closely with the Utilities Division. The Engineering Division has three inspectors who are fully certified and cross-trained, responsible for backflow device testing and cross-connection control, as well as the inspection of all new construction to ensure compliance with District and regulatory standards.

The District began offering backflow inspection to the community in order to provide competition for private plumbers and inspectors who reportedly were charging elevated prices. The District charges a rate comparable to the market and ensures appropriate cost recovery. In 2020, the inspectors performed 2,086 backflow tests out of approximately 4,000 in the District (roughly 54% are done by the District versus private plumbers).

The District has seen an increase in construction inspections. The unit reviewed over 300 sets of plans last year and performed over 400 field inspections. Inspectors interviewed for this review reported that, particularly during summer, their schedules are fully booked with just the backflow inspections, leaving them to try to squeeze in unscheduled new construction inspections when they can. The result can be delays and, at times, unhappy customers. Staff report difficulties in taking time off, particularly in summer, as this results in the other two employees in the unit trying to cover the workload and often results in backlogs.

Recommendation 7: Cross-train other District staff to assist the Inspection Unit during summer months.

In order to better manage inspection workload, the District should cross-train other staff to provide assistance during summer months. Other staff, such as seasonal staff who are busy during the winter months or the meter reader, could be certified to perform backflow inspections in summer and to provide backup to the District's three inspectors.

TECHNOLOGY

Technology plays a vital role in planning and maintaining the District's efficient operations. The District makes appropriate use of commonly used technologies in the industry, notably its use of a Computerized Maintenance Management System (CMMS) and Supervisory Control and Data Acquisition (SCADA).

The District uses software known as NEXGEN as its CMMS. NEXGEN is a key tool in the District's asset management program. NEXGEN contains a listing of each asset, its service history, and schedules for planned maintenance. Asset locations are also recorded in the District's Geographic Information System (GIS) system, which is linked to NEXGEN. Work orders are generated through NEXGEN, and the completion of those work orders is tracked through NEXGEN. Staff report that the District's service area has spotty wireless access, so use of NEXGEN is primarily limited to District offices. Staff also report difficulty with GIS while in the field. While conducting field work, staff must manually record their activities using pen and paper, and upon returning to the District must then enter their data into NEXGEN.

SCADA is used to remotely monitor and control District utility assets. SCADA is widely adopted throughout the utility industry and is a vital tool that enables the District to provide a high level of service. It alerts staff to potential failure conditions at remote locations and allows staff to diffuse potential problems before they turn into emergencies.

One class of technology that the District does not employ is a Laboratory Information Management System (LIMS). A LIMS works to automate much of the recordkeeping necessary to maintain a certified laboratory. LIMS are commonly used in larger laboratories, and they are an important tool to ensure the reliability of laboratory operations. A LIMS is not currently required to maintain state certification, but staff believe that a regulatory requirement is likely to be made in the coming years. A popular and inexpensive LIMS/WIMS (Water Information Management Solution) is Hach WIMS™ by Hach company. There are other more comprehensive and expensive LIMS systems on the market.

The District's meter reading is conducted using AMR drive-by reading. While automated, this is not the highest level of technology currently available. Automatic Meter Infrastructure (AMI) uses a series of fixed-base receivers to automatically connect meters to a central network without visiting the property and is able to obtain near real-time metering information, for both residents (who can log into the system) and the utility. It is understood that reception difficulties interfere with the use of AMI in the District.

Recommendation 8: Invest in mobile technology (i.e., tablets) for field crews.

Spotty wireless coverage is not unusual in the utility industry, and workarounds have been developed. Before leaving the office in the morning, tablets can be pre-loaded with needed or likely needed work orders. Crews can use the tablets in the field, filling out their work orders as needed, and upon return to the office the tablets will sync with the CMMS.

It is Raftelis' understanding that the District is piloting a similar deployment of tablets with the Inspectors in which their work orders for the day are preloaded. Raftelis endorses this project and, barring technical difficulties, recommends that the program be expanded to all field crews. Doing so will reduce the redundant efforts currently undertaken by crews and will likely reduce the likelihood of mistakes that may occur when later entering handwritten notes.

Recommendation 9: Invest in a LIMS/WIMS system.

LIMS/WIMS systems are commonplace in many labs. Given the value that the District receives from its surface water filtration exemption, maintaining the lab's accreditation should be of upmost importance to the District. Proper use of a LIMS/WIMS will improve the lab's resiliency. A prior section of this report noted the importance of succession planning. Given the institutional knowledge that could be lost in the lab with the loss of a single individual, investment in a LIMS can also be thought of as a succession planning tool for the lab.

STAFF RETENTION AND SUCCESSION PLANNING

One of the key attributes of a sustainable and resilient utility is that it prepares for staff turnover with a robust ability to recruit and train new people. Larger utilities often have significant specialization across their organizations, but also are large enough that the knowledge to perform job functions is not retained only by a single individual. Because IVGID is not a large utility but has specialized positions, it is susceptible to a loss of knowledge should certain individuals leave.

While there are no signs of critical issues with relation to retention, several recent departures and delays in the ability to fill vacant positions highlight the need for succession planning. Succession planning should include assuring salaries and benefits are appropriate, as well as cross-training and investing in knowledge management practices. To ensure consistent staffing levels and reduce risk to the utilities, the Board and District management should ensure that staff retention and recruitment remains a priority.

The District recently negotiated salary and benefits adjustments. During this review, compensation (including benefits) was not mentioned as a primary issue driving staff departures. Salary comparisons do not consider other factors impacting the choice to work for an organization, such as commuting distances, management styles/culture, and organizational politics. Such information is typically only known through exit interviews of departing staff or employee surveys.

More critical than recruitment and retention right now is the fact that there are several positions within the Utility that pose an operational risk should an individual retire or leave the District and for which there is no one trained as a back-up. The primary positions that pose this risk are the Utility Superintendent, Utilities Specialist, Asset Management Technician, Administrative Manager, Inspectors, and Lab Director. The Lab Director is a role in which the Lab Analyst may be able to temporarily fill, though concerns about maintaining lab accreditation and workload leave this a short-term solution at best. In addition to their unique value to the District, these positions may be among the most difficult to recruit for, given the specialized knowledge and levels of experience required.

Recommendation 10: Conduct succession planning for planned and unplanned departures.

To promote the ability to rapidly post job notices, job descriptions and qualifications should be periodically reviewed to ensure they remain current. Critical duties should be identified, and plans should be made for how those duties can be performed in the absence of those staff members. These plans should identify who is to perform the duties, the training necessary to conduct them, and how the training is to be delivered. Cross training or job shadowing may be helpful to preserve knowledge. Other techniques include documenting processes and activities and continuing to invest in a knowledge management system like NEXGEN which contains work and asset information.

SYSTEM VULNERABILITY AND RISK

IVGID appears to have appropriate levels of redundancy and a reasonable amount of excess water and sewer system capacity. Both the water and wastewater plants have sufficient capacity to meet expected demands, as do the water distribution and wastewater collection systems. As with all utilities, there are potential single points of failure, but their presence is not unusual. For instance, staff are aware of potential alternative routings should various pump stations go down. The wastewater effluent pipeline is another potential single point of failure, but there is sufficient onsite emergency effluent storage at the wastewater treatment plant to temporarily mitigate the loss of the pipeline. Staff mitigate risk to the utility system through the following strategies:

- **Condition assessments** – the NEXGEN CMMS contains condition assessment data that is updated as staff perform work orders/inspect assets. (The Fleet Division employs Computerized Fleet Analysis (CFA) as its Fleet Maintenance Management Software.)
- **Preventative maintenance** – The District’s preventative maintenance program minimizes unplanned downtime.
- **Renewal and replacement (R&R) capital program** – The R&R program replaces assets at the end of their useful life prior to the unacceptable growth of the assets’ risk of failure.
- **30-minute expected response time** – The District operates with the expectation that a call-out can be responded to within 30 minutes at any time of the day.

LIFE CYCLE COST ANALYSIS METHODS / FLEET MANAGEMENT

IVGID staff use knowledge of actual asset conditions and experience to provide sufficient lead time to anticipate asset replacement in the Capital Improvement Plan (CIP). Most major utility infrastructure assets have an expected useful life of well over 20 years, so there are few surprises when assets are nearing the end of their useful life. While the industry commonly anticipates a 50-100 year lifespan for pipelines, installation conditions and other factors have a significant bearing on longevity. Therefore, planning to replace a percentage of the systems’ pipe once it reaches a certain age based on industry and system experience, and then prioritizing replacements based on field experience such as the number of failures, is typically the best appropriate practice for a small utility like IVGID. Treatment, pumping, and storage facilities typically have a useful life of 30-50 years, depending on operating and maintenance conditions; although, some need to be replaced prematurely to accommodate growth or changing regulations and some may last much longer with consistent maintenance. Using condition is generally the best indicator of the need to replace these facilities.

The utility’s PM program extends the useful life of assets and creates regular checkpoints to assess asset condition. IVGID uses this information to estimate the remaining useful life of assets and plan for capital replacement. Frequent condition assessment, coupled with appropriate maintenance is the best way to manage these long-lived assets.

The Fleet Division of Public Works maintains over 630 vehicles and pieces of equipment, plus an additional 170 golf carts. The fleet, which includes a broad array of units including buses, autos, trucks, equipment, golf carts, and more, is maintained through four maintenance shops located throughout the District, one at the Public Works facility, one

at the Championship golf course, one at the Mountain golf course, and one at the ski area. Vehicle maintenance occurs primarily at the Public Works facility shop.

Utility fleet and short lifecycle assets like mobile equipment are typically replaced using an expected replacement frequency in combination with actual asset condition. The lifecycle is often 5-15 years depending on the type of asset and its operation and maintenance; although, there are no fixed industry benchmarks. This is a reasonable approach because there is often enough experience with the group of assets to understand median failure intervals and when replacement is warranted. Applying a blanket replacement interval without exception does not allow adjustment for individual asset performance. IVGID appropriately uses a reasonable replacement interval for short-lived assets to develop the longer-term CIP, but then adjusts annual replacement needs based on the condition of individual assets. In Raftelis' opinion, based on observation of industry practices, this is the best appropriate practice for short-lived utility assets.

Some utilities participate in alternative delivery models (e.g., service contracts) for short lifecycle assets. For instance, some utilities choose to use lease and service agreements for fleet procurement. The District may wish to investigate whether there are such alternative delivery methods available to it and whether they might make sense. Any consideration of alternative delivery models should include not just the cost of the contract, but any factors that may influence the District: staff redundancies, service times, reliability, loss of organizational capabilities, etc. However, given the District's somewhat isolated location and existence of its Fleet group, it is unlikely that engaging in such a delivery method would be a marked improvement.

The advanced nature of the utility's asset management program, namely the data contained in NEXGEN and CFA (fleet assets), means that there are records available to make comparisons of replacement versus repair of assets. Currently, those comparisons are done through experience. Such an analysis may be of particular use when considering whether to upgrade a particular asset. For instance, knowledge of historical PM activity of a blower can allow calculation of the true operating cost of the blower and form a more accurate comparison to the potential operating cost of a new blower which may have greater efficiency and operate with a different PM schedule.

The Fleet Division has historically been staffed at levels such that preventive maintenance is regularly performed on schedule. Should the District increase the fleet size, extend the working life of assets, and/or see more breakdowns and failures, then additional staff, expertise, and/or the need for more contracted work at dealerships and vendors may be needed.

ENGINEERING DIVISION AND CONSTRUCTION MANAGEMENT

The Engineering Division of the Public Works Department is comprised of eight positions, as shown below in Figure 18, and is responsible for delivery of capital projects District-wide. This includes working with design and consulting engineers, updates to the GIS system, contracts management, and project management (overseeing the work of contractors hired to design and construct capital projects). Project management includes new construction as well as some ongoing maintenance work, such as the District's pavement management program.

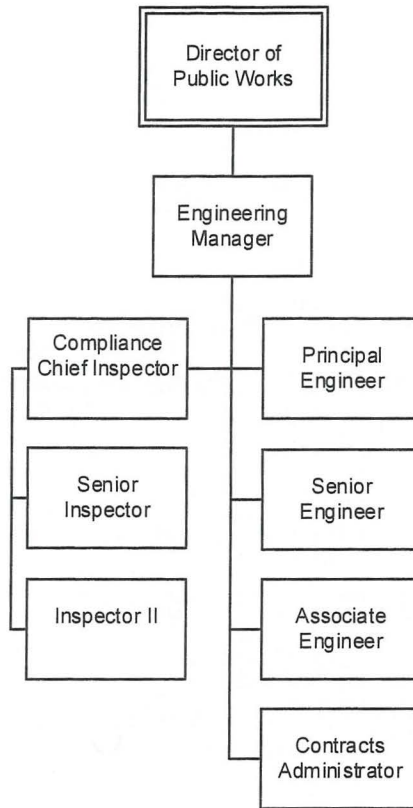


Figure 18: Engineering Division

The Division is led by an Engineering Manager and contains three staff members engaged in inspection activities, a Principal Engineer, a Senior Engineer, an Associate Engineer, and a Contracts Administrator. The Engineering Manager position was recently filled after a brief vacancy, and the District has had some turnover in the engineering roles. The District recently reclassified the vacant Senior Engineer position as a project manager to reflect a focus on delivering capital projects, rather than engineering or design. The Engineering division operates the District’s GIS which is well developed, according to staff. The utilities distribution and collection systems are fully mapped, and the data is updated as changes occur. The Division does not have dedicated software to assist with capital projects management. It utilizes primarily Microsoft® Excel for project tracking and the NEXGEN work order system. This is typical and appropriate for smaller utilities.

Engineers have a target to bill 80% of their time to capital project accounts. The remaining 20% is charged to budgeted operations accounts through the use of work orders. In other jurisdictions, engineering groups often have their own operations budget to which non-capital project time is charged and which is not linked to work orders. Work order time charging is only appropriate when the work is related to a specific asset. This typical approach is less administratively demanding than the District’s current method. It may also lessen some of the tendency to bill time to capital projects or assets that may be more appropriately categorized as operations. For example, general planning activities non-specific to a project and training time should be charged to an operations account.

