Applegate Group, Inc.
Water Resource Advisors for the West

December 3, 2014

Mr. Terry Dalpiaz
PO Box 804
Delta, CO 81416

RE: North Delta Canal Master Plan - Phase 2 Scope

Dear Terry:

Applegate Group, Inc. is pleased to present you with the following proposal for Phase 2 of the North Delta Canal Master Plan Study. This scope is revised from our earlier proposal to account for recent conversations with you and the CWCB.

Task 1 – Data Gathering

Flow Measurement
A portable Acoustic Doppler Velocimeter meter will be used to estimate the seepage loss along sections of the main canal between the headgate on the Gunnison River and the main service area north of Delta, as well as along the canal section off of Tongue Creek. We anticipate breaking the canal system into approximately ten segments based on topography, soil type, and existing structures. The flow meter will also be used to verify the accuracy of the two existing Parshall Flumes on the canal. It should be noted that the measuring accuracy of this method is similar to a Parshall Flume (+/-5%) and will not be able to detect small losses. This data will be used to find sections with significant seepage losses and identify areas where future improvements would result in significant water savings.

Site Visit and Survey
Applegate will spend a day touring the ditch system and major laterals in order to better understand how the canal is typically operated and gather key survey data points using a survey grade GPS system. The majority of this time will be spent in the main service area north of Delta. Detailed topographic survey data is not included in this proposal in an effort to stay within the grant budget.

Task 2 – Water Supply and Demand

Water Supply
Using diversion records and limited stream flow data from Tongue Creek the water supply for that diversion will be estimated for typical wet, dry, and average years. The supply from the main ditch will be assumed to be constant and limited to the capacity of the existing tunnel pipe.

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Water Demand

The irrigated area will be estimated by adjusting GIS data from the Division of Water Resources in order to conform to information from NDIC Board and site visits. Land that is currently fallow but still holds shares in NDIC will be included in the irrigated area. Inclusion of lands under development will depend on the ownership of any NDIC shares. Once an accurate irrigated area has been established the water demand will be calculated during wet, dry, and average years using CoAgMet data and a total system efficiency. The system efficiency will be estimated using flow measurement data discussed below and typical values for the types of irrigation practiced in the service area.

Task 3 – System Improvements

This task will evaluate and recommend future projects that could improve the flexibility and reliability of the system to maximize irrigation deliveries and beneficial use. This evaluation will involve the conceptual level evaluation of projects in order to identify those with the most potential. Projects that will be considered will include:

- Remote monitoring or control of key structures
- Lining or piping sections with high seepage loss or a high risk level, as identified in Task 1
- Convert the six open laterals along 1525 Road, 1550 Road, and 1575 Rd to pressurized pipelines in order to reduce waste and provide improved service to those users
- Improved flow measurement
- New structures such as checks that would improve the flexibility of the system
- The addition of equalizer reservoirs to help to buffer variable demand patterns and maximize beneficial use of District water.
- A new tunnel bore to bypass the recently piped tunnel section and restore the capacity of that section.

This task will not include final engineering design of any improvements. Rather, it will be used to estimate the cost and benefits of such improvements such that NDIC can prioritize projects as they move forward.

Task 4 – Reconfigured System & Hydropower Potential

The King study evaluated an option that would relocate the main canal diversion on the Gunnison River downstream to a point near the Hartland Ditch diversion. Doing so would eliminate the need to modify the tunnel pipe and replace other infrastructure, such as the siphon, in the future. Applegate will expand on the ideas presented in the King report and asses their potential for meeting any shortages identified in Task 1. It is possible that a smaller pump station at this location used only during times of shortage could limit the volume of pumped water and reduce the overall pumping costs.

Hydropower Feasibility Analysis

If water was diverted at the historic location and passed through the first section of the canal to Austin, all or some of that water could be discharged back to the river through a turbine thereby generating some revenue to help offset costs. The assessment of hydropower will consider generation outside of the irrigation season using new junior water rights, in order to boost revenues. Applegate will initiate discussions with Delta Montrose Electric Association (DMEA) to assess the possibility of essentially net metering a pump station near the Hartland Ditch with generation at a facility near Austin.

Water Rights Analysis
Adding hydropower and a second headgate would require some changes to NDIC's existing water rights. This task will evaluate potential challenges with these items and will include coordination with the Division of Water Resources and the local water commissioner to assess potential water rights issues that could arise if this option was pursued.

