



Geotechnical  
Environmental  
Water Resources  
Ecological

November 22, 2013

Mr. Michael Friend, P.E.  
Special Projects Branch  
Bureau of Corrective Actions  
Nevada Division of Environmental Protection  
2030 E. Flamingo Road, Suite 230  
Las Vegas, Nevada 89119-0818

Dear Mr. Friend:

**Re: Titanium Metals Corporation, Henderson, Nevada Facility, Facility ID #H000537  
Beta / NW Ditches Removal Action Completion Report**

This removal action completion report is being submitted on behalf of Titanium Metals Corporation (TIMET). The report documents all aspects of the removal action work and includes data collected during the work. The contents of this report are in accordance with the NDEP approved Removal Action Work Plan – Revision 2 (RAWP-Rev2, June 26, 2013). The report text, tables, and figures are included in the attached PDF. Due to the size of many of the appendices, a sharefile link is being sent for electronic file access. Hard copies including disk copy of the appendices will be sent in accordance with the NDEP distribution list.

Please call me at 503-342-3774 if you have any questions.

Sincerely yours,

A handwritten signature in blue ink, appearing to read "Rich Truax".

Rich Truax, PE  
Senior Project Manager

cc: Richard Pfarrer, TIMET – hard copy & efile  
JD Dotchin, NDEP, Las Vegas, Nevada – hard copy & efile  
BMI Compliance Coordinator, NDEP, Las Vegas, Nevada – hard copy & efile  
NDEP, c/o McGinley and Assoc., 815 Maestro Drive, Reno, Nevada 89511 – hard copy  
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Ranjit Sahu, BMI – efile  
Ed Modiano, OSSM GWTS – efile

Joe Kelly, Montrose – efile  
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Jay Steinberg, NERT – efile  
Allan DeLorme, NERT – efile  
John Pekala, NERT – efile  
Curt Richards, Olin – efile  
Jay Gear, Olin – efile  
Chuck Elmendorf, Stauffer – efile  
George Crouse, Syngenta – efile  
Enoe Marcum, WAPA – efile  
Rebecca Shircliff, Neptune & Co. – efile & hard copy



Geotechnical  
Environmental  
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**Removal Action Completion Report  
BMI Beta Ditch/Northwestern Ditches  
Located on the Titanium Metals  
Corporation Plant Site**

BMI Common Areas, Clark County, Nevada

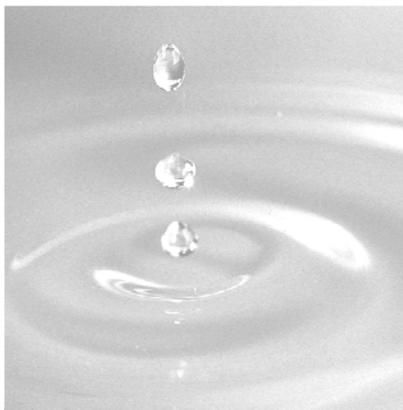
**Prepared for:**

Nevada Division of Environmental Protection  
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**Prepared by:**

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November 2013  
Project 1323080



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Removal Action Completion Report  
BMI Beta Ditch/Northwestern Ditches Located on the  
Titanium Metals Corporation Plant Site  
BMI Common Areas, Clark County, Nevada  
November 2013

Jurat:

*I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulations and ordinances.*

For the services provided and attested to with this Jurat including compilation of information collected by other firms for incorporation into this Beta / NW Ditches Removal Action Completion Report:

GEI CONSULTANTS, INC.



Kelly R. McIntosh  
Senior Consultant

Nevada Certified Environmental Manager  
EM No. 2199; Expires September 24, 2015  
Date Signed: November 22, 2013

# 1. Introduction

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The Titanium Metals Corporation (TIMET) has retained GEI Consultants (GEI) to prepare this Removal Action Completion Report (Report) documenting the removal of soil from the segment of the BMI Common Areas ditch network that enters the TIMET Plant Site at its western property boundary with Tronox known as the former BMI Beta / NW Ditch. The work described herein concludes the actions required of TIMET to satisfy Items 3 and 4 of the December 14, 2012 Enforcement Action and Order from Nevada Division of Environmental Protection (NDEP).

The TIMET facility is located in Clark County, Nevada. The BMI Beta / NW Ditch encompasses an area of approximately 5.3 acres<sup>1</sup> (Figure 1) referred to in this Report as the "Site." The Remedial Action Work Plan – Revision 2 (RAWP-Rev2) documents provide further historical details of the Site and Beta / NW Ditch.

## 1.1 Regulatory Basis

TIMET submitted the RAWP-Rev2 to the NDEP on June 26, 2013. The RAWP-Rev2 included an Excavation Plan Technical Memorandum (Excavation Tech Memo), which further outlined the remedial action objective (RAO) of the work plan. Table 2 of the Excavation Tech Memo, Excavation Analysis by Location, specifically directed the excavation limits and supported the rationale for the RAO. The RAO stated in the RAWP-Rev2 was to remove vadose zone soils exceeding the NDEP outdoor industrial worker direct contact Basic Comparison Levels (BCLs) with the exception of radioisotopes. This RAO included polychlorinated biphenyls (PCBs) at concentrations greater than 1 milligram per kilogram (mg/kg) and the removal of asbestos-contaminated soil. Based on these removal criteria, approximately 30,000 cubic yards of soil was designated for excavation. Radioisotopes (radium 226 and 228; thorium 228) are believed to be present more ubiquitously in the area and better managed via future Site-wide risk assessment and decision making. The RAWP-Rev2 was approved by the NDEP in a letter dated July 9, 2013 (Appendix A).

## 1.2 Project Background

The RAWP-Rev2 and its attached documents provide a discussion of background information related to the Beta/NW Ditch. Previous investigations and studies supporting the RAWP-Rev2 and related to the Site investigation include:

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<sup>1</sup> Approximate acreage based on the boundaries for the sub-area drawn in Figure 1.

- Sampling and Analysis Plan for the BMI Beta Ditch / Northwestern Ditch BMI Beta / NW Ditch Located on the TIMET Corporation Plant Site, Revision 1, February 18, 2011 (TIMET 2011a)
- Technical Memorandum Regarding Asbestos: BMI Beta / Former Northwestern Ditch Area, July 29, 2011 (TIMET 2011b)
- Dioxin Comparability Assessment: BMI Beta / Former Northwestern Ditch Area, October 24, 2011 (TIMET 2011c)
- Data Gap Sampling and Analysis Plan for the BMI Beta Ditch / Northwestern Ditch Located on the Titanium Metals Corporation Plant Site, March 30, 2012 (TIMET 2012)
- Response to NDEP's October 4, 2012 Comments on TIMET's Calculation of Leaching-Based Site-Specific Levels: BMI Beta Ditch / Former Northwestern Ditch area, February 26, 2013 (TIMET 2013a)
- RAWP-Rev2 with Excavation Plan Technical Memorandum and associated documents, June 26, 2013 (TIMET 2013b)

### **1.3 Document Organization**

The remainder of this document provides the Removal Action Completion Report in accordance with Section 4.2 of the RAWP-Rev2 including:

- Copies of daily logs/notes (Appendix B)
- Location maps (Figure 1)
- Surveying results (including plan and cross sectional maps showing pre- and post-excavation conditions) (Figures 2 – 8)
- Results of confirmation soil sampling (Table 1)
- Transportation and disposal documentation (Appendix C & D)

Section 2 of this document provides a general overview of the work performed and various preparation and ancillary activities required for completion of the work. Section 3 provides excavation project specific details with referenced figures and documentation. In addition, Section 3.3 provides a discussion and summary table of soil sample analyses for the wheel wash area. Section 4 provides the conclusions from the overall Beta / NW Ditch excavation work.