The Contracts Administrator performs a variety of work tasks in support to the Engineering Division, as well as the Department of Public Works as a whole. Besides administering contracts, this position prepares monthly reports on Department benchmarks and status, updates the District website for projects under construction and solar panel data, documents public records requests for Public Works, schedules inspections and assists the inspectors including serving as a liaison to local residents and realtors on backflow compliance, arranges Department travel and training, and many other duties. The Contracts Administrator has prepared a detailed “Engineering Processes and

Procedures” manual, which is a living document and will greatly assist new staff to become familiar with Division procedures. Staff prepare and maintain a detailed five-year capital plan and, in fact, have a 20-year plan for in-house planning purposes, primarily focused on rolling replacement costs. The CIP includes department, project number, project title, project manager, and projected expenditures for the next five years, plus the total as shown in the sample below:



5 Year Capital Improvement Plan Summary - WORKING COPY - As of 5.21.2020

Department	Project Number	Project Title	Project Manager	2021	2022	2023	2024	2025	Total
	2299DI2603	Residential meter and electronics replacement	Collection/Distribution Supervisor	-	-	-	150,000	250,000	400,000
	2299LV1720	2013 Mid Size Truck #630 Compliance	Fleet Superintendent	-	31,000	-	-	-	31,000
	2299WS1704	Watermain Replacement - Martis Peak Road vicinity	Senior Engineer	990,000	-	-	-	-	990,000
	2299WS1705	Watermain Replacement - Crystal Peak Road	Senior Engineer	-	50,000	986,000	-	-	1,036,000
	2299WS1706	Watermain Replacement - Slott Pk Ct	Senior Engineer	-	250,000	-	-	-	250,000
	2299WS1802	Watermain Replacement - Aider Avenue	Senior Engineer	-	-	50,000	536,000	-	586,000
	2299WS1803	Watermain Replacement - Future	Senior Engineer	-	-	-	50,000	600,000	650,000
	2299WS1804	R6-1 Tank Road Construction	Senior Engineer	-	125,000	-	-	-	125,000
				1,225,000	706,000	1,511,000	930,000	1,105,000	5,477,000
Sewer	2523HE1723	2001 Sellick Forklift #499	Fleet Superintendent	-	-	-	65,000	-	65,000
	2523HV1721	2006 Kenworth T800 Bin truck #587	Fleet Superintendent	-	197,200	-	-	-	197,200
	2523LE1720	2018 Flail Mower #784	Fleet Superintendent	-	-	-	15,000	-	15,000
	2524HE1725	2008 Chevrolet Camera Truck #615	Fleet Superintendent	-	-	-	85,000	-	85,000
	2524SS1010	Effluent Pipeline Project	Engineering Manager	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	10,000,000
	2599BD1105	Building Upgrades Water Resource Recovery Facility	Utility Superintendent	80,000	40,000	30,000	50,000	275,000	475,000

Figure 19: 5 Year Capital Improvement Plan Sample

Each project in the CIP has a data sheet created in the District’s Questica system which provides details on the project. Capital projects with budgets are presented to the Board for approval. In the past few years, a field was added to include information regarding the funding types (cash, debt, grant, etc.) for each project. A sample data sheet is shown here:



Project Summary

Project Number:	2220WS1705
Title:	Watermain Replacement - Crystal Peak Road
Project Type:	D - Capital Improvement - Existing Facilities
Division:	21 - Supply & Distribution
Budget Year:	2022
Finance Option:	
Asset Type:	DI - Distribution Infrastructure
Active:	Yes

Project Description			
Project area Crystal Peak Road only. This project is a continuation of the multi-year program to replace 1960's era thin-wall steel watermain and other deficient watermain. Replacement criteria is twofold: Replace those watermain with the most leaks and in streets with aging pavement. Since our water loss is now less than 8%, our main objective is to work closely with the Washoe County Road Department to replace watermain just prior to the County's repaving the street. We also work closely with the North Lake Tahoe Fire Protection District to determine areas of low fire flow, which may indicate a need for increased capacity in that area. There is approximately 6 miles of old steel watermain remaining in the system.			
Our watermain replacement strategy involves meeting with Washoe County prior to each budget year and jointly agreeing on streets to be paved and watermain to be replaced. This project budgets to replace approx. 6 miles of pipeline in 15 years at \$1,500,000 per mile. Without additional escalators, that is \$9,000,000 in 15 years or \$600,000 per year. Adjustments have been made to allow for the trend of a high year then low year of work scheduled.			
Project Internal Staff			
Engineering will perform Design, Engineering, Bidding, Contract Administration and Inspection tasks. Outside contractor to do the work. IVGID resources remain available for ongoing maintenance activities and emergency response.			
Project Justification			
Our overall goal is to replace deficient watermain to keep our unaccounted for water loss to under 8% and to avoid costly pavement patch penalties imposed by Washoe County. The original watermain installed in much of Incline Village in the 1960's were thin-walled steel. These pipes are now failing repeatedly and need replacement. Washoe County has high pavement penalty costs for replacing watermain in newly paved streets. Replacing watermain in newly paved streets or streets with an excellent pavement condition could increase project costs by up to 50% due to pavement cut penalties.			
Forecast			
Budget Year	Total Expense	Total Revenue	Difference
2022			
Internal Planning & Design	50,000	0	50,000
Year Total	50,000	0	50,000
2023			
Construction Inspection & Testing	60,000	0	60,000
Crystal Peak Road Watermain Construction	851,000	0	851,000
Internal Planning & Design	25,000	0	25,000
Washoe Co Street Repair and Penalties	50,000	0	50,000
Year Total	986,000	0	986,000
	1,036,000	0	1,036,000
Year Identified	Start Date	Est. Completion Date	Manager
2017	Jul 1, 2021	Jun 30, 2023	Senior Engineer
			Project Partner

Figure 20: Capital Project Data Sheet Sample

Over the past two years, the Board and public have raised questions with regard to contract management, financing, and procurement procedures. The District hired an accounting firm, Moss Adams, to review internal capital programming and project management practices as a result of concerns regarding past contracting practices. The Moss Adams review dated December 21, 2020, "Construction Advisory Fact Validation Report," examined performance based upon eight specific contracts and resulted in 11 recommendations for improvement but also noted several positives, including that the District has a Strategic Plan and long-range principles, that a multi-year CIP is maintained, and that capital program procedural documents are maintained in accordance with Nevada Revised Statutes.

Moss Adams recommendations 1, 2, 4, and 8 stated that the District should implement and consolidate policies and procedures related to master planning, reporting, scope definitions and prioritization, communication efforts, and invoice processing related to contract administration. Recommendation 3 advised the District to "Continue procurement and implementation efforts for new capital program management technology." Other recommendations guided proper administration and documentation for projects, including "Ensure appropriate documentation and execution of any modifications to contractual agreements" and "Establish change order and addendum-specific reporting within key capital program reporting."

Raftelis concurs with the Moss Adams findings and the District's goal to provide a greater focus on project management for the Engineering Division and a reduced focus on design and engineering. Raftelis also supports a

focus on recruitment and retention within the Division. The Division is small enough that current rates of turnover are unsustainable for preserving institutional memory. Having staff who are knowledgeable about the details of constructed projects and historical practices is invaluable in a utilities and public works organization.

WASTE NOT DIVISION

The Waste Not division of Public Works is staffed by a Resource Conservationist and two Program Coordinators who are responsible for solid waste and recycling operations, including household hazardous waste. While the division originally focused upon recycling education programs, its role has expanded over time to include a variety of educational outreach. Staff in the Waste Not Division oversee a variety of environmental programs related to solid waste, recycling, and water quality. Programs managed by the group include a cigarette butt reduction program, watershed protection, water quality monitoring, invasive species control, micro-plastics research, staffing of the household hazardous waste drop-off site, bear awareness and wildlife containment, and more.

The Division's conservation and sustainability focus has grown as a result of IVGID's expressed goal for long-term protection of the environment. The District has a long legacy of environmental protection that goes beyond regulatory driven measures. Staff are passionate about their work and provide a great deal of public outreach and education. They work closely with volunteers and partner agencies. All division staff have been in their roles for over five years.

The Resource Conservationist serves as the Executive Director of the Tahoe Water Suppliers Association, a 20-year-old organization established by Nevada water regulators, and which now includes 12 members in the Tahoe Basin. Six of the water suppliers that are members have an extremely rare waiver to filtration under the Surface Water Treatment Rule provisions of the Safe Drinking Water Act. It is estimated that less than 50 of approximately 16,000 public community water systems have this filtration exemption authorized by the U.S. EPA. It is awarded to those water supplies that have exceptional quality as measured by water quality standards meeting rigid criteria. This designation means IVGID is dealing with the highest quality source water. It also means that IVGID can avoid millions of dollars in capital investment for a water filtration plant and the hundreds of thousands in associated yearly operating expenses. Maintaining the quality of Lake Tahoe should be of the highest priority for both environmental stewardship and financial reasons.

The Tahoe Water Suppliers Association includes members in both Nevada and California, resulting in the need for the Executive Director to remain knowledgeable about regulations and legislation in both states. The members participate through a cost-sharing agreement to the Association, which offsets a large portion of the Resource Conservationist's salary.

The Division currently staffs the District's household hazardous waste (HHW) site, which has no dedicated staff and does require staff capacity and attention.

Recommendation 11: Provide direction to staff regarding the leadership role of IVGID in the region with regard to environmental resources and conservation.

Given the variety of programs and focus areas of this unit, the Board should clarify its leadership role in the Association and in overall regional environmental protection. It is obvious that a considerable amount of the Resource Conservationist's time and other staff time is spent on Association work. While this time is offset by funding, the District should provide staff with clear direction on the parameters of its involvement and the District's role in regional conservation and environmental stewardship. Note that other suppliers from across the country with

filtration exemptions such as the New York City Department of Environmental Protection, Massachusetts Water Resources Authority, and Portland Water District invest millions each year to protect their unfiltered supplies.

Recommendation 12: Explore options for the household hazardous waste site.

The District should request staffing and/or alternative arrangements for the household hazardous waste site in any upcoming solid waste franchise negotiations to provide higher quality service in this area. All of the solid waste franchise fees are currently being spent on District operations rather than as potential new revenues. Any decrease in District-provided service will increase the benefit of franchise fees and increase revenues. An alternative is to consider a sharing or partnering agreement for the site with a neighboring jurisdiction.

Utilities Financial Policies and Procedures

The District accounts for its three utilities – water, wastewater, and solid waste and recycling -- in a single enterprise account, the Utility Fund, using fund accounting and as shown in the Proprietary Funds of the Annual Financial Report. Nevada Revised Statutes (NRS) 354.517 defines an enterprise fund as a fund established to account for operations (1) which are financed and conducted in a manner similar to the operations of private business enterprises, where the intent of the governing body is to have the expenses (including depreciation) of providing goods or services on a continuing basis to the general public financed or recovered primarily through charges to the users; or (2) for which the governing body has decided that a periodic determination of revenues earned, expenses incurred, and net income is consistent with public policy and is appropriate for capital maintenance, management control, accountability, or other purposes.

An enterprise fund identifies the total direct and indirect costs to provide a service and the sources and amounts of revenues that support the service for which a fee is charged in exchange for service. Utilities are typically accounted for as enterprise funds due to the fact that the primary revenue source is user rate payments. By using an enterprise fund, ratepayers can feel comfortable knowing that their rates pay only for the costs of that utility and do not subsidize other District operations, for example.

In order to provide the most flexibility for the District, and in keeping with Nevada Revised Statutes, the district has included the financials for all three utility types—water, wastewater, and solid waste—within a single all-encompassing Utility Fund. While this is an acceptable and legal practice, it makes analysis of a single utility’s performance more difficult.

The District does separately track budget, revenues, and expenditures for each utility as department codes within its financial system and reports this information on monthly and annual reports. It does not, however, separate each utility by fund in a manner reflected on the balance sheet or within the financial statements. This would be useful for rate setting and financial management purposes, even internally should the District choose to continue reporting as a single fund to the State.

Recommendation 13: Establish sub-fund accounts in the chart of accounts for each utility within the Utility Fund.

The use of individual sub-funds for each utility type would be advantageous for several reasons. First, it would provide additional transparency to the Board and to ratepayers in knowing how each utility type is performing. This information, in turn, has a direct bearing on the setting of rates and on future planning for capital projects and each utility type’s ability to fund them.

The District should establish sub-funds within the Utility Fund for its own internal analytical purposes and to provide easy financial information on each utility type. While there are department accounts specific to each utility that allow

for separate analysis of budget, revenues, and expenditures, an overall fund including fund balance for each utility is not available. This will require adjustments to the chart of accounts and instruction to staff on which account codes to use moving forward. This change can be for internal analytical purposes only, and the District can still report to the State using the single enterprise Utility Fund; in doing so, the District retains some flexibility with regard to inter-utility transfers, should that need arise. The Director of Finance is already exploring this approach.

UTILITY FUND CONDITION

The Utility Fund accounts for the financials of the District's three utilities. The last rate increase occurred in 2019, and a planned 2020 increase was deferred in order to provide more time to review the Fund's financials, as well as to mitigate impacts of the COVID-19 pandemic on the community. It should be noted that the pandemic had a significant impact on the Incline Village community, with many former part-time homes now being used year-round, and an influx of tourists who could travel regionally to the area but not abroad. These changes impacted Utility Fund revenues and expenses in some measure in the 2020 fiscal year.

The Utility Fund is in sound condition, with ample funds available to cover operating expenses and debt service in the near term. A review of the District's audited Annual Financial Reports shows that during Fiscal Years 2017-2020, the Utility Fund Net Position (operating revenues less expenditures) increased by \$1-2 million each year. However, the amount of the Change in Net Position has declined significantly, by over 42%, from \$2.4 million in 2017 to \$1.4 million in 2020, showing a narrowing of the gap between revenues and expenditures as shown below.