Task 5 – Cost Estimates and Funding Options

Infrastructure improvements discussed above will be significant for NDIC. Applegate will prepare a preliminary opinion of probable cost for any recommended improvements; this will allow for a comparison of the aforementioned options based upon their cost effectiveness. Applegate will investigate potential options for funding these improvements, such as the USBR salinity control program, the USBR Water Smart Program, the CWCB loan program, Water Supply Reserve Account and others deemed appropriate.

Task 6 – Engineering Report

A report will be prepared to summarize the work under phase 2. This report will include all data collected during the project, conceptual drawings of any infrastructure, and the overall cost benefit analysis discussed above.

Options evaluated in this study will be compared to assist the District in selecting a course of action. Options that will be compared include:

- Tunnel conversion to Siphon (from Phase 1)– no other system improvements
- Replacement of Existing Infrastructure – Tongue Creek Siphon and Trestle
- Improvements to the system such as lining & piping, flow monitoring & control, and equalizer reservoirs – including replacing existing infrastructure
- Reconfiguration of Canal System – including replacing existing infrastructure as needed

The comparison will list the construction and operational cost of various options, the advantages and disadvantages or each option, and any associated key risk factors.

Task 7 – Meetings and Coordination

Two meetings with the NDIC Board in Delta are anticipated during Phase 2. The first will be to discuss our findings once Phase 2 is 60% complete and obtain any feedback at that time. A second meeting will be held to present and discuss the conclusions of Phase 2.

Budget

Applegate understands that the CWCB money has allowed for a budget of $75,000 for an Engineering Feasibility Study. This scope has been developed in order to meet that budget, while properly addressing issues identified by NDIC and Kirk Russell. Applegate proposes to bill this project on a fixed fee basis. The fee for Phase 1 services was $25,200 and the fee for Phase 2 services is $49,800 for a total of $75,000.

Schedule

Applegate's proposed schedule for this project is attached.

Summary

We appreciate the opportunity to continue working on this project and carry it forward. The scope of work outlined above should give you a good roadmap of what options the district has to bring closure to this project and get it in operation.

Cordially,

Applegate Group, Inc.

Craig Ullmann, P.E.
Senior Water Resource Engineer

cc: AG File No. 14-121

Attachment A
Work Authorization

TO: North Delta Irrigation Company (Client)

FROM: Applegate Group, Inc. (Consultant)

WORK ORDER NO.: 14-121-2

PROJECT TITLE: North Delta Canal Master Plan – Phase II

PROJECT LOCATION: Colorado

Pursuant to the terms and conditions of the Master Professional Services Agreement dated July 9, 2014, this Work Order hereby authorizes Consultant to perform the specified Services under the particular conditions set forth herein:

1. **SCOPE OF WORK:** Consultant agrees to provide consulting services as described under Phase II in the attached proposal dated December 3, 2014.

2. **COMPENSATION:** Compensation will be on a Fixed Fee basis for a total of $49,800.

3. **BILLING SCHEDULE:** Consultant will bill Client monthly.

4. **TIME FOR COMMENCEMENT:** This work will begin upon execution of this Work Order.

5. **TIME FOR COMPLETION:** As described in the attached proposal.

6. **REPORTING REQUIREMENTS:** Consultant will provide detail to each invoice itemizing work that has been completed for the current period.

7. **OTHER PROVISIONS:**
Upon execution of this Work Order, Consultant and Client agree to be bound by and comply with all the terms and conditions contained in the above referenced Master Professional Services Agreement, except as modified by the specific terms and conditions, if any, contained herein.

APPROVED AND ACCEPTED BY:

Applegate Group, Inc.

Signature: Mike Applegate

Name: Mike Applegate

Title: President

Date: December 1, 2014

North Delta Irrigation Company

Signature: _____

Name: TERRY DALPIAZ

Title: SEC/TREAS.

Date: 12-4-14

North Delta Irrigation Company - Tunnel and Canal Feasibility Study
Proposed Project Schedule

	Task Description	2014		2015	
		November	December	January	February
Phase 2	Data Gathering				
	Water Supply and Demand				
	Canal Improvements				
	Reconfigured Canal System				
	Cost Estimates and Funding Options				
	Engineering Report				
	Meetings and Coordination				