## **2. Scope of Work Performed**

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The following is a list of general steps completed throughout the construction process:

- Mobilization
- Finalize required permits
- Designate equipment laydown area and trailer location
- Modify perimeter fencing for ingress/egress
- Establishment of haul routes with imported Type II material
- Clearing and grubbing
- Construct wheel wash station and security guard post
- Excavation and export of ACM soils
- Demolition of culvert related concrete structures within excavation area
- Excavation and export of non-ACM soils
- Import backfill material
- Backfill excavation area/perform geotechnical testing
- Replace fencing along northern property line
- Establishment of final grades
- Conduct as-built survey
- Permit closures
- Application of dust mitigation palliative
- De-mobilization

### **2.1 Site Preparation**

Prior to performing soil excavation activities, remediation support features were established and corresponding signage erected as appropriate and as identified in the design plans. A temporary access gate through the northern fence line allowed for haul truck ingress and egress to Warm Springs Road. The gate was open and security personnel were present during work hours to account for all vehicles entering via this access. A wheel wash station was constructed at the exit point of the temporary access.

Approximately 4,000 tons of type II road base material was imported and placed on Site as an engineering control, creating a buffer between original Site soils and both vehicle and foot traffic. Establishment of the haul roads with this material prevented excess fugitive dust and created clearly visible easements for guiding the high volume truck traffic regularly present on Site. General fill as well as the type II road base material were imported from Boulder Ranch Quarry. Figure 1 shows the access, egress, and Site roadways layout.

Demolition of several concrete structures was necessary. Construction-related debris and vegetation encountered while excavating was transported to the APEX Landfill for disposal. Disposal manifests are attached as Appendix C.

## **2.2 Well Abandonment**

Groundwater monitoring and future extraction wells had been previously installed by others in the remediation areas as part of previous field activities. Wherever possible, the wells were retained, clearly marked, and the remediation contractor was instructed to employ measures to protect these wells from damage during remediation. Eight wells within the footprint of the excavation area were abandoned. The abandoned wells were EW-Qal-03 and -05, CLD1-R, CMT-104, TMPZ-106, EWxMCF-03, -04, and -09. Well abandonment procedures were performed in accordance with Nevada Division of Water Resources requirements. Well decommissioning reports have been provided by the drilling contractor and are included for reference in Appendix E.

## **2.3 Pre-Excavation Conditions**

Before commencement and subsequent to the completion of earth work (discussed further in Section 3.1.5), the Site was surveyed to document pre-Site conditions. Prior to remediation, the entire Site had been topographically mapped using 1-foot elevation contours in a State Plane format. Similar data collection was conducted for the generation of as-built drawings. Figure 1 provides the pre-excavation site grades.

## **2.4 Permitting**

As detailed in the RAWP-Rev2, prior to soil excavation activities, required permits were obtained by Envirocon from the appropriate agencies. Permit closures were also finalized with the associated agency following completion of all construction activities.

### 3. Remediation Excavation

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This section summarizes the remediation activities including excavation procedures, stockpiling and loading procedures, the methods for transporting soils, air monitoring procedures, decontamination procedures, and associated documentation.

#### 3.1 Soil Excavation

The excavation activities progressed in accordance with the Nevada Division of Environmental Protection (NDEP) -approved The Remedial Action Work Plan – Revision 2 (RAWP-Rev2). The soil excavation project began with equipment mobilization August 5, 2013 and was completed with demobilization by October 18, 2013. A milestone for the work was substantial completion of excavation: defined as completion of excavation activities and 6 inches of backfill placed. Substantial completion of the excavation portion of the work was originally scheduled to be completed by August 26, 2013. An August 21, 2013 request by TIMET was approved by NDEP to extend the substantial completion to September 30, 2013. This extension was necessitated due to the extended time required to acquire a grading permit for the work which was complicated by a flood plain extending into the excavation area. Substantial completion of the excavation was subsequently achieved by September 26, 2013. Backfill import, placement, final grading and restoration / demobilization then continued to October 18, 2013.

The excavated materials included asbestos containing materials (ACM, soils indicated by the Site inspector to potentially contain asbestos), soils indicated by the Site inspector to not contain asbestos (non-ACM), grubbing and debris materials including crushed concrete culvert material, and scrap metal from concrete culvert structures rebar. The approximate total removal of each material is provided on the following table:

| Type                       | Tons        |
|----------------------------|-------------|
| ACM                        | 15,368 Tons |
| Non-ACM                    | 41,462 Tons |
| Clearing & Grubbing Debris | 572 Tons    |
| Scrap Metal                | 13 Tons     |

All soil was approved for non-hazardous off-Site disposal at the Apex Landfill located at 13550 North Highway 93, in Apex, Nevada. Supporting information that details the excavation, removal, and any variances to the design plans are provided in the following sections and the appendices attached to this Report.

### **3.1.1 Excavation Procedures**

Excavation was performed to the depths specified in the design plans which were based on Table 2 of the Technical Excavation Memo (RAWP-Rev2, Attachment 1). That table, updated to include samples obtained during construction, is included in Appendix A of this completion Report. The excavation conformed to the limits specified in the design plan. The excavation design is shown on Figure 2. Final excavation elevations are shown on Figure 3. Excavation cross-sections comparing design to actual excavation are shown on Figures 5 – 8. Final site grade after backfill and restoration is shown on Figure 4. Bottom of excavation confirmation-documentation samples were collected in accordance with the RAWP-Rev2 Appendix B Table 2. Table 1 herein provides the results of the confirmation samples and compares them to the relevant screening levels for the RAO. A discussion of the results is provided in Section 3.2.

TIMET retained Envirocon as the remediation contractor to complete the excavation in accordance with the plans and specifications developed for this work. Envirocon utilized construction equipment as appropriate to remove contaminated soils and debris to the depths and lateral extent specified. Soils were either loaded directly into trucks for off-Site disposal, or designated stockpiles were created within the excavation areas to expedite loading as well as avoid contact with soil outside the excavation limits.