Table 5: Utility Fund Change in Net Position, 2017-2020 Annual Financial Reports

	2017 Actual	2018 Actual	2019 Actual	2020 Actual	Percent Change 2017-2020
REVENUES					
Charges for Service	11,813,169	11,925,557	12,785,742	12,564,466	6.4%
Operating grants			1,440		
Capital Grants	425,509	199,934			-100.0%
Investment Earnings	60,132	77,280	282,484	298,225	396.0%
Other	17,730	50,020	15,066	(22,332)	-226.0%
TOTAL	12,316,540	12,252,791	13,084,732	12,840,359	4.3%
EXPENSES					
Utility	9,883,961	10,253,834	10,554,488	11,495,874	16.3%
TOTAL	9,883,961	10,253,834	10,554,488	11,495,874	16.3%
Transfers In (Out)		120,000	120,000	45,000	
Change in Net Position	2,432,579	2,118,957	2,650,244	1,389,485	-42.9%
Beginning Net Position	70,226,498	72,659,077	74,778,034	77,308,278	10.1%
Prior Period Adjustment			(120,000)		
Ending Net Position	72,659,077	74,778,034	77,308,278	78,697,763	8.3%

Looking at the components making up the Utility Fund’s Net Position in the table below, there is a strong investment in capital assets (80.3%) as is typical of utility operations which necessitate significant infrastructure. Restricted amounts are minimal at under 1% of the total, with the remaining 19.2% in Unrestricted Net Position, or funds available for use as directed by the Board.

Table 6: Components of Utility Fund Net Position, 2017-2020

	2017 Audited	2018 Audited	2019 Audited	2020 Audited	Percent Change 2017-2020
Investment in Capital Assets	59,817,845	64,377,397	64,549,358	63,202,365	5.7%
Restricted	305,022	309,344	316,611	322,895	5.9%
Unrestricted	12,536,210	10,091,293	12,442,309	15,172,503	21.0%
TOTAL NET POSITION	72,659,077	74,778,034	77,308,278	78,697,763	8.3%

For the past several years, at the Board’s direction, the District had set aside \$2 million per year as part of its Unrestricted Net Position in the Utility Fund toward the estimated \$30 million effluent pipeline project. This is funded by a specific capital charge on each ratepayer’s bill. As of August 2020, the Board of Trustees had designated \$9,656,890 of the Unrestricted Net Position of \$15,172,503, or 63.6% of total Unrestricted Net Position. In August 2020, the Board designated an additional \$1,912,767 to the project, resulting in a total effluent pipeline project set aside of \$11,569,657, or 76.3% of total Unrestricted Net Position.

While Total Change in Net Position remains positive, in 2020 it did not cover the \$2 million planned set-aside for the effluent pipeline project. If this were to be subtracted from the Change in Net Position, in 2020 the Fund would have had negative Change in Net Position, meaning revenues did not exceed expenditures for that fiscal year. The budgeted estimate for 2021 shows an estimated Change in Net position of \$1.7 million, also below the \$2 million set-aside. While not sustainable in the long term, an operating deficit in a single fiscal year is possible and the reason utilities and other organizations maintain reserves.

If the District continues with the current revenues and expenditure levels, however, the Utility Fund will not be sound in the near future. This situation can be rectified in one or a combination of three ways:

1. **Reduce Expenditures:** The District can examine current expenditures and, if possible, reduce operating expenditure levels.
2. **Raise Rates** – Increase utility rates to allow contributions to the capital reserve account and cover operating expenses and debt payments.
3. **Decrease or Stop Contributing to the Capital Reserve Account Set-Aside** – IVGID already has a considerable amount of money in the capital reserve account being set aside. The District could use these funds to partially pay for capital projects, principally the effluent pipeline, and pay any remaining amount with bonded debt. The annual debt service payment (principal and interest) on a loan is likely to be less than the current \$2 million set-aside amount, depending upon total amount financed and interest rate.

Recommendation 14: Review expenditures in the Employee Benefits, Legal/Audit/Professional Fees, and Central Services line items.

As shown in Table 4 of this report, these line items increased by 18% or more over the past four fiscal years, a rapid increase. For this reason, the District should review specific expenditures in these line items to determine the reasons for the increases and identify whether any actions can occur to mitigate and reduce expenditures in the future. Were these one-time anomalies as in a legal issue, for example, or increases that are ongoing year after year? This information will be important in considering expenditures for use in rate modeling.

Recommendation 15: Undertake a comprehensive rate study for the water and wastewater utilities.

Based upon 2020 Annual Financial Report results, Utility Fund revenues are exceeding expenses but the net between them has dropped by 42% in the past four years. In 2020, the Change in Net Position of \$1.4 million was insufficient to cover both operating expenditures and the annual \$2 million set-aside from the effluent pipeline project. (Note that the \$2 million set-aside cannot be categorized as an operating expenditure, but rather is a cash set-aside.) The Utility Fund, while still in sound condition, is losing ground when taking the restricted \$2 million set-aside into account. The Utility Fund must either increase revenues or decrease expenditures in order to cover both operating expenditures and continue to meet the \$2 million annual set-aside policy. The District should contract with an outside vendor to undertake a comprehensive rate study at its earliest convenience. A rate study can help address several other financial issues. First, if the District is going to manage its water and wastewater utilities separately from a financial perspective, a rate study is a necessary step in order to ensure that one utility does not subsidize the other. Second, a rate study can help clarify the consequences of capital financing choices. Rate studies can include scenario analyses that can produce different financial plans depending on how the District chooses to finance its capital projects.

Debt

The Utility Fund's financial condition cannot be fully assessed without consideration of debt position. Debt is the use of financing, such as loans or bonds, to pay for infrastructure projects. As noted above, one of the tenets of considering the use of debt is not only the direct interest and administration costs, but also non-financial considerations such as requiring current ratepayers to fully pay for an asset that may be benefiting future users 20 plus years from now. Prior to issuing debt, however, it is important to understand limits regarding its usage and available capacity.

Nevada Revised Statutes 318.277 for general improvement districts states, "Debt limit of district. A district may borrow money and incur or assume indebtedness therefore, as provided in this chapter, so long as the total of all such indebtedness (but excluding revenue bonds, special assessment bonds, and other securities constituting special obligations which are not debts) does not exceed an amount equal to 50 percent of the total of the last assessed valuation of taxable property (excluding motor vehicles) situated within such district." Based on information in the 2020 Annual Finance Report statistical section, a calculation shows that Total FY 2020 Debt for the District of \$1,033,778 is \$857 million below 50% of the District's assessed valuation, which equals \$858.6 million.

Board Practice 14.2.1.1.0 states "Debt issued for utility purposes must remain within a Debt Coverage Ratio of 1.75 times." The Debt Service Coverage Ratio is calculated by dividing operating revenues less operating expenses other than depreciation and interest by the annual principal and interest payments and stated in number of times the net revenue covers the annual debt service. For IVGID's Utility Fund in 2020, this calculation results in a Debt Coverage Ratio of 9.4. In summary, Utility Fund revenues for the year cover its outstanding debt by over 9 times. According to AWWA national benchmarks, surveyed debt service coverage ratios for combined utilities range from 1.46 at the 25th percentile to about 3.38 at the 75th percentile.

It is important for the District to understand its full financial position, including debt capacity. IVGID has sufficient capacity to issue additional debt for Utility Fund projects if desired.

FINANCIAL POLICIES

As this review began, the Board and staff were discussing several financial policies related to the District as a whole but also as they relate to the Utility Fund. As previously mentioned in this report, an external Certified Public

Accounting firm, Moss Adams, was hired to review and opine on several policy matters. Below, Raftelis discusses our review of each of the financial policies that should be revised and updated.

It is important to note that multiple factors have impacted the District’s financial practices in recent years. Several new Board members have joined the District, bringing with them new ideas and expectations of staff; while this is to be expected and even encouraged, staff should not be criticized for following longstanding practices that complied with the prior Board’s policies at the time. Second, the COVID-19 pandemic impacted every agency by requiring considerable extra effort just to maintain ongoing operations; even the best-intentioned staff would have difficulty being proactive under these circumstances. Finally, there were several management transitions in the District during this time which results in significant uncertainty and inefficiency as historical knowledge is lost and new staff, with new ideas, join the District.

While we would not characterize the District’s past financial reporting as best practice, no proof of malintent or illegality on the part of staff was found in the data analyzed for this review. In many cases, actions were taken based upon longstanding internal practices and in the absence of specific, detailed policy direction.

Fund Balance / Reserves Policy

It is critical for utility operations to ensure sufficient fund balance or “reserves” in order to cover unforeseen critical infrastructure failures, economic downturns, and other financial impacts. The District has in place two Board policies, 7.1.0 and 17.1.0, and two Board practices, 7.2.0 and 17.2.0, related to setting appropriate reserves. Board policy 7.1.0 for “Appropriate Level of Fund Balance” states that the Operations reserve for the Utilities Fund will be 25% of operating expenses for the fiscal year based on the current adopted budget. In Section 2.0 of Board Practice 7.2.0 for “Appropriate Level of Fund Balance,” the District set the following three reserve types as relates to the Utility Fund:

Table 7: IVGID Fund Balance Policy for Utility Fund

Type of Reserve	Policy	Amount per 6/30/2020 Annual Financial Report (audited)
Operations (Operating Reserve)	25% of operating expenses	Operating Expenses of \$11,384,036 x 0.25 = \$2,846,009
Debt Service Reserve	One year’s payments (or as set by debt coverage ratio established in bond documents)	One year’s payments = \$523,988
Capital Expenditure Reserve	One year of a three-year average depreciation	Three-year average depreciation for Fiscal Years 2018-20 is \$3,164,934

Per IVGID’s policy, the District should hold at least \$6,534,931 (\$2,846,009 + \$523,988 + \$3,164,934) in reserves in order to hit all three targets. As of June 30, 2020, the Utility Fund had \$15,172,503 in Unrestricted Net Position. However, that includes \$9,656,890 of prior set-asides by Board action to provide funding for the \$30 million effluent pipeline project. Subtracting this set-aside from the total Unrestricted Fund Balance results in \$5,515,613 in remaining Unrestricted Fund Balance, or 84.4% of the District’s three reserve targets.

Often utilities express operating reserves in terms of “Days of Cash on Hand.” According to the AWWA utility benchmarking study, approximately 25% of utilities have 250 days of cash on hand and 75% have 490 days of cash on hand. Applying this calculation to IVGID for June 30, 2020, shows 177 days of cash on hand, putting IVGID at the lower end for reserves as compared to other water agencies nationwide.

Some sample policies from other agencies in the region are as follows.

Table 8: Sample Fund Balance Policies of Other Regional Agencies

Agency	Reserve Type	Policy
South Tahoe PUD	Operating	Two months' operating expenditures
	Capital Reserve	One year's capital spending with a maximum of two times accumulated depreciation balance
	Sewer Rate Stabilization	Minimum one year's property tax receipts with a maximum 1.5 year's property tax receipts
	Water Rate Stabilization	Minimum 10% of one year's water service charge revenue with a maximum of 15% of one year's water service charge revenues
Tahoe City PUD	Water and Sewer Capital	50% of one year's average annualized capital replacement value
	Water and Sewer Budget Stabilization	90 days of current budget operating expenses (less depreciation and project recovery)
City of Roseville Environmental Utilities	Operating	90 days' worth of operating expenses
	System Critical Failure	1-2% of Capital Assets belonging to Utility (Note: This reserve can be foregone if covered by insurance)
	Rate Stabilization	Roughly 50% of annual operating expenditures or 180 days' cash

Recommendation 16: Review and revise the District's fund balance policy.

There is no right or wrong policy with regard to fund balances. The policy should reflect the comfort level of the Board and staff to set aside “rainy day funds” to ensure ongoing operations and sound financial condition while recognizing these funds are charges to ratepayers. The reserve policies set by the Board are commonly deemed to be the minimum levels, with agencies often holding reserves in excess of the policy level. Typically, the more risk averse the Board is, the higher the reserve levels. An acceptable balance must be found between having enough insurance for unexpected events and future needs and holding onto ratepayer funds “just in case.” Given considerable discussion in the past year regarding this issue, and changing Board perspectives on the matter, it is important that the District review and revise its fund balance policies. Finance staff are already working on this issue and the Board supported additional funding for outside assistance at its March 10, 2021, meeting.

Capitalization Policy

Another area of interest was the process and policy related to capitalization of assets. In layperson's terms, capitalization refers to the circumstances when a purchase or expenditure becomes an asset on the financial books rather than an expense. This typically applies to infrastructure and other expenditures that will have useful lives over the course of multiple fiscal years. For example, the purchase of a light vehicle is capitalized over a useful life of, say, seven years. In Year 1, the vehicle is worth full price as an asset on the books. In Year 2, the asset is worth 6/7 of the price, and so on. Because assets are a “positive” (credit) on the books, versus expenditures which are a “negative” (debit), this is an important distinction. Each year, an enterprise must add up the current value of all capital assets to determine total assets of the entity. If, for example, things that are not truly assets are capitalized, this will result in an artificially high asset value which will sway the books positive and include items that are not truly assets.

The District has two existing Board Policies, 8.1.0 and 9.1.0, and one Practice 2.9.0, that relate to this issue. Policy 8.1.0 “Establishing the Estimated Useful Lives of Capital Assets,” sets the life cycle for various asset types. Policy 9.1.0, “Establishing Appropriate Capitalization Threshold for Capital Assets,” notes that items should be capitalized “if they have an estimated useful life of greater than two years following the date of acquisition or placed into service” and also notes, “In no case will the District establish a capitalization threshold of less than \$5,000 for any individual item.” Practice 2.9.0, “Capitalization of Fixed Assets,” sets accounting thresholds of \$5,000 for equipment and \$10,000 for structures and land improvements, among other practices.

Prior to this review, Board and public members raised concerns regarding capitalization of master plans and preliminary studies related to capital projects. While these studies impact capital asset’s design and plan, utilities across the country treat similar expenditures differently depending on their internal accounting conventions and accounting practices are subject to interpretation on this matter. To help resolve this issue, the District engaged Moss Adams firm to review the District’s capitalization practices and share their findings. In their second report, they stated:

The District has been capitalizing expenditures incurred in the development of master plans as well as costs incurred that do not relate to specific capital projects or that increase the service capacity of an existing capital asset This is not in compliance with established governmental accounting practices. In addition, the Board's capitalization policies and practices are not sufficiently detailed to provide guidance on what types of costs should be considered for capitalization.

The District is in need of developing more robust capitalization policies that provide for the different stages of a capital project, how to handle costs incurred in each stage, clarification on the nature of expenditures that increase the service capacity and therefore appropriate to capitalize, and the nature of expenditures that are repairs and maintenance and therefore should be expensed as incurred.

Raftelis concurs. The District’s policies, set by the Board, do not reflect the level of detail expected from staff and should be updated to provide clearer direction. At a minimum, the life cycle, capitalization threshold, and discussion of master plans, preliminary plans, and other pre-construction but related project activities should be included.

The District’s Finance staff has already begun the process to write off some past capitalized expenses. A draft revised policy was presented to the Board at its April 29, 2021, meeting, and staff will return with final versions for approval by June 2021. The audited 2020 Annual Financial Report included \$665,009 recorded as a prior year adjustment in governmental activities and \$138,505 in the Community Services Special Revenue Fund due to the restatement of capital assets restated to expense. However, no restatements were identified for the Utility Fund.

Recommendation 17: Revise and update the District’s policies and practices related to capitalization of assets.

The District’s Finance staff is already in process of drafting a revised policy and procedure for capitalization and brought this issue and a draft revised policy before the Board on its April 29, 2021, meeting agenda (Item J.7). The draft policy specifically states that “Costs incurred in pre-planning phases, including Master Plans and Project Feasibility Studies that explore potential capital projects should be expensed.” We concur that finalizing the update of this policy, and ensuring additional staff training in this area, will benefit the District and ensure more accurate and transparent financial reporting.

Capital Funding Policy

The District has established limitations on the size of a project for which debt can be considered but has no specific policy in place regarding when and how to use debt and other financing sources to pay for large infrastructure projects. Board Practice 14.2.1.2.3.0 states “The District will consider issuing a bond for any ‘utility’ project or group of projects when that totals more than \$2.5 M and can be repaid within 20 years of the completion of the project acquisition or construction. The additional time allowed is in recognition of that maturity under the Nevada State Revolving Fund Loan Program. Shorter maturities are preferred whenever feasible.”

Historically, prior Boards have rejected debt financing and used cash financing. Board Policy 6.1.0 states, “The District, through the Board of Trustees, shall adopt a process that specifies appropriate uses for debt and identifies the maximum amount of debt and debt service that should be outstanding at any time.”

The topic of capital projects financing methods has arisen recently due to several factors. First, there are new Board members with differing opinions on the matter who are questioning past practice. Second, the cost of debt/loan financing at the time of this review was at historically low interest rates, making the cost of debt financing less expensive. Third, the District is undertaking what is its largest capital project, the estimated \$30 million effluent pipeline project. In past years, the Board directed staff to set aside \$2 million from the Unrestricted Net Position of the Utility Fund toward this project, in effect saving up cash ahead of time to “PayGo” (pay as they go) for the project.

Recommendation 18: Review and revise the District’s funding policy for capital projects.

It is an opportune time to revisit this issue and revise the District’s policy for funding capital projects. Several Board members interviewed for this review were open to considering the use of debt for large projects, as long as staff analysis justified the financials and the debt service (principal and interest payment) requirements are not too onerous.

A revised policy should include metrics by which staff is required to analyze project financing to determine the costs of PayGo versus the use of loans or debt. Besides the financial costs of borrowing (interest and administrative costs related to borrowing), the District should include consideration of the non-financial considerations, such as generational impacts, as outlined in the table below:

Table 9: Considerations for Capital Projects Financing

	PAY AS YOU GO (PAYGO)	DEBT (Loans/ Bonds)
PROS	<ul style="list-style-type: none"> • Future funds not tied up in debt payments • Can use interest savings (that would be spent on debt) toward other projects • No risk of default 	<ul style="list-style-type: none"> • Projects delivered when needed; no wait • Costs spread over life of asset • Builds capacity to invest with available funds • Those using the project, pay for the project
CONS	<ul style="list-style-type: none"> • Can increase wait time for projects while saving up • Large projects can exhaust budget • Risk of project inflation during wait • Burden to current users for benefit of future users 	<ul style="list-style-type: none"> • Borrowing rate could be high • Debt payments impact future budgets and reduce future flexibility

Once a policy is created, staff can analyze large-scale capital projects with regard to lifespan, project cost, and cost/benefit of PayGo versus debt financing based upon current financing rates. For capital projects over \$2.5M, staff should perform a calculation on total cost if financed and impact upon net position if paid in cash.

This analysis should be applied as soon as possible to the effluent pipeline project, to take advantage of favorable interest rates. The District should consider debt financing for all, none, or a portion of the project. A hybrid model utilizing the set-aside already established and financing of the balance could be advantageous and reduce financing costs. All or a portion of the established set-aside can be used toward financing the project, with the balance used to enhance reserve levels in the Utility Fund.

Conclusion

This organizational assessment was undertaken to assess operations and identify opportunities to enhance efficiency and effectiveness within the Incline Village General Improvement District's utilities operations. The recommendations in this report were developed to build upon the District's already high service level and approach to District operations in a unique operating environment.

By investing in public outreach and communications, revising and clarifying several financial policies, addressing organization structure and staff retention concerns, and increasing technology to enhance efficiency, the District will ensure its utilities operations continue to provide high value to residents for years to come.

Using this report as a guide, the District will be able to continue to improve operations and services and to streamline internal processes for the benefit of the IVGID community. Prioritization of these recommendations and thoughtful, planned implementation are needed to ensure resources are expended prudently and risks to utility operations reduced.

MEMORANDUM

TO: Board of Trustees

THROUGH: Indra Winqest
District General Manager

FROM: Brad Underwood, P.E.
Director of Public Works

SUBJECT: Mountain Cart Path Informational Memo

DATE: October 6, 2021

The following information is provided to the Board in addressing a contract change approved by the Engineer/Owner.

Timeline

- Bidding documents were received from Design Engineer on July 21, 2021.
- The bid was setup for the Contractors to bid on two segments:
 - Base Bid to reconstruct the pathway along holes #3, #4, and most of #5.
 - Alternate Bid to reconstruct the pathway along the remainder of hole #5, holes #6, #7, and most of #8.

The bidding was set up this way to ensure that some of the intended work could be awarded for construction as the Engineer's estimate totaled \$684,916.54 (see attached - Lumos), which exceeded the construction budget for the project of \$405,000.

- PW Staff Advertised for Bid on July 23, 2021
- PW Staff held a Non-Mandatory Pre-Bid meeting on August 3, 2021, but no contractors attended. PW Staff was notified that a representative of MKD Construction was looking at the site later that afternoon.
- PW Staff received 5 questions during the bidding phase and an Addendum (prepared by the Design Engineer) was issued on August 24, 2021 (no questions regarding the use Recycled Type I Base or request for additional subsurface reports).
- Bid opening was held on August 26, 2021 and two bids were received. The Bids were opened and read aloud in front of PW Staff, representative of Cruz Construction and a representative of FW Carson. Both contractors

submitted bids on both the Base Bid and Alternate Bid as set forth in the bid documents. PW Staff asked if FW Carson felt comfortable with their bid and they were. No protests were received within the 5 business days (as allowed for by NRS 338.142). FW Carson did not request to pull their bid within the 24 hours as allowed in the contract documents.

- The bids were reviewed and all documents and calculations were verified by PW Staff. The Board memo was finalized by inserting the bid results late in the afternoon on August 26, 2021 (to meet posting requirements for the Board Meeting on September 2, 2021).
- A Construction Contract was awarded to FW Carson (low bidder) by the Board of Trustees at the meeting of September 2, 2021. Both the Base Bid and Alternate Bid were awarded as the total of the two (\$357,138.80) was lower than the project construction budget of \$405,000.
- On September 7, 2021, an PO was created and fully approved on September 9, 2021 based upon the Board of Trustees approvals.
- A preconstruction meeting was held on September 8, 2021 with PW Staff, FW Carson, and Golf Staff). A request was made by the contractor to get a copy of the geotechnical report. The geotechnical report was emailed to FW Carson the afternoon of September 8, 2021 (see attached email correspondence).
- On September 9/10, 2021, FW Carson verbally requested to use Recycled Type I Base per the geotechnical report (attached), bring in a pulverizing machine recycle material on-site. PW Staff spoke with Design Engineer, who concurred that Recycled Type I Base material was an acceptable alternative. PW Staff contacted Reno Tahoe Geo (Geotechnical Firm performing material testing) September 13, 2021 to advise them that Recycled Base was approved and they will need to obtain material samples to facilitate field testing.
- September 16, 2021, a Notice to Proceed was issued to FW Carson to begin the work.
- September 17, 2021, FW Carson mobilized to the site and began placing BMPs, and potholing.
- September 20, 2021, FW Carson mobilized the pulverizing machine.

Changes to Work/Amending the Contract

The Engineer and/or Owner have the right to authorize changes of work per the contract documents. Which changes are to be documented as amending the contract. This is supported per the following contract document excerpts:

Section 9

- *Article 10.04 Engineer's Authority – Article 10.04.D – Engineer's authority as to changes in the Work is set forth in Article 11.*
- *Article 10.06.A – Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work.*
- *Article 11.01 Amending and Supplementing the Contract – Article 11.01.A – The Contract may be amended or supplemented by Change Order, a Work Change Directive, or a Field Order.*
- *Article 11.03 Work Change Directives – Article 11.03.A – Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or*
- *Article 11.04 Field Orders – Article 11.04.A – Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.*
- *Article 11.05 Owner-Authorized Changes in the Work – Article 11.05.A – Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.*
- *Article 11.05.B – Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon*

As detailed in the timeline above, PW Staff met the requirements that are outlined specifically in these referenced sections of the contract documents. PW Staff is currently working to finalize the appropriate change order to reflect the approval of using recycled base as agreed to with the contractor.

Revised Work

- From conversations with previous engineering staff as well as golf staff, a major concern with golf cart path replacement projects is the damage to the existing turf and irrigation system components that occur during construction. In observing the contractor's method of utilizing a pulverizing machine, very little damage to the adjacent turf and irrigation system components was observed. In fact, to date only one (1) un-marked irrigation box was damaged as part of the installation of rip rap.
- The pulverization method reduced the amount of heavy equipment (loader, dump truck, backhoe) trips that were required in a one way in one way out travel path; which in turn reduced the amount of damage to adjacent turf and irrigation system components as stated above.
- Recycled Type I Base is used throughout the construction industry in roadway construction and is a sustainable product. The sustainability aspects are the re-use of existing on-site materials, less trucking activity resulting in less traffic impacts, less resources used and less impacts to greenhouse gas.
- The recycled materials were tested by Reno Tahoe Geo to ensure specifications of the Standards of Public Works Construction (Orange Book) were met as required by the contract documents, and any identified unsuitable material was removed and replaced per the project plans and specifications.
- Material testing frequency recommendations are included in the Standards of Public Works Construction. The testing frequency was met or exceeded by Reno Tahoe Geo.
- Based on the end product, Staff will be evaluating whether this method should be preferred over removal and replacement for future phases of the work.

Opportunities for Improvement

- Include within the Contract Documents, any report associated with the project that is pertinent in developing the project documents (i.e. geotechnical, environmental, historical, etc.).
- Review timeframes for execution of the contract and make improvements to contract processing.
- Develop a process to ensure contract documents are fully executed prior to issuing a notice to proceed to the contractor.

- Follow up verbal changes/directives with written documentation in a timely manner.
- Initiate internal design review meetings at critical points (i.e. 60% and 90%) in the project design process.

**Incline Village G.I.D Public Works
Mountain Golf Course Cart Path Reconstruct Phase 1
Engineer's Estimate of Probable Cost
Date: 06/29/2021
JN 10164.001**



Engineer's Estimate - Base Bid					
Item No.	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/Demobilization	LS	1	\$ 27,626.00	\$ 27,626.00
2	Full Depth AC Pavement & Base Removal (Existing AC Pavement Removal, Subgrade Excavation, Off-Haul)	SF	15,320	\$ 9.00	\$ 137,880.00
3	New Full-Depth AC Pavement Section (3" AC Pavement, 4" Type 2 Aggregate Base, Grading & Compaction)	SF	15,320	\$ 9.00	\$ 137,880.00
4	AC Curb	LS	1	\$ 500.00	\$ 500.00

Sub Total = \$ 303,886.00
Contingency (15%) = \$ 45,582.90
Total = \$ 349,468.90

Engineer's Estimate - Alternate Bid					
Item No.	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/Demobilization	LS	1	\$ 26,517.60	\$ 26,517.60
2	Full Depth AC Pavement & Base Removal (Existing AC Pavement Removal, Subgrade Excavation, Off-Haul)	SF	12,888	\$ 9.00	\$ 115,992.00
3	Remove Asphalt Surface	SF	3,688	\$ 5.00	\$ 18,440.00
4	New Full-Depth AC Pavement Section (3" AC Pavement, 4" Type 2 Aggregate Base, Grading & Compaction)	SF	12,888	\$ 9.00	\$ 115,992.00
5	New 3" Asphalt	SF	3,688	\$ 4.00	\$ 14,752.00

Sub Total = \$ 291,693.60
Contingency (15%) = \$ 43,754.04
Total = \$ 335,447.64

General Note:

This preliminary estimate of probable construction cost is the Engineer's best judgement as a professional engineer generally familiar with this type of construction. However, since the Engineer has no control over market conditions, the Engineer does not guarantee that proposals, bids, or actual construction cost will not vary from this estimate.

\\la.lumosengineering.net\Shared\LAProj\10164.001 - Mountain Golf Course Cart Path Reconstruct\Civil\Estimates\2021-06-25 Cost Estimate-Base & Alternate Bid\101

From: Brad B. Underwood
Sent: Wednesday, October 6, 2021 9:27 AM
To: Joshua Nelson <Joshua.Nelson@bbklaw.com>; Winquest, Indra S. <ISW@ivgid.org>
Subject: FW: Complete Contract Document - Mountain Golf Cart Paths
Importance: High

Josh and Indra,

Please see the email that was sent by Kate below with the attachment that she included. Notice the date of September 8th with Board approval of the contract on September 2nd.