A digital copy of the ACM and non-ACM non-hazardous material manifests are provided as Appendix C, and a summary table (supplied by Apex Landfill owner Republic Services) listing each load transported to the Apex Landfill can be found in Appendix D. Transportation was managed in accordance with the Transportation Plan completed by Envirocon (RAWP-Rev2 Appendix H). Figure 1 shows the truck access, egress, and Site import fill roadways utilized for the work. All truck loads were inspected prior to leaving the Site and were in accordance with Clark County air quality requirements for soil transport.

Final excavation elevations were recorded by a professional land surveyor (Diamond Back Surveying) and are depicted in Figures 3 and 5 – 8. Comparison of Figure 3 with the design excavation grades in Figure 2, and the cross-section Figures 5 – 8 illustrate that the final elevations either met or exceeded the planned limits of excavation.

### **3.1.2 Asbestos Containing Materials**

A portion of the overall quantity of soil and debris that were removed from the excavation area included soil commingled with ACM. Asbestos impacted soils were identified in the field using both visual and laboratory sample analyses. Identification and removal of ACM impacted soils was directed by a Nevada certified asbestos abatement consultant, Broadbent Associates, Inc. (Broadbent). Walker Specialty Construction, Inc. (Walker) was the licensed asbestos abatement contractor (subcontracted by Envirocon) responsible for the actual

removal of the ACM impacted soils. Handling of these materials required additional measures governed by Occupational Safety and Health Administration (OSHA) regulations to mitigate contact with potential on- and off-Site receptors. Walker prepared the ACM abatement work plan and made the required NESHAP and OSHA notifications through Clark County Department of Air Quality. The work was performed using modified OSHA Class 1 ACM abatement controls. Broadbent conducted work zone air monitoring and determined appropriate sampling for confirmation of ACM. Both Walker and Broadbent representatives utilized modified level C PPE while performing ACM remedial activities. The ground was watered extensively during the entire abatement activities, and as required for transportation, the haul trucks were lined with two layers of 6-mil plastic sheeting prior to being loaded with ACM and then “burrito” wrapped for transport to the Apex Landfill. An ACM completion report, prepared by Broadbent, including analytical data, is attached as Appendix F.

### **3.1.3 Decontamination Procedures**

During Site mobilization and setup, Site access roads, haul roads, and excavation access areas were constructed in order to avoid the potential for cross-contamination by these activities on the Site. Figure 1 depicts the access and haul routes that were constructed. Clean fill was imported to construct these routes atop the Site surface soils along the boundaries outside of the excavation areas. In addition to construction of the import fill cross-contamination barrier roads, a wheel wash for exiting vehicles was constructed at the Site exit as shown on Figure 1. All exiting vehicles were inspected to assure no residual soils were present on truck exteriors. The wheel wash was primarily intended as a dust control measure to minimize potential track-out of clean import material on vehicle tires.

Other potentially contaminated items (e.g., protective suits, respirator cartridges) were disposed of with the excavated soil at the Apex Landfill. Tools such as shovels were thoroughly washed and rinsed at the decontamination area prior to reuse.

At the completion of Site work during demobilization, the wheel wash area was removed by shallow gravel and soil excavation. The shallow gravel and soil material was disposed at the Apex Landfill. Recycled wheel wash water was utilized for dust suppression within the excavation areas (not on the haul roads). Soil sampling was completed after the shallow excavation of the wheel wash area and is discussed in Section 3.3.

### **3.1.4 Health and Safety**

Remediation activities were performed in accordance with the Site Health and Safety Plan (HASP) provided by Envirocon. The HASP included specifics relating to training and documentation, personal protection equipment, air monitoring, and related emergency procedures. Daily tailgate meetings were held and documented on the Daily Logs (Appendix B). These tailgate meetings included all personnel from all contractors, and

communicated any specific day-to-day hazards, as well as provided opportunity for contractor communications on safe and efficient daily work practices.

Subcontractors at the project (e.g., Walker Services; Broadbent) also provided their own Health & Safety Plan (HASP) that was registered with GEI/TIMET at the Site. All personnel completed the GEI/TIMET safety training program. All personnel were required to check in / out at the guard gate and received a badge and vehicle pass (as applicable) on a daily basis. Security personnel were present 24 hours a day, 7 days a week. No visitors were allowed on the Site without escorts, with the exception of trained NDEP representatives.

### **3.1.5 Dust Control and Monitoring**

Dust control measures were ongoing by Envirocon during all portions of Site work from mobilization through demobilization. Dust control efforts were in accordance with Envirocon's Dust Mitigation Plan and Clark County Permit (RAWP-Rev2, Appendix D). In addition to the dust control plan and permit, GEI prepared and implemented a perimeter air monitoring plan (PAMP, RAWP-Rev2, Appendix E).

Dust mitigation was accomplished by the use of multiple water trucks as a maintenance measure throughout the general Site area as well as in the immediate vicinity of soil disturbing activity. Water was obtained from an on-site hydrant and stored in tank for faster filling of trucks. In addition to water spraying of the Site haul roads, water was also sprayed on excavation areas. Pre-watering of excavation areas with excavator mixing was often required to achieve dust suppression during excavation activities. Dust suppression of ACM excavation areas was also achieved by water spray as described in Section 3.1.2. In addition to these efforts, the wheel wash was also utilized as a dust suppression method by minimizing potential track-out of haul road soils which could later dry and create dust. Further, street sweeper / vacuum units were utilized at the Site exit onto the highway. Clark County conducted a number of dust control inspections during the Site work. Suggestions were made by Clark County and implemented by Envirocon for increased sweeping / vacuum at the Site exit. Clark County indicated satisfaction with the dust control measures and no permit violations were incurred.

During excavation activities, dust monitoring was conducted to evaluate the effectiveness of dust control measures used to control fugitive dust. Action levels were defined as dust concentrations of 150 ug/m<sup>3</sup> for 60 minutes. No exceedances above PAMP action levels were recorded throughout the duration of the project. Shut-down of the Site work was never required due to air monitoring data. This is indicative of the effectiveness of the dust suppression efforts. Site work was shut-down due to high wind conditions. This action was implemented by Envirocon and GEI as winds increased and prior to dust or PAMP

exceedances. An air monitoring report from the PAMP activities is provided in Appendix G along with the recorded data.

### **3.1.6 Backfill and Restoration**

After excavation activities were completed, Diamondback Land Surveying conducted a post-excavation survey. The survey determined the limits of the excavation, and is the basis of Figures 3 and 5 – 8 comparing design to actual excavation depths. The survey data is provided in Appendix H.

All of the excavated areas were backfilled with fill procured from Boulder Ranch Quarry. A total of 67,475 tons were imported to the Site for excavation backfill. Backfill material placement was in conformance with the design plans and specifications. Figure 4 shows the final restoration grades based on the land survey (Appendix H).

The field method for backfill compaction consisted of wheel rolling each lift multiple times with a rubber tire wheel loader. Method compaction and density testing was performed by GeoTek, Inc., under contract with Envirocon, using a nuclear density gauge at a frequency of 1 test per 10,000 square foot of backfill area. Each 12-inch lift was tested at this frequency in accordance with the American Society for Testing and Materials. Geotechnical testing results (Appendix I) showed that all lifts were within 92 percent of the modified Proctor. Survey points for testing locations were recorded by Envirocon using an equipment-mounted Global Positioning System.

After completion of final grading, 1,375 gallons of palliative was mixed with water according to manufacturer's specification and applied to the entire Site to limit fugitive dust. Perimeter fencing that was removed to facilitate excavation activities was replaced with new materials by Envirocon subcontractor, Fencing Specialists, Inc. A gate was installed within the northern fence line at TIMET's request for future access to and from Warm Springs Road.

## **3.2 Beta Ditch Excavation Sampling**

Soil samples were collected from the excavation bottom during the excavation work in accordance with the Excavation Plan Technical Memo and Table 2 therein (Appendix B of the approved RAWP-Rev2). As noted in the RAWP-Rev2, this sampling was done to document residual concentrations in locations where there were no sample results at the final excavation extent. The Beta Ditch soil data set, including residual concentrations data, will be retained for use in the ongoing site wide conceptual side model (CSM) analysis for the Site. The residual data samples were tested for select analytes that were exceeding the outdoor industrial worker Basic Comparison Levels (BCLs) in the characterization samples at each specific location. Analytes tested for included hexachlorobenzene, polychlorinated

biphenyls (PCBs), dioxins/furans, and niobium. These are the only analytes that could not be confirmed to meet the BCLs and remedial action objective (RAO) at all sample locations, though not all of these analytes were required at all locations.

The sample results are presented in Table 1, and compared to the outdoor industrial worker BCLs RAO. In eight of the 18 locations confirmation results for all analytes tested were below outdoor industrial worker BCLs (BD-1, BD-5, BD-13, NW-5, NW-9, NW-17, NW-23, and NW-24). In two other locations (NW-1 and NW-11), PCB results were just slightly above the BCL but met or were very close to the RAO of 1 parts per million (ppm).

In the remaining eight locations (BD-2, BD-3, BD-4, BD-16, BD-17, NW-2, NW-20, and NW-8), dioxin/furan concentrations expressed as toxic equivalents (TEQ) were above the BCL. In addition, hexachlorobenzene exceeded the BCL in 2 samples (BD-3 and NW-8) and total PCBs exceeded the RAO in 5 samples (BD-3, BD-4, NW-1, NW-2, and NW-11). It is noteworthy that four of these samples were between 0.883 and 1.06 ppm, with BD-3 being 6.28 ppm.

The excavated areas were covered with clean fill as part of the remediation work and detailed on Figure 4 showing finished elevation. The soils with BCL exceedances will also be evaluated as part of the Site-wide CSM. Laboratory analytical packages and data validation for the sampling, along with the Chain-of-Custody documents are included as Appendix J.

### **3.3 Wheel Wash Area**

As described in Section 3.1.3, Envirocon utilized a wheel wash at the Site exit for additional dust control efforts. The location of the wheel wash is shown on Figure 1. The wheel wash was utilized for removal of import fill haul road material from truck wheels to further control potential dust sources.

Trucks drove over a gravel track-out pad prior to the wheel wash. At the wheel wash station, water sprayed upwards from fixed mounted sprayers to remove import fill haul road dust/dirt from the truck wheels. Trucks drove over an additional gravel track-out pad as they exited the wheel wash. NDEP Site inspection personnel noted that spray from the wheel wash sometimes contacted the underside of bottom-dump trucks or clam-shell haul trucks. After being sprayed, wheel wash water flowed back to an adjacent small storage pond. From time-to-time the storage pond water was used as dust control on excavation areas and the storage pond refilled with fresh water from the dust control water storage tank.

Over the course of the project operational adjustments such as personnel using hand sprayers instead of fix mounted sprayers were employed in an effort to enhance wheel wash performance. The goal of the Site exit operations was to minimize potential track-out

residue. Ongoing efforts at the Site exit had increasing success with minimizing residues. It is noteworthy that the Site passed all Clark County dust control inspections.

As a result of the observation of potential contact of wash water with the underside of bottom-dump trucks and what appeared to be discolored puddles in the wash area, NDEP requested that soil samples be collected at the wheel wash area at the completion of the Site work. TIMET provided an October 8, 2013 work plan (Appendix K) to NDEP for this sampling. NDEP verbally approved the plan and the sampling was completed on October 15<sup>th</sup>. The wheel wash area gravel and surface cover was excavated and disposed at the Apex Landfill as part of the Site demobilization and restoration. The soil sampling plan consisted of a total of three soil samples: a composite sample from the remaining surface soil after the area was excavated; and, one sample from each of the two areas adjacent to the wheel wash noted to potentially contain discolored puddles.

The soil samples were analyzed for the constituents indicated to exceed BCLs in the Beta Ditch soils (Table 2, Appendix A). Table 2 of this completion report provides the results of the wheel wash area sampling and comparison to BCLs. As shown on the table, all constituents of interest are well below their respective BCLs, and the wheel wash area does not contain constituents at or above BCLs as a result of the Beta Ditch work.

## 4. Conclusions

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This Removal Action Completion Report details the removal of soil from the segment of the BMI Common Areas ditch network known as the Beta / NW Ditch on the TIMET Site. All work was conducted and completed pursuant to the Nevada Division of Environmental Protection (NDEP)-approved Remedial Action Work Plan – Revision 2 (RAWP-Rev2) including the design plans and specifications attached to the RAWP-Rev2.

The Beta / NW Ditch area excavation was completed to or beyond the excavation limits specified in the design and specifications. Excavation figures based on professional land survey data included in this Report document that excavations met or exceeded the specified areal extents and depths (Figures 2 – 8). Confirmation sampling conducted in accordance with the RAWP-Rev2 was completed and has been summarized in Table 1 of this Report.

The excavated areas were covered with clean fill as part of the remediation work and measures have been taken to control unwanted entrance to the Site. The remaining soils with BCL exceedances will be evaluated as part of the Site-wide CSM

GEI concludes that the Remedial Action Objectives stated in the NDEP-approved RAWP-Rev2 and Items 3 and 4 of the NDEP December 14, 2012 Order have been fulfilled.

## 5. References

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TIMET. 2011a. Sampling and Analysis Plan for the BMI Beta Ditch / Northwestern Ditch Located on the Titanium Metals Corporation Plant Site, Revision 1. February 18.

TIMET. 2011b. Technical Memorandum Regarding Asbestos: BMI Beta / Former Northwestern Ditch Area. July 29.

TIMET. 2011c. Dioxin Comparability Assessment: BMI Beta / Former Northwestern Ditch Area. October 24.