Brad

From: Kate S. Nelson
Sent: Wednesday, October 6, 2021 9:06 AM
To: Brad B. Underwood <BBU@ivgid.org>
Subject: FW: Complete Contract Document - Mountain Golf Cart Paths

From: Kate S. Nelson
Sent: Wednesday, September 8, 2021 2:33 PM
To: Rector, Ronnie L. <Ronnie_Rector@ivgid.org>; Troy Carson <troy@fwcarsonco.com>;
rian@fwcarsonco.com

60A

Subject: RE: Complete Contract Document - Mountain Golf Cart Paths

Hi Troy –

Attached is the geotech report that we discussed at the pre-construction meeting.

Kate

From: Rector, Ronnie L.

Sent: Wednesday, September 8, 2021 1:56 PM

To: Troy Carson <troy@fwcarsonco.com>; rian@fwcarsonco.com

Cc: Kate S. Nelson <ksn@ivgid.org>

Subject: Complete Contract Document - Mountain Golf Cart Paths

Here's the entire contract book for your review and approval. If you would prefer to just come in and sign over here, I'll allow it. 😊

Or, you could print out just the attached Signature Page, sign that and return it to me.

Let me know if you'd like an actual hard copy of this bugger and I'll provide it once the Trustees have also signed off.

Also let me know if you have any questions!

Ronnie

Ronnie Rector

Public Works Contracts Administrator

Incline Village General Improvement District

1220 Sweetwater Road, Incline Village NV 89451

P: 775-832-1267

F: 775-832-1260

rr@ivgid.org

<https://www.yourtahoeplace.com/ivgid>



GEOTECHNICAL INVESTIGATION REPORT

IVGID MOUNTAIN GOLF COURSE CART PATH EVALUATION

JN: 10164.000

INCLINE VILLAGE, NEVADA

SEPTEMBER, 2020

PREPARED FOR:

INCLINE VILLAGE G.I.D. PUBLIC WORKS
ATTN: MICHAEL LEFRANCOIS
893 SOUTHWOOD BLVD.
INCLINE VILLAGE, NV 89451-9425

PREPARED BY:

LUMOS & ASSOCIATES, INC.
808 E. COLLEGE PARKWAY, SUITE 101
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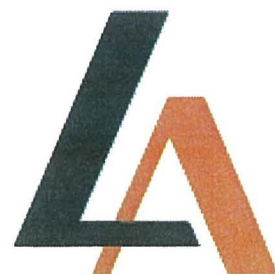


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IVGID MOUNTAIN GOLF COURSE CART PATH EVALUATION Incline Village, Nevada

INTRODUCTION

Submitted here within are the results of Lumos and Associates, Inc. (Lumos) geotechnical investigation for the proposed IVGID Mountain Golf Course Cart Path Evaluation project located in Incline Village, Nevada. A vicinity map is included as Plate 1 and a site map is included as Plate 2.

It is our understanding that the proposed project will consist of re-construction of the cart paths within the Mountain Golf Course. We have assumed that final grades at the site will be approximately the same as the existing grades.

The purpose of our investigation was to characterize the site geology and soil conditions, describe the native soil, determine their engineering properties as they relate to the proposed construction, and to identify any adverse geologic, soil/bedrock, or groundwater conditions. The current scope of work did not include any soil and/or groundwater contamination evaluations at the site.

The recommendations contained herein have been prepared based on our understanding of the proposed improvements and our findings of subsurface conditions at the site. Re-evaluation of the recommendations presented in this report should be conducted after the final site grading and construction plans are completed, if there are any variations from the assumptions described herein.

It is possible that discontinuities are concealed beneath earth materials between and beyond exploration points. Such discontinuities are beyond the evaluation of the Engineer at this time. No guarantee of the consistency of sub-surface conditions or site geology is implied or intended.

GEOLOGIC SETTING

Incline Village is located at the northern end of the Lake Tahoe Basin, a large fault-bounded valley within the eastern portion of the Sierra Nevada geomorphic province. Lake Tahoe is one of the world's largest and deepest alpine lakes, approximately 22 miles long and at least 1,600 feet deep. The Sierra Nevada is geographically characterized by a steep eastern slope that separates the Sierra Nevada and Great Basin geomorphic provinces and a gentle western slope that eases down into the Great Valley.

The surface geology of the project has been mapped by George J. Saucedo (2005). The mapping indicates that Tahoe glacial deposits from the Pleistocene Age underlie a majority of the site (Qta). The mapping also indicates the southern portion of the site is underlain by undivided glacial deposits from the Pleistocene and Holocene age (Qgo). Refer to Plate 3.

The geologic evolution of the Sierra Nevada province is extremely complex and involved a long sequence of events. First, subduction and abduction of oceanic plates below and across the continental plate began. This interaction between the two plates created different metamorphic rock complexes at the collision area known as a trench. Then, the deep continental crust began to melt into granite magma and volcanoes began to erupt above the granite batholiths. The basin and range to the east began to widen and open. Finally, the Sierra Nevada began to rise and tilt a few degrees to the west.

Glaciers have played an active roll in shaping the Sierra Nevada Mountains, particularly during the past two (2) million years. Alpine glaciers were present around Lake Tahoe during much of this period and extended below the current level of the Lake along the west shoreline (i.e., at Emerald Bay). The large U-shaped valleys surrounding the Lake were carved out by ice and display typical glacial features such as polished rock, lateral moraines and glacial lakes (tarns).

SITE CONDITIONS AND FIELD EXPLORATION

At the time of our investigation, the cart path asphalt had extensive cracking throughout (fatigue and transverse).

The current field investigation included a subsurface exploration. The location of the exploratory core drillings were determined by using existing features at the site and a map of the core locations. Therefore, the approximate location of the exploratory core drillings should be considered accurate only to the degree implied by the methods used.

Ten (10) exploratory core drillings were excavated with a Milwaukee core drill and a six (6) inch diameter bit, throughout the proposed project area, to a maximum depth of 24 inches below-existing-grade (b.e.g.). The locations of the exploratory core drillings within the site are shown on Plate 2. The subsurface soils were continuously logged and visually classified in the field by our Geotechnician in accordance with the Unified Soil Classification System (USCS). Representative soil samples were collected at each material change within the exploratory core drillings and subsequently transported to our Carson City geotechnical laboratory for testing and additional analysis.

The subsurface soils encountered consisted generally of silty sands with varying amounts of gravel to the total depths explored for this project. Groundwater was not encountered at the time of our investigation and is not expected to impact the development of this site. However, seasonal groundwater fluctuations should be anticipated at the site.

FIELD AND LABORATORY TEST DATA

Field and laboratory data was developed from samples taken and tests conducted during the field exploration and laboratory phases of this project. The core holes were initially started utilizing a core machine with a six-inch bit, then hand excavated to the depths explored. Representative bulk samples were collected at each lithological change. All samples were subsequently transported to our Carson City geotechnical laboratory for testing and analysis.

Laboratory tests performed on representative samples included sieve analysis, Atterberg Limits, and R-values. Much of this data is displayed on the "logs" of the exploratory core holes to facilitate correlation. Field descriptions presented on the logs have been modified, where appropriate, to reflect laboratory test results. The logs of the exploratory core holes are included in Appendix A of this report as Plates A-1 through A-10. Plate A-11 describes the various symbols and nomenclature shown on the logs.

Individual laboratory test results are presented in Appendix B as Plates B-1 through B-3. Laboratory testing was performed per ASTM standards, except when test procedures are briefly described and no ASTM standard is specifically referenced in the report. Atterberg limits were determined using the dry method of preparation (Plate B-2).

The soil samples obtained during this investigation will be held in our laboratory for 30 days from the date of this report. The samples may be retained longer at an additional cost to the client or obtained from this office upon request.

DISCUSSION AND RECOMMENDATIONS

GENERAL

The following recommendations are based upon the construction and our understanding of this project, as outlined in the introduction of this report. If changes in the construction are proposed, they should be presented to the Lumos Geotechnical Department, so that these recommendations can be reviewed and modified in writing, as necessary. As a minimum, final construction drawings should be submitted to the Lumos Geotechnical Department for review prior to actual construction and verification that our geotechnical design recommendations have been implemented.

GENERAL SITE GRADING

Prior to placement of fill and/or the proposed improvements, the areas to receive fill and/or improvements shall be cleared and grubbed. Clearing and grubbing is not anticipated under the existing cart path. Clearing and grubbing may be required if improvements will be placed outside of the existing cart path. Where required, clearing and grubbing is anticipated to be as much as six (6) inches, or more, where thicker vegetation/roots are present.

Root- or organic-laden soils encountered during excavations, should be stockpiled in a designated area on site for later use in landscaping, or removed off site as directed by the owner. Excavated soils free from any organics, debris or otherwise unsuitable material and with particles no larger than three (3) inches in maximum dimension may be stockpiled and moisture conditioned for later use as compacted structural fill provided it meets the criteria for structural fill soils.

All surfaces to receive fill and/or improvements should be observed and approved by a Lumos representative prior to placement of fill. The surfaces shall be scarified to a minimum depth of twelve (12) inches, oversize particles (+3") removed, moisture conditioned to within two percent (2%) of optimum, and re-compacted to at least ninety

percent (90%) of the ASTM D1557 standard. This requirement may be waived, at the discretion of the Geotechnical Engineer. Fill material should not be placed, spread or compacted while the ground is frozen or during unfavorable weather conditions. When site grading is interrupted by heavy rain or snow, grading or fill operations should not resume until a Lumos representative approves the moisture content and density conditions of the subgrade or previously placed fill.

Unstable conditions due to yielding and/or pumping soils are not anticipated to be encountered on site. However, native soils may yield or pump under heavy equipment loads or where vibratory equipment draws up water. If yielding or pumping conditions are encountered, the soils should be scarified in place, allowed to dry as necessary and re-compacted, where applicable. Alternatively, the unsuitable or saturated soil should be removed, the exposed surface leveled and compacted/tamped as much as practical without causing further pumping, and covered (including the sides) with geotextile stabilizing fabric (Mirafi HP370 or other equivalent). The fabric should then be covered with at least 12 inches of 3- to 6-inch **angular rock fill** with enough fines to fill the inter-rock pore spaces. Placement should be by end dumping. No traffic or other action should be allowed over the fabric, which may cause it to deflect/deform prior to cobble placement. Test sections should be used to determine the minimum thickness and/or number of layers required for stabilization.

Stabilization should be evaluated by proof-rolling standards commensurate with the equipment used, and approved by a Lumos representative. The placement of the stabilizing rock-fill may require additional over-excavation to maintain appropriate grading elevations. A filter fabric (Mirafi 180N or equal) should also be placed over the cobble rock fill to prevent piping of fines from covering soils into the stabilizing rock matrix.

Acceptable structural fill soils to be used for this project should consist of non-expansive material (LL less than 35 and/or a PI less than 12, and/or an Expansion Index less than 20), and should be free of contaminants, organics (less than two percent (2%)), rubble, or natural rock larger than three (3) inches in largest dimension. The R-Value shall be a

minimum of 30. Any import soils should be tested and approved prior to being placed or delivered on-site (seven (7) day advanced notice). Structural fill soils shall also meet the following gradation requirements:

**TABLE 1
STRUCTURAL FILL GRADATION SPECIFICATIONS**

SIEVE SIZE	% PASSING
3"	100
¾"	70 - 100
#40	15 - 65
#200	10 - 30

Soils not meeting all of the above requirements may be approved for use as structural fill at the discretion of the Geotechnical Engineer. It is anticipated the site silty sands will be suitable for reuse as structural fill, provided the oversize particles (+3") are removed. Compacted fill should be placed only on compacted sub-grade or on compacted fill in lifts not exceeding eight (8) inches in loose thickness, moisture conditioned to within two percent (2%) of optimum, and compacted to at least ninety percent (90%) relative compaction, as determined by the ASTM D1557 standard. Particle size, and lift thickness, may be increased by the Geotechnical Engineer, provided the contractor can demonstrate specified compaction requirements can be achieved.

If fill is to be placed on slopes steeper than 5:1, the existing slope shall be benched, in equipment wide swaths, that have a grade at least 20:1 into the slope. The bottom of the fill slope shall have a key a minimum of two (2) feet deep and ten (10) feet wide.

Fill material should not be placed, spread or compacted while the ground is frozen or during unfavorable weather conditions. When site grading is interrupted by heavy rain or snow, grading or filling operations should not resume until a Lumos representative approves the moisture content and density conditions of the subgrade or previously placed fill.

Landscape areas should be cleared of all objectionable material. In cut areas, no other work is necessary except grading to proper elevation. In fill areas, fill should be placed in loose lifts not exceeding twelve (12) inches and compacted to at least ninety percent (90%) relative compaction to prevent erosion.

Water should not be allowed to pond adjacent to structures, and measures should be taken to reduce surface water infiltration into the foundation soils.

A representative of Lumos should be present during site grading operations to ensure that any unforeseen or concealed conditions within the site are identified and properly mitigated, and to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction and is dependent upon compaction and stability of the subgrade soils. The soils engineer may reject any material that does not meet engineering characteristics, compaction, and stability requirements. Further, recommendations of this report are based upon the assumption that earthwork construction will conform to recommendations set forth in this section of the report.

PAVEMENT DESIGN

The pavement structural section was determined for the asphalt concrete utilizing an R-value of 51 for the native silty sands (laboratory test results) and an R-value of 70 for the aggregate base course, (Standard Specifications for Public Works Construction (SSPWC)). Refer to Table 2, "Recommended Asphalt Pavement Section". We recommend removing the upper seven (7) inches of asphalt and underlying soil to allow for the recommended asphalt and Type 2, Class B aggregate base to be placed. The area exposed should be scarified in place to a depth of at least 12 inches, particles larger than three (3) inches removed, moisture conditioned to within two percent (2%) of optimum, and compacted to at least ninety percent (90%) of ASTM D1557. Aggregate base should consist of Type 2, Class B material and meet the requirements of the SPPWC. The existing asphalt, base, and/or decomposed granite may be pulverized and reused as aggregate base, provided it meet the requirements of Type 1 Recycled Aggregate Base. Aggregate base material (Type 2, Class B or Type 1 Recycled) should be compacted to at least ninety-five percent (95%) of the laboratory maximum density as determined by the ASTM D1557 standard.

**TABLE 2
RECOMMENDED ASPHALT PAVEMENT SECTION**

	Minimum Asphalt Pavement Thickness	Minimum Aggregate Base Thickness	Properly Prepared Suitable Subgrade
Cart Path	3"	4"	12"

See Appendix C for Calculations

The recommendation for the three inches of asphalt is to help mitigate against the heavy freeze thaw cycles that happen in this area and the four inches of aggregate base is to help maintain a way in which water can move under the path and not pool up to help with the fatigue cracking.

The asphalt concrete shall contain PG64-28NV oil and Type 3 asphalt aggregate per the SSPWC. We recommend a 50-blow Marshall mix that targets three percent (3%) air voids. Asphalt concrete, placed in cart paths, should be compacted to between ninety-three percent (93%) and ninety-eight percent (98%) of the Rice theoretical maximum density.

All mix designs for asphalt concrete should be submitted to the Geotechnical Engineer for review and approval a minimum of seven (7) days prior to paving.

MOISTURE PROTECTION AND DRAINAGE

The finish surface around all structures including the cart path pavement should slope away from foundations and pavements and toward appropriate drop inlets or other surface drainage devices. It is recommended that within ten (10) feet of the cart path a minimum slope of two percent (2%) be used for soil sub-grades. These grades should be maintained for the life of the project.

CONSTRUCTION SPECIFICATIONS

All work shall be governed by the Standard Specification for Public Works Construction (SSPWC), as distributed by Washoe County except as modified herein.

LIMITATIONS

This report has been prepared in accordance with the currently accepted engineering practices in Northern Nevada. The analysis and recommendations in this report are based upon exploration performed at the locations shown on the site plan, the proposed improvements as described in the Introduction section of this report and upon the property in its condition as of the date of this report. Lumos makes no guarantee as to the continuity of conditions as subsurface variations may occur between or beyond exploration points and over time. Any subsurface variations encountered during construction should be immediately reported to Lumos so that, if necessary, Lumos' recommendations may be modified.

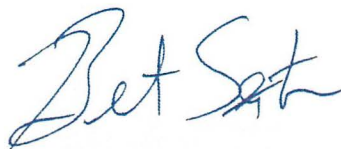
This report has been prepared for and provided directly to Incline Village G.I.D. Public Works ("The Client"), and any and all use of this report is expressly limited to the exclusive use of the Client. The Client is responsible for determining who, if anyone, shall be provided this report, including any designers and subcontractors whose work is related to this project. Should the Client decide to provide this report to any other individual or entity, Lumos shall not be held liable for any use by those individuals or entities to whom this report is provided. The Client agrees to indemnify, defend and hold harmless Lumos, its agents and employees from any claims resulting from unauthorized users.

If this report is utilized in the preparation of an Engineer's Estimate of Probable Construction Costs, then the preparer of the estimate acknowledges that the report recommendations are based on the subsurface conditions found at the specific locations investigated on site; that subsurface conditions may vary outside these locations; and that no guaranty or warranty, express or implied, is made that the conditions encountered are representative of the entire site. The preparer of the estimate agrees to indemnify, defend and hold harmless Lumos & Associates, its agents and employees from any and all claims, causes of action or liability arising from any claims resulting from the use of the report in the preparation of an Engineer's Cost Estimate.

GEOTECHNICAL INVESTIGATION REPORT

This report is not intended for, nor should be utilized for, bidding purposes. If it is utilized for bidding purposes, Client acknowledges that the report recommendations are based on the subsurface conditions found at the specific locations investigated on site; that subsurface conditions may vary outside these locations; and that no guaranty or warranty, express or implied, is made that the conditions encountered are representative of the entire site. The Client agrees to indemnify, defend and hold harmless Lumos & Associates, its agents and employees from any and all claims, causes or action or liability arising from any claims resulting from the use of the report for bidding purposes.

As explained above, subsurface variations may exist and as such, beyond the express findings located in this report, no warranties express, or implied, are made by this report. No affirmation of fact, including but not limited to statements regarding suitability for use of performance shall be deemed to be a warranty or guaranty for any purpose.

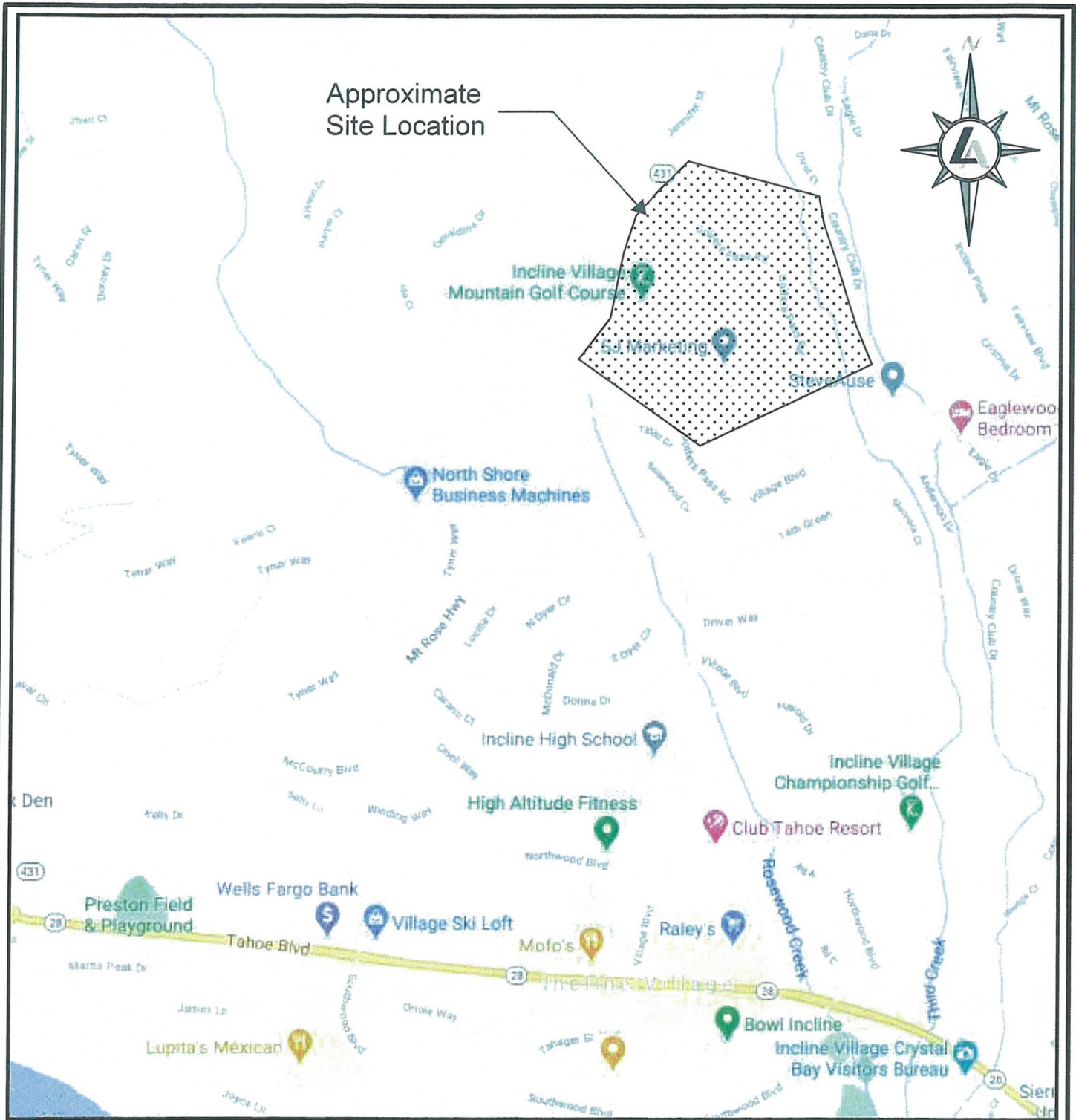


Bert Sexton, E.I.
Geotechnician
Lumos & Associates, Inc.



Mitch Burns, P.E., C.E.M.
Materials Engineering Manager
Lumos & Associates, Inc.

- American Society for Testing and Materials (ASTM), 2020, Annual Book of ASTM Standards, West Conshohocken, PA
- Naval Facilities Engineering Command, 1986, Design Manual 7.01
- Naval Facilities Engineering Command, 1986, Design Manual 7.02
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- Washoe County, 2016, Standard Specifications for Public Works Construction, "Orange Book", Washoe County, NV



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IVGID Mountain Golf Course Evaluation

VICINITY MAP

PLATE

1



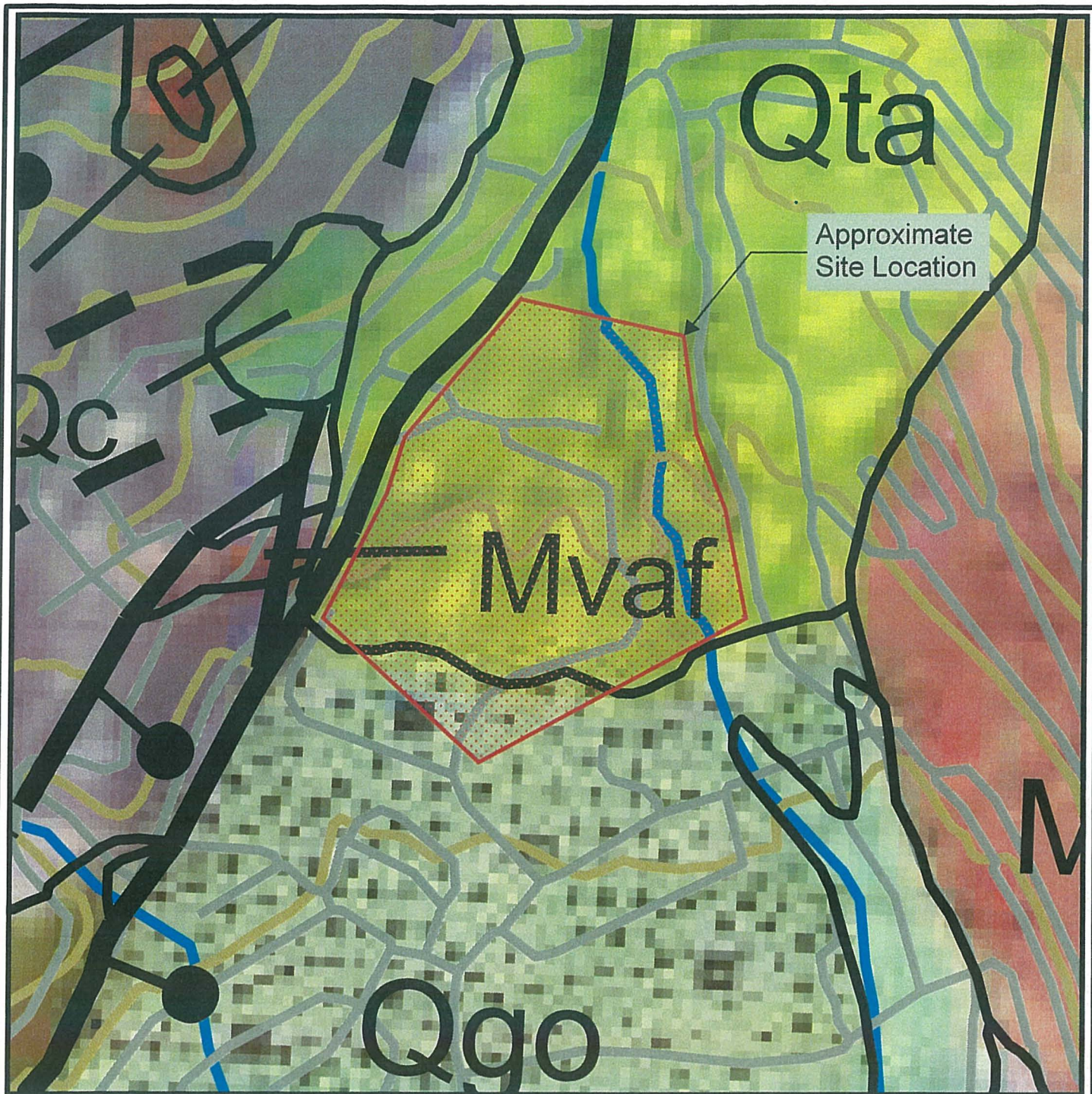
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IVGID Mountain Golf Course Evaluation

SITE MAP

PLATE

2



**GEOLOGIC MAP OF THE LAKE TAHOE BASIN
CALIFORNIA AND NEVADA**

George J. Saucedo 2005

Tahoe glacial deposits (Pleistocene) Glacial deposits undivided (Pleistocene and Holocene?)



Till



Outwash deposits



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IVGID Mountain Golf Course Evaluation

GEOLOGIC MAP

Job Number: 10164.000

Date: Sept., 2020

PLATE

3


APPENDIX A

CORE HOLE No. C-02

Logged By: **B. Sexton** Total Depth: **2 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			2" Asphalt, Brittle, and Fatigue Cracking.												
			1" of Material Similar to Aggregate Base.			0.2									
		Z	3" of a Fill Material. That Consists of a Light Brown Silty SAND with Gravel (SM) , Moist and Medium Dense. Estimated to have 15% Medium to Fine Gravel, 60% Coarse to Fine Sand, and 25% Non-Plastic Silt.			0.3									
0.5		Z	Brown Silty SAND (SM) , Moist, Medium Dense, and with Roots. Estimated 10% Medium to Fine Gravel, 70% Coarse to Fine Sand, and 20% Non-Plastic Silt.			0.5									
1.0															
1.5		Z													
2.0						2.0									
Core Hole terminated at 2 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.															