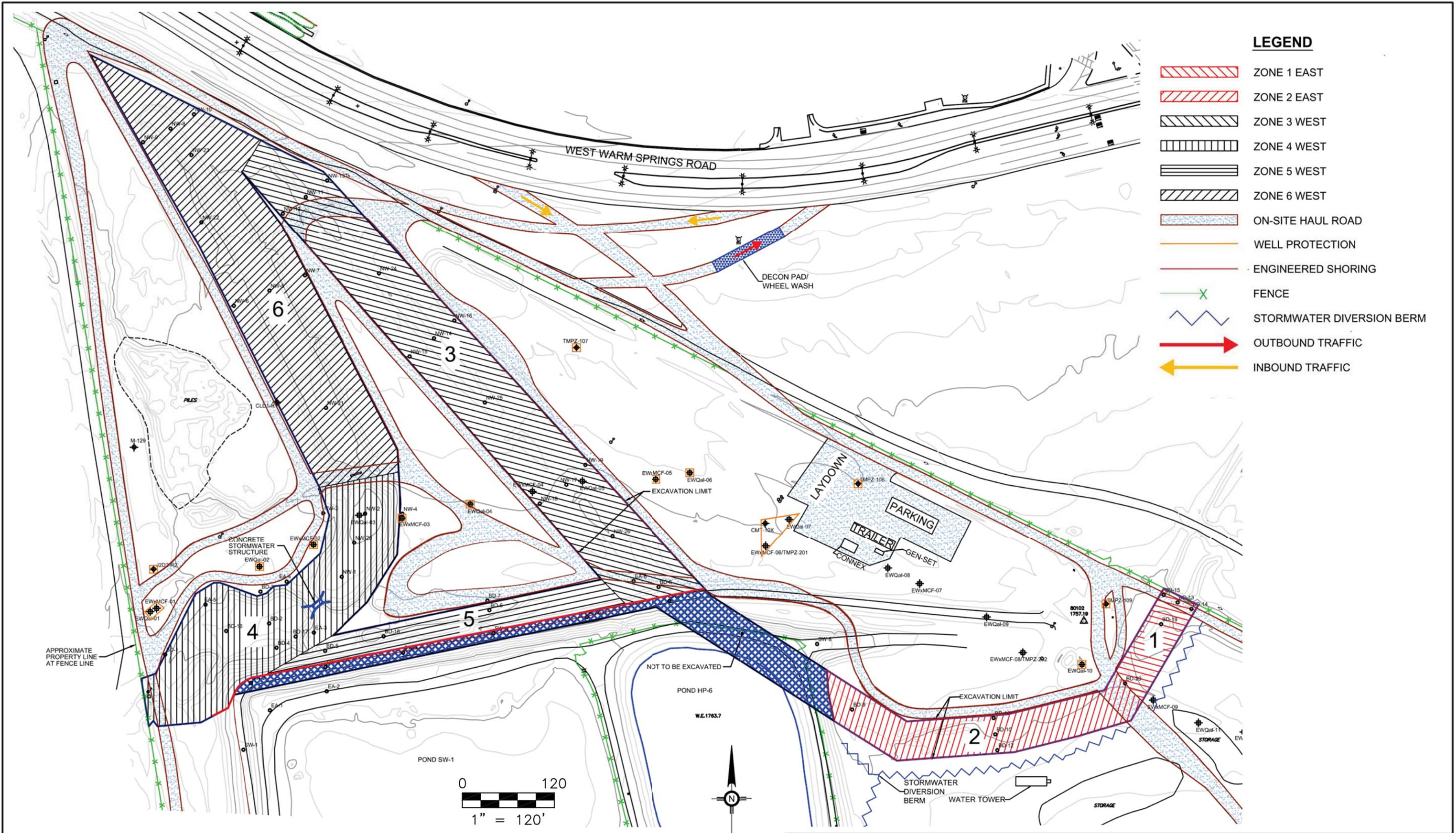
TIMET. 2012. Data Gap Sampling and Analysis Plan for the BMI Beta Ditch / Northwestern Ditch Located on the Titanium Metals Corporation Plant Site. March 30.

TIMET. 2013a. Response to NDEP's October 4, 2012 Comments on TIMET's Calculation of Leaching-Based Site-Specific Levels: BMI Beta Ditch / Former Northwestern Ditch Area. February 26.

TIMET. 2013b. Removal Action Work Plan – Revision 2 (RAWP-Rev2) with Excavation Plan Technical Memorandum and associated documents, June 26, 2013 (TIMET 2013b)

## Figures

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- LEGEND**
- ZONE 1 EAST
  - ZONE 2 EAST
  - ZONE 3 WEST
  - ZONE 4 WEST
  - ZONE 5 WEST
  - ZONE 6 WEST
  - ON-SITE HAUL ROAD
  - WELL PROTECTION
  - ENGINEERED SHORING
  - FENCE
  - STORMWATER DIVERSION BERM
  - OUTBOUND TRAFFIC
  - INBOUND TRAFFIC

**NOTE**

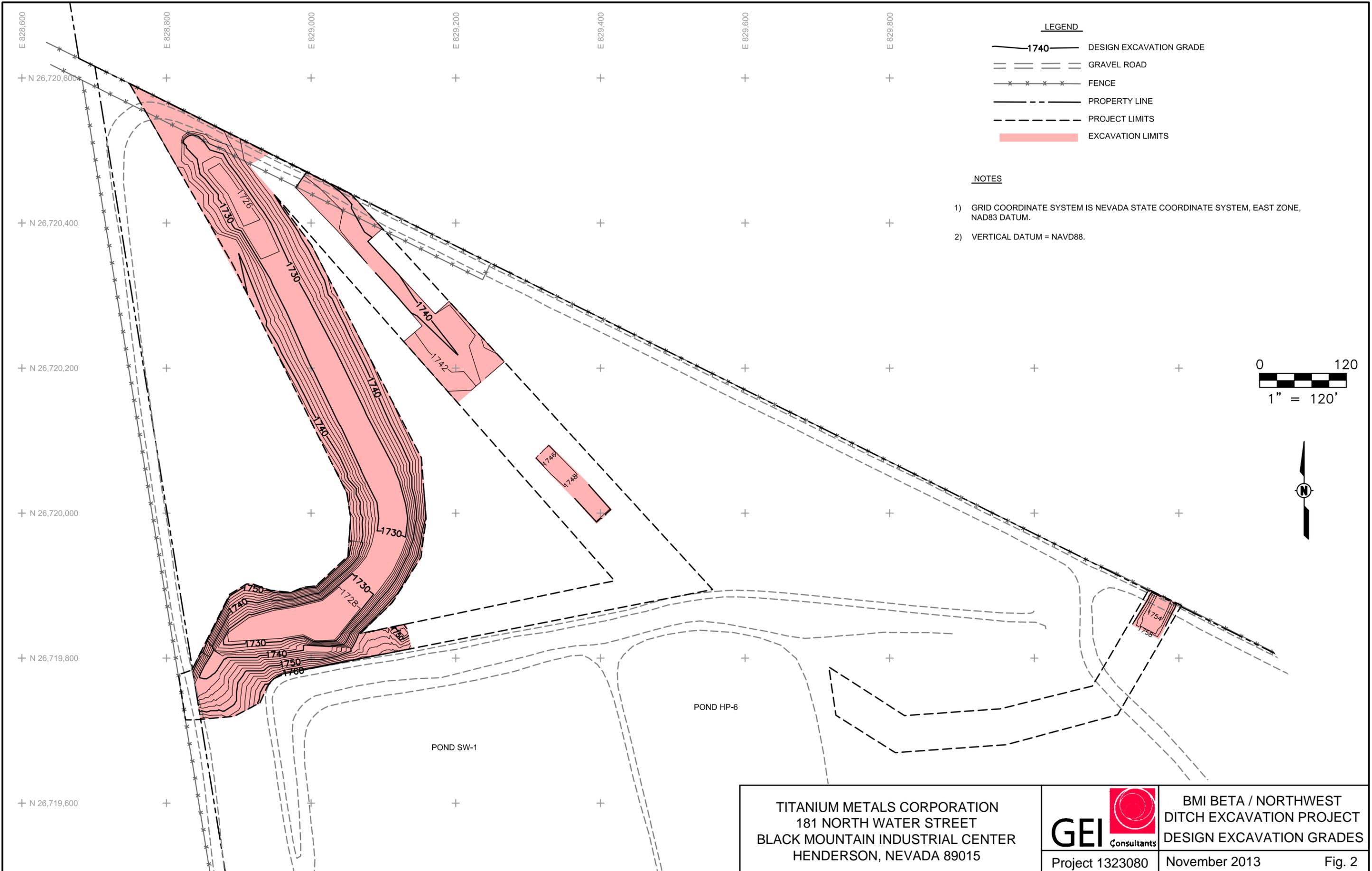
1) SOURCE FILE PROVIDED BY ENVIROCON. DRAWING TITLED "TIMET BETA DITCHES SITE LAYOUT" MAY 24, 2013.