CORE HOLE LOG 10164.000 IVGID MTN GOLF GP J US LAB.GDT 9/17/20



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IVGID Mountain Golf Course Evaluation

LOG OF EXPLORATORY CORE HOLE

Job Number: 10164.000 Date: September 2020

PLATE

A-2 82

CORE HOLE No. C-03

Logged By: **B. Sexton** Total Depth: **2 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**


Depth in Feet	Graphic Log	Sample Type	Percolation Test	Split Spoon	Ziplock Sample	Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			California Sampler	Bulk Sample	Static Water Table										

SOIL DESCRIPTION

		2" Asphalt, Brittle, Porous, and Fatigue and Transverse Cracking.	0.2												
		5" of Material Similar to Aggregate Base.													
0.5		Brown Silty SAND (SM) , Moist, Medium Dense, and with Roots. Material Combined with Cores 1 and 4. See Core 1 for Test Results.	0.6												
1.0															
1.5															
2.0			2.0												

Core Hole terminated at 2 feet.
 Core Holes Filled with Soil and Capped with Non-Shrink Grout.

CORE HOLE LOG 10164.000 IVGID MTN GOLF GPJ US LAB.GDT 9/17/20



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IVGID Mountain Golf Course Evaluation

LOG OF EXPLORATORY CORE HOLE

Job Number: 10164.000 Date: September 2020




PLATE

A-3


83

CORE HOLE No. C-04

Logged By: **B. Sexton** Total Depth: **1 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			Percolation Test	Split Spoon	Ziplock Sample										
			2" Asphalt, Brittle, Porous, and Fatigue and Transverse Cracking.												
		Z	2" of Material Similar to Decomposed Granite.												
		Z	Brown Silty SAND (SM) , Moist, Medium Dense, and with Roots. Material Combined with Cores 1 and 4. See Core 1 for Test Results.												
0.5															
			Refusal at 12" Due to a Rock That Couldn't be Excavated Out of the Core Hole.												
1.0															
			Core Hole terminated at 1 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.												

CORE HOLE LOG 10164.000 IVGID MTN GOLF.GPJ US LAB.GDT 9/17/20



Lumos & Associates
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 Carson City, NV 89706
 775-883-7077
 Fax: 775-8837114
 mburns@lumosinc.com

IVGID Mountain Golf Course Evaluation

LOG OF EXPLORATORY CORE HOLE

Job Number: 10164.000

Date: September 2020

PLATE


A-4

CORE HOLE No. C-05

Logged By: **B. Sexton** Total Depth: **1.33 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			3 1/2" Asphalt, Less Cracking Noted, Most Likely a Previously Patched Area.												
			6" of Material Similar to Aggregate Base.			0.3									
0.5		Z													
		Z	Medium Brown Silty SAND with Gravel (SM). Moist, Medium Dense, and with Roots. Estimated 15% Medium to Fine Gravel, 65% Coarse to Fine Sand, and 20% Non-Plastic Silt.			0.8									
1.0		Z													
			Refusal at 16" Due to a Rock That Couldn't be Excavated Out of the Core Hole.			1.3									
			Core Hole terminated at 1.33 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.												

CORE HOLE LOG: 10164.000 IVGID.MTN.GOLF.GPJ US_LAB.GDT_9/17/20



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IVGID Mountain Golf Course Evaluation

LOG OF EXPLORATORY CORE HOLE




Job Number: 10164.000 Date: September 2020

PLATE


A-5

CORE HOLE No. C-06

Logged By: **B. Sexton** Total Depth: **2 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			2 1/2" Asphalt, Brittle, Porous, and Fatigue and Transverse Cracking.												
		Z	3 1/2" of Material Similar to Aggregate Base.			0.2									
0.5		Z	Medium Brown Silty SAND with Gravel (SM), Moist, Medium Dense, and with Roots. Estimated 15% Medium to Fine Gravel, 65% Coarse to Fine Sand, and 20% Non-Plastic Silt.			0.5									
1.0															
1.5															
2.0						2.0									
Core Hole terminated at 2 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.															

CORE HOLE LOG 10164.000\VGID.MTN.GOLF.GPJ US LAB.GDT 9/17/20



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VGID Mountain Golf Course Evaluation

LOG OF EXPLORATORY CORE HOLE

Job Number: 10164.000 Date: September 2020

PLATE


A-6

CORE HOLE No. C-07

Logged By: **B. Sexton** Total Depth: **2 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			2 1/2" Asphalt, Brittle, Porous, and Fatigue and Transverse Cracking.												
			2" of Material Similar to Decomposed Granite.												
0.5		Z	Medium Brown Silty SAND (SM) , Moist, Medium Dense, and with Roots. For Testing Purposes This Material was Combined with the Same Native Subgrade Layer from Cores 8 and 10.												
1.0		Z				8.4		NP	NP	12.1	71.6	16.4	78		
2.0															
			Core Hole terminated at 2 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.												

CORE HOLE LOG 10164.000 IVGID.MTN GOLF.GPJ US LAB.GDT 9/17/20



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IVGID Mountain Golf Course Evaluation

LOG OF EXPLORATORY CORE HOLE

Job Number: 10164.000 Date: September 2020

PLATE


A-7

CORE HOLE No. C-08

Logged By: **B. Sexton** Total Depth: **1.25 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			1 3/4" Asphalt, Brittle, Porous, and Fatigue and Transverse Cracking.												
0.2			2 3/4" of Material Similar to Aggregate Base.												
0.4	Z														
0.5			Medium Brown Silty SAND (SM) , Moist, Medium Dense, and with Roots. Material Combined with Cores 7 and 10. See Core 7 for Test Results.												
1.0	Z														
1.3			Refusal at 15" Due to a Rock That Couldn't be Excavated Out of the Core Hole.												
			Core Hole terminated at 1.25 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.												

CORE HOLE LOG 10164.000 IVGID MTN GOLF.GPJ US LAB.GDT 9/17/20



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IVGID Mountain Golf Course Evaluation

LOG OF EXPLORATORY CORE HOLE

Job Number: 10164.000

Date: September 2020

PLATE

A-8

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CORE HOLE No. C-10

Logged By: **B. Sexton** Total Depth: **1.5 feet**
 Date Logged: **9-9-2020** Water Depth: **No groundwater encountered**
 Drill Type: **Hand Excavation** Ground Elev.: **E.G.S. feet ±**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Moisture Content, %	Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			3" Asphalt with Transverse Cracking.												
		Z	4" of Material Similar to Aggregate Base.		0.3										
0.5		Z	Medium Brown Silty SAND (SM) , Moist, Medium Dense, and with Roots. Material Combined with Cores 7 and 8. See Core 7 for Test Results.		0.6										
1.0		Z													
1.5			Refusal at 18" Due to a Rock That Couldn't be Excavated Out of the Core Hole.		1.5										
			Core Hole terminated at 1.5 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.												

CORE HOLE LOG: 10164.000.IVGID.MTN.GOLF.GPJ.US.LAB.GDT.9/17/20

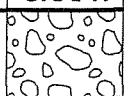



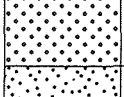
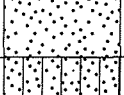

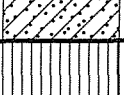




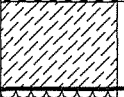




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IVGID Mountain Golf Course Evaluation
LOG OF EXPLORATORY CORE HOLE
 Job Number: 10164.000 Date: September 2020

PLATE
A-10
 90

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS <small>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE</small>	GRAVEL AND GRAVELLY SOILS <small>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE</small>	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS <small>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE</small>	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SM	SILTY SANDS, SAND - SILT MIXTURES
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS <small>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE</small>	SILTS AND CLAYS <small>LIQUID LIMIT LESS THAN 50</small>		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS <small>LIQUID LIMIT GREATER THAN 50</small>		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
			CH	INORGANIC CLAYS OF HIGH PLASTICITY	
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Other Tests	
AN	ANALYTICAL TEST (pH, Soluble Sulfate, and Resistivity)
C	CONSOLIDATION TEST
DS	DIRECT SHEAR TEST
MD	MOISTURE DENSITY CURVE

LUMOS LEGEND - 10164.000 IVGID MTN GOLF GPJ - 10-23-06.GDT - 9/15/20



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IVGID Mountain Golf Course Evaluation