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SITE AREA HAUL ROUTES

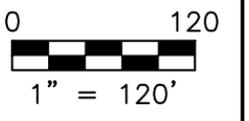
Project 1323080 November 2013 Fig. 1



**LEGEND**

|  |                         |
|--|-------------------------|
|  | DESIGN EXCAVATION GRADE |
|  | GRAVEL ROAD             |
|  | FENCE                   |
|  | PROPERTY LINE           |
|  | PROJECT LIMITS          |
|  | EXCAVATION LIMITS       |

- NOTES**
- 1) GRID COORDINATE SYSTEM IS NEVADA STATE COORDINATE SYSTEM, EAST ZONE, NAD83 DATUM.
  - 2) VERTICAL DATUM = NAVD88.



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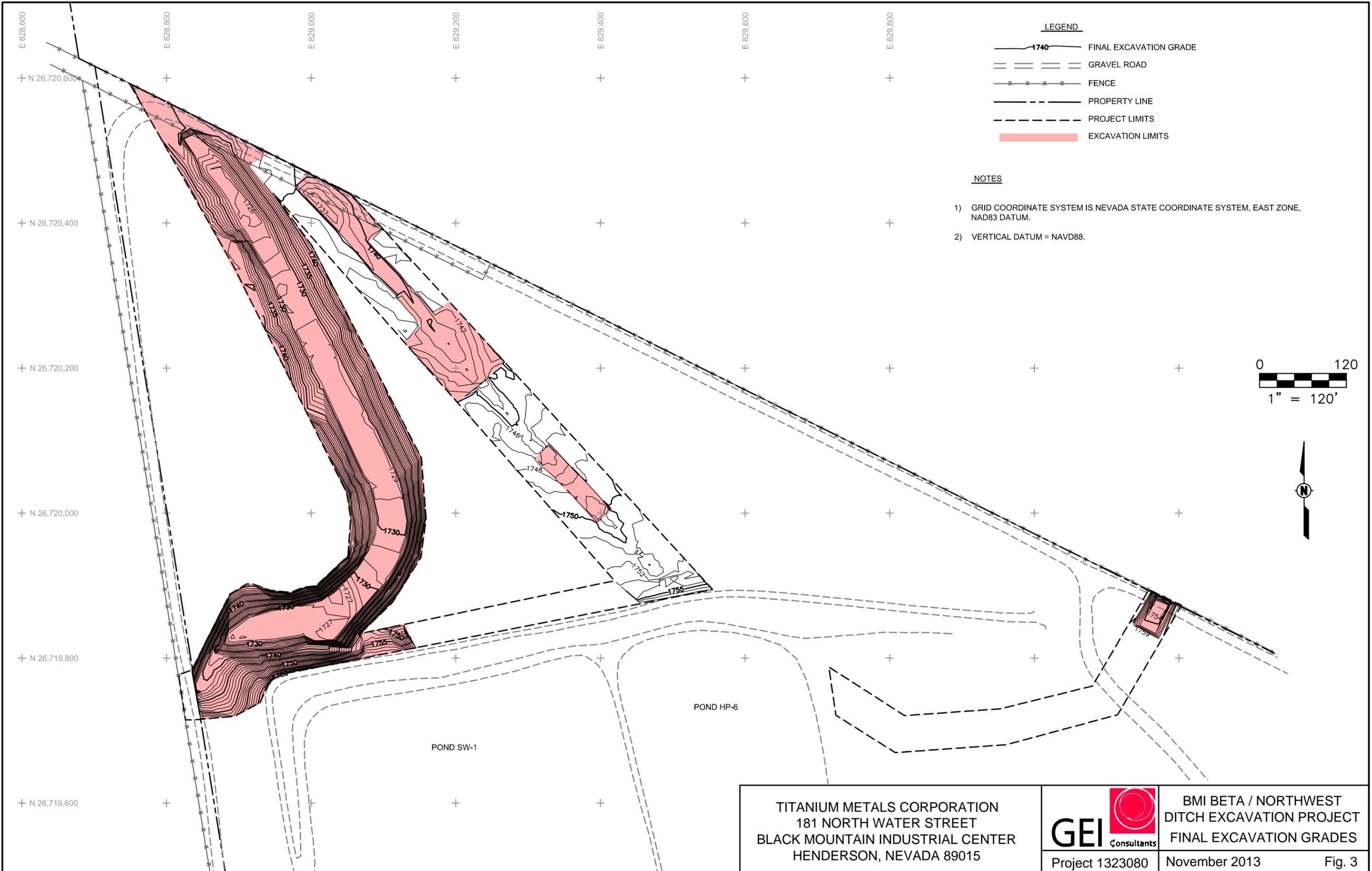


BMI BETA / NORTHWEST  
 DITCH EXCAVATION PROJECT  
 DESIGN EXCAVATION GRADES

Project 1323080

November 2013

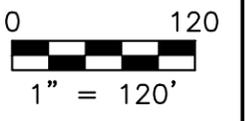
Fig. 2



**LEGEND**

|  |                        |
|--|------------------------|
|  | FINAL EXCAVATION GRADE |
|  | GRAVEL ROAD            |
|  | FENCE                  |
|  | PROPERTY LINE          |
|  | PROJECT LIMITS         |
|  | EXCAVATION LIMITS      |

- NOTES**
- 1) GRID COORDINATE SYSTEM IS NEVADA STATE COORDINATE SYSTEM, EAST ZONE, NAD83 DATUM.
  - 2) VERTICAL DATUM = NAVD88.

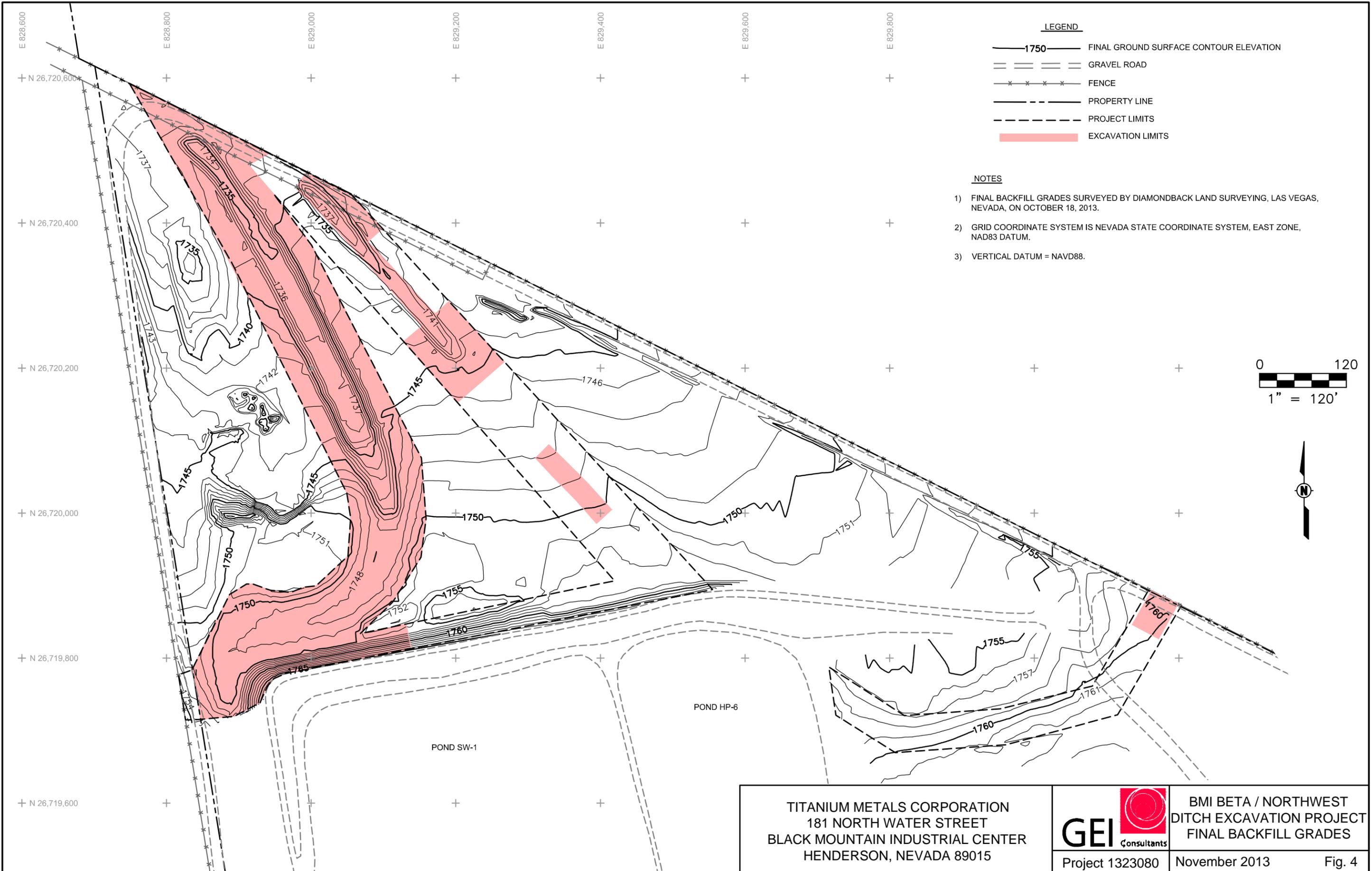


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BMI BETA / NORTHWEST  
 DITCH EXCAVATION PROJECT  
 FINAL EXCAVATION GRADES

Project 1323080 November 2013 Fig. 3



**LEGEND**

- FINAL GROUND SURFACE CONTOUR ELEVATION
- GRAVEL ROAD
- FENCE
- PROPERTY LINE
- PROJECT LIMITS
- EXCAVATION LIMITS

**NOTES**

- 1) FINAL BACKFILL GRADES SURVEYED BY DIAMONDBACK LAND SURVEYING, LAS VEGAS, NEVADA, ON OCTOBER 18, 2013.
- 2) GRID COORDINATE SYSTEM IS NEVADA STATE COORDINATE SYSTEM, EAST ZONE, NAD83 DATUM.
- 3) VERTICAL DATUM = NAVD88.



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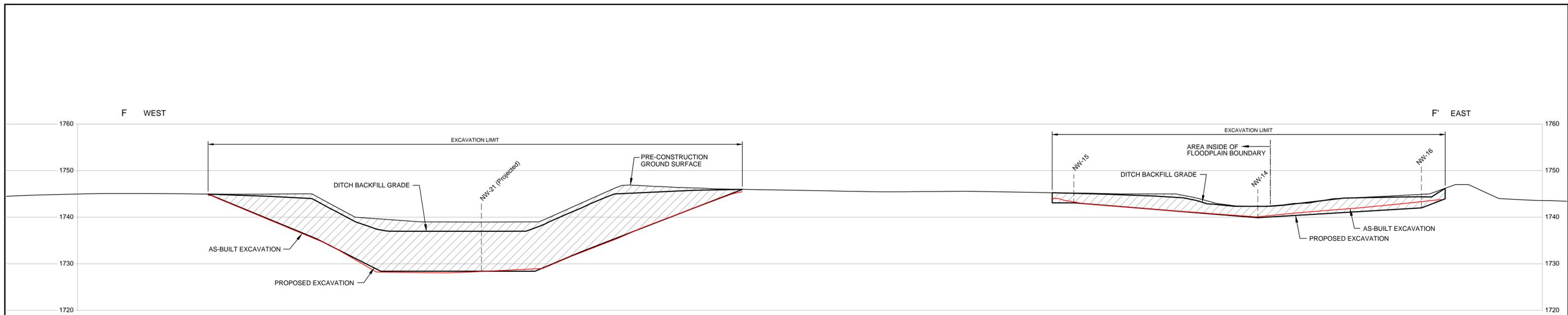
BMI BETA / NORTHWEST  
 DITCH EXCAVATION PROJECT  
 FINAL BACKFILL GRADES