LEGEND

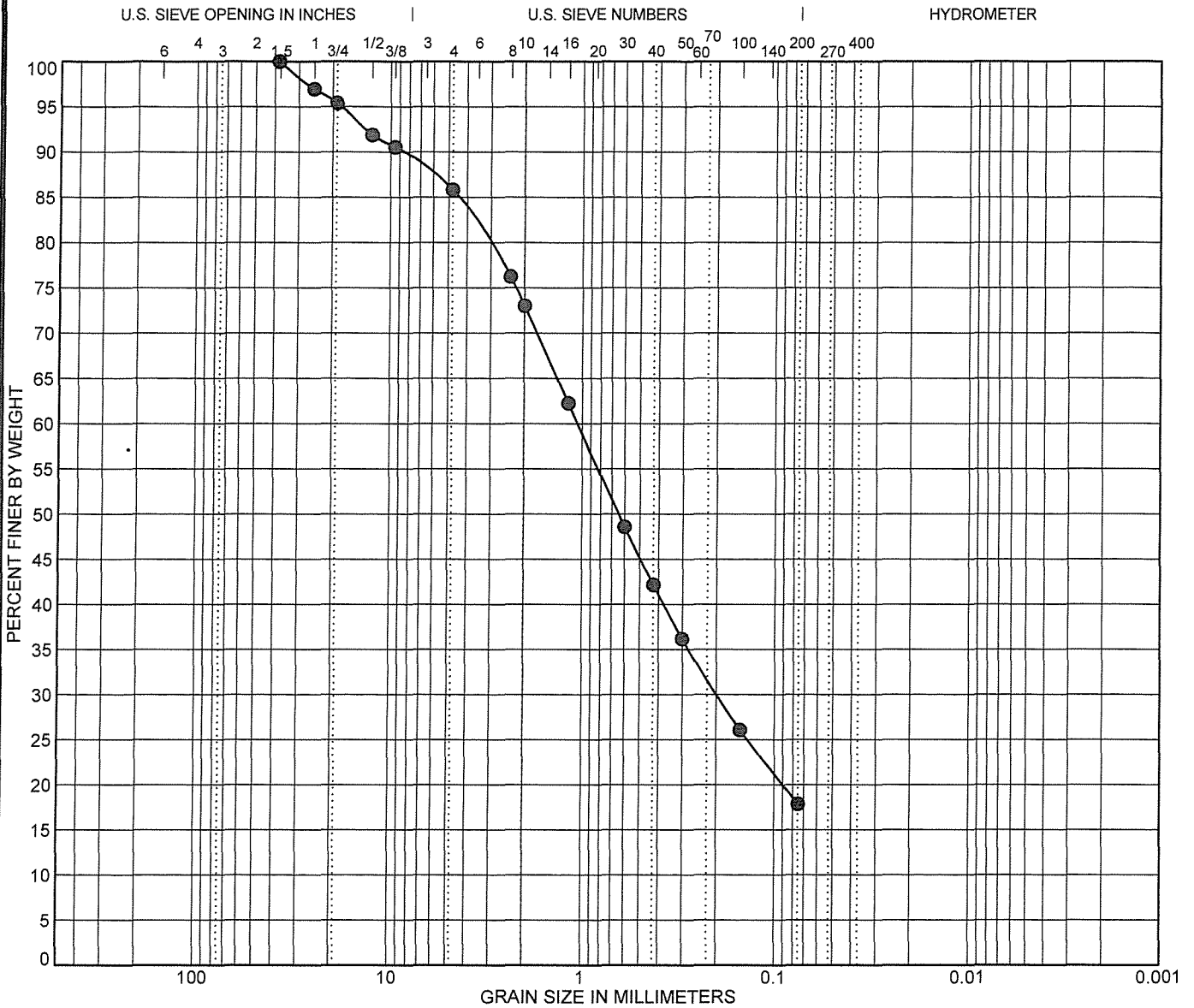
Job Number: 10164.000

Date: September 2020

PLATE

A-11

APPENDIX B



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

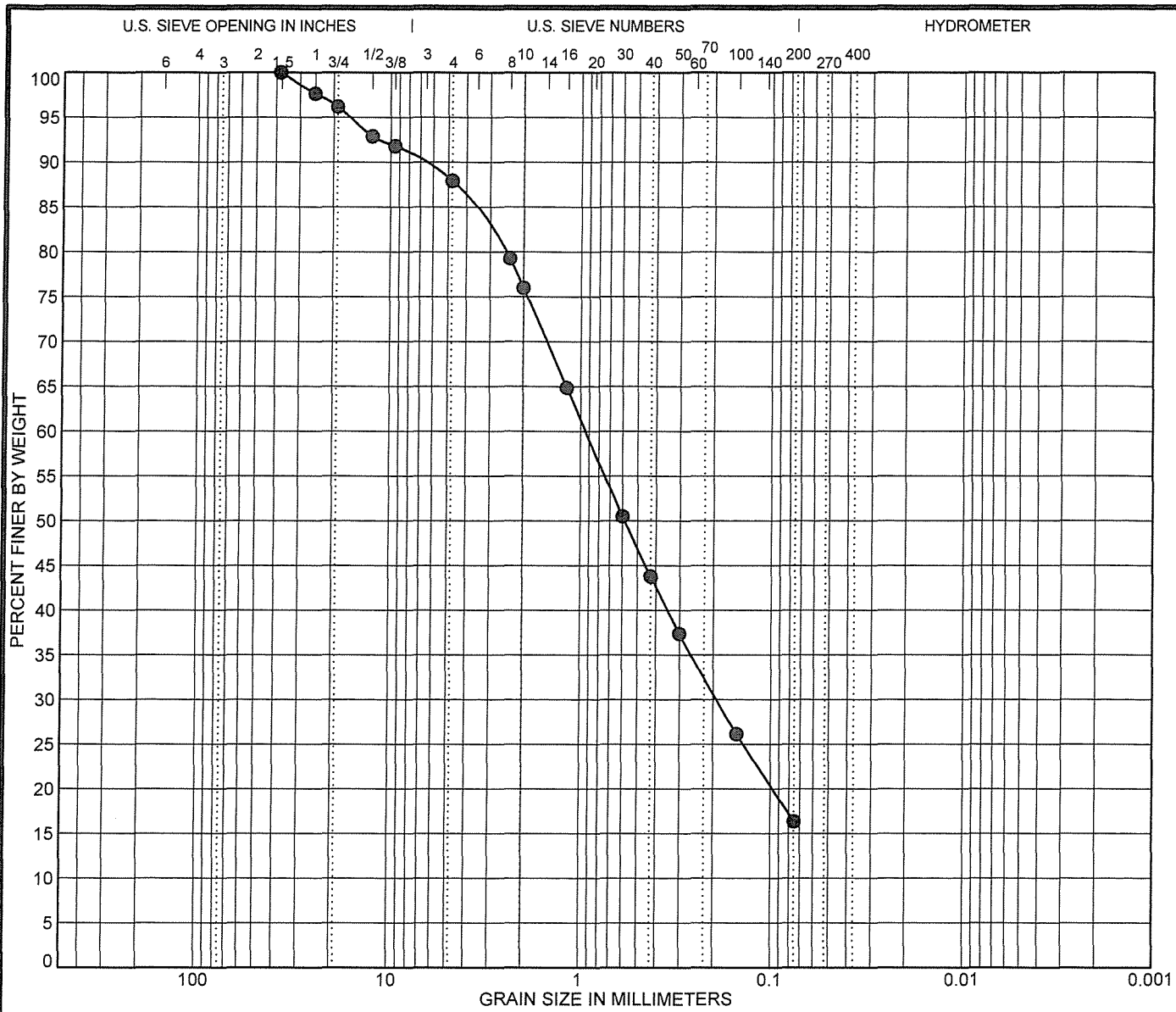
Specimen Identification		Date: 9-11-2020					LL	PL	PI	Cc	Cu
●	C-01	Classification					NP	NP	NP		
	Depth: 0.5	Silty SAND (SM)									
	Sample Location	Combined Native Subgrade from Cores 1, 3, & 4									
	USCS	SM									
	AASHTO										
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	C-01	38.1	1.055	0.196		14.2	68.0		17.9		
	Depth: 0.5										
	Natural Moisture	5.4 %		S.E.		Absorption %					
	R-Value	51		Durability Index		Soundness					
	Percentage of Wear (500 rev)	%		Specific Gravity		Direct Shear					

LUMOS GRAIN SIZE 10164.000 IVGID MOUNTAIN GOLF COURSE EVALUATION LAB.GDT 9/15/20

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IVGID Mountain Golf Course Evaluation
GRAIN SIZE DISTRIBUTION
 Job Number: 10164.000 Date: September 2020

PLATE
B-1.1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Date: 9-11-2020					LL	PL	PI	Cc	Cu
● C-07	Classification					NP	NP	NP		
Depth: 0.38	Silty SAND (SM)									
Sample Location	Combined Native Subgrade from Cores 7, 8, & 10									
USCS	SM									
AASHTO										

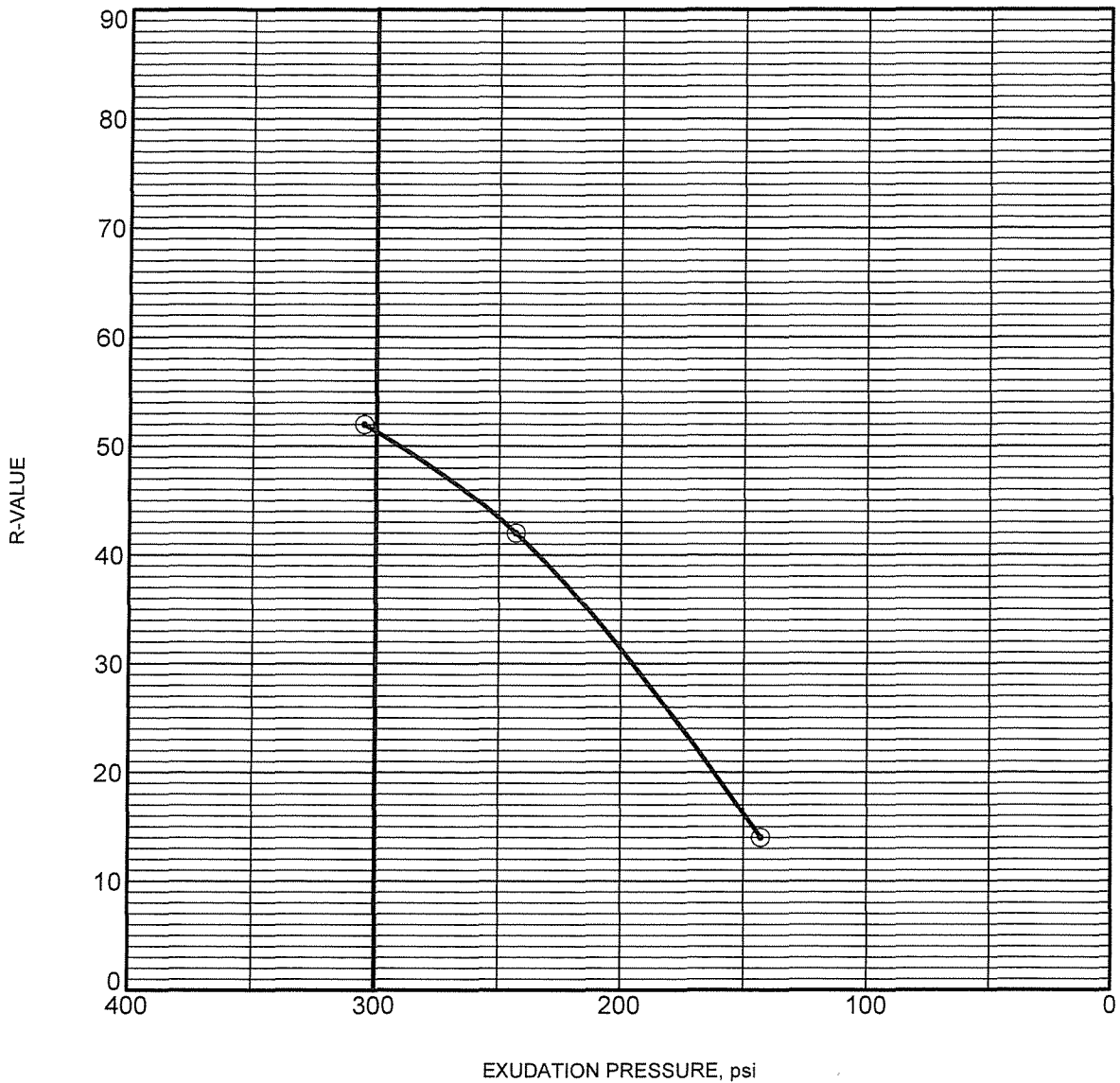
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● C-07	38.1	0.938	0.19		12.1	71.6	16.4	
Depth: 0.38								
Natural Moisture	8.4 %		S.E.		Absorption %			
R-Value	78		Durability Index		Soundness			
Percentage of Wear (500 rev)	%		Specific Gravity		Direct Shear			

LUMOS_GRAIN_SIZE_10164.000_IVGID_MTN_GOLF_GP_J_US_LAB_GDT_9/15/20

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IVGID Mountain Golf Course Evaluation
GRAIN SIZE DISTRIBUTION
 Job Number: 10164.000 Date: September 2020

PLATE
B-1.2



Test Data

Specimen No.	Water Content (%)	Dry Density (pcf)	Expansion (psf)	Exudation (psi)	Test R-Value*
1	13.7	120.0	0.0	143.0	14.0
2	12.2	126.0	0.0	243.0	42.0
3	11.7	120.1	0.0	305.0	52.0

* Reported values have been corrected for sample height, where required.

Test Result

Specimen Identification	Classification	R-Value
C-01 0.5	Silty SAND (SM)	51

R-VALUE 10164.000 IVGID.MTN.GOLF.GPJ US.LAB.GDT 9/15/20



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IVGID Mountain Golf Course Evaluation

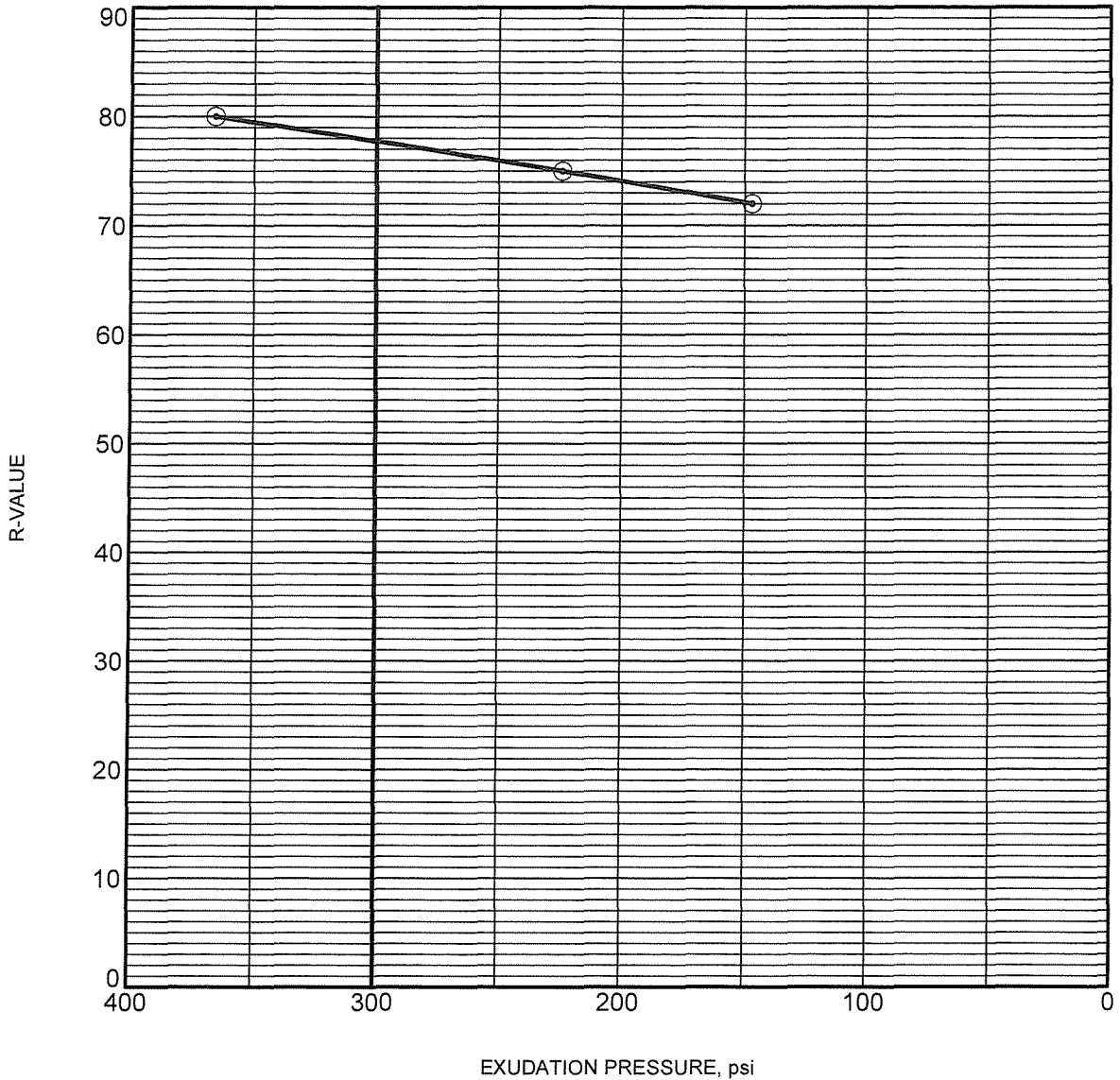
RESISTANCE VALUE TEST

Job Number: 10164.000

Date: September 2020

PLATE

B-3.1



Test Data

Specimen No.	Water Content (%)	Dry Density (pcf)	Expansion (psf)	Exudation (psi)	Test R-Value*
1	10.6	126.8	0.0	366.0	80.0
2	11.8	125.0	0.0	147.0	72.0
3	11.1	122.4	0.0	224.0	75.0

* Reported values have been corrected for sample height, where required.

Test Result

Specimen Identification	Classification	R-Value
C-07 0.4	Silty SAND (SM)	78

R-VALUE 10164.000 IVGID.MTN.GOLF.GPJ.US.LAB.GDT.9/15/20



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IVGID Mountain Golf Course Evaluation

RESISTANCE VALUE TEST

Job Number: 10164.000

Date: September 2020

PLATE

B-3.2

APPENDIX C

Job # 10164.000
Client: IVGID Mountain Golf Course Evaluation
Description: Pavement Calculations
By: B. Sexton

T.I. = 4.5 (light traffic)
Gf = 2.5
GE = 0.0032(TI)(100-R)
t_{layer} = GE/Gf

$GE_{AC} = 0.0032(4.5)(100-70) = 0.43'$
 $t_{AC} = 0.43/(2.5)(12") = 2.1" \Rightarrow$ **use 3" Asphalt**
 $t_{AC(actual)} = (3)(2.5)/12" = 0.63'$

$GE_{AB} = 0.0032(4.5)(100-51) = .71'$
 $t_{AB} = (0.71 - 0.63)(12")/1.1 = 0.9" \Rightarrow$ **use 4" Aggregate Base**

Therefore, use 3" of Asphalt Concrete underlain by a minimum of 4" of Type 2 Class B Aggregate Base. This is due to the freeze thaw cycles and water migration under the cart path.



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IVGID Mountain Golf Course Evaluation
PAVEMENT CALCULATIONS

Job Number: 10164.000

Date: Sept., 2020

PLATE

C-1