Project 1323080

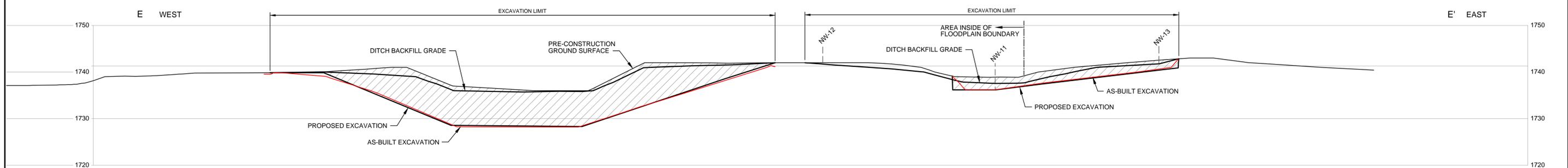
November 2013

Fig. 4





**CROSS-SECTION F-F'**  
SCALE: 1" = 10' HORIZ. & VERT.



**CROSS-SECTION E-E'**  
SCALE: 1" = 10' HORIZ. & VERT.

|   |          |                                    |     |  |
|---|----------|------------------------------------|-----|--|
| Attention:  |          |                                    |     |  |
|   |          |                                    |     |  |
| If this scale bar does not measure 1" then drawing is not original scale. |          |                                    |     |  |
| NO.   | DATE     | ISSUE/REVISION                     | APP |  |
| 1   | 11/20/13 | AS-BUILT EXCAVATION CROSS-SECTIONS | KJC |  |

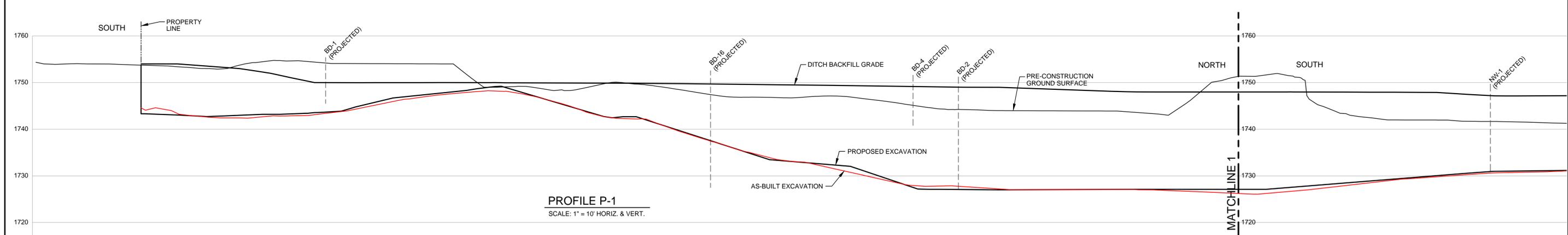
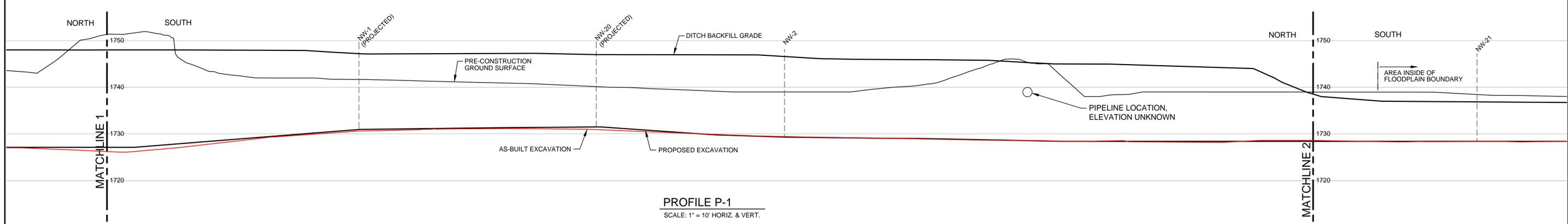
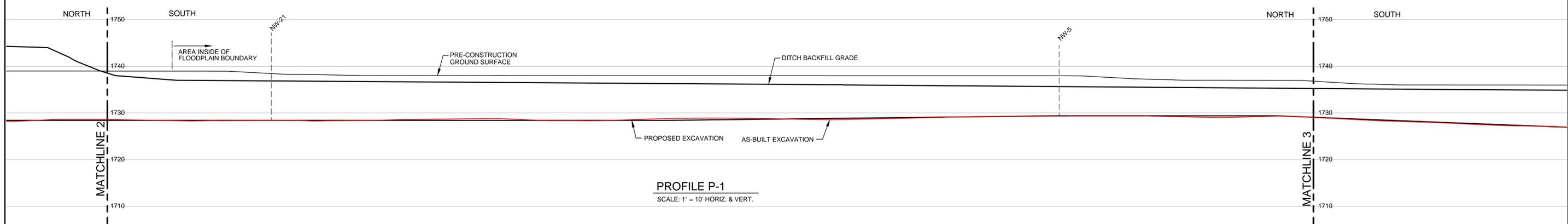
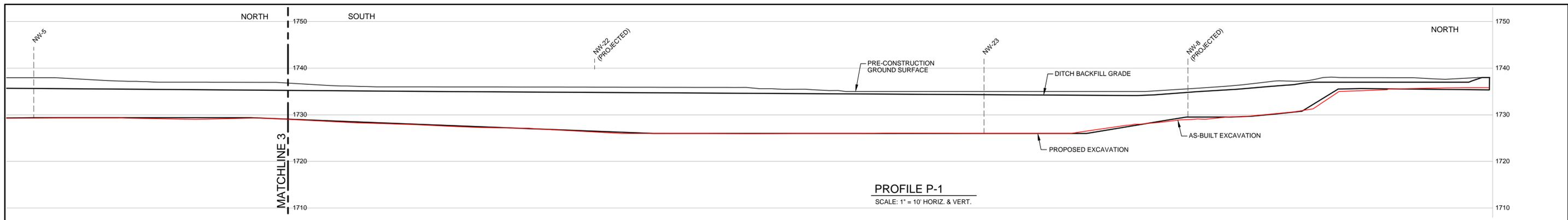
Designed: R. Truax  
 Checked: R. Truax  
 Drawn: K. Curtin  
 Submittal Date: 11/22/2013



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BMI BETA / NORTHWEST DITCH EXCAVATION PROJECT  
 AS-BUILT EXCAVATION CROSS-SECTIONS E-E', F-F'

FIG. NO. 6



|   |          |                                    |     |  |
|---|----------|------------------------------------|-----|--|
| Attention:  |          |                                    |     |  |
|   |          |                                    |     |  |
| If this scale bar does not measure 1" then drawing is not original scale. |          |                                    |     |  |
| NO.   | DATE     | ISSUE/REVISION                     | APP |  |
| 1   | 11/20/13 | AS-BUILT EXCAVATION CROSS-SECTIONS | KJC |  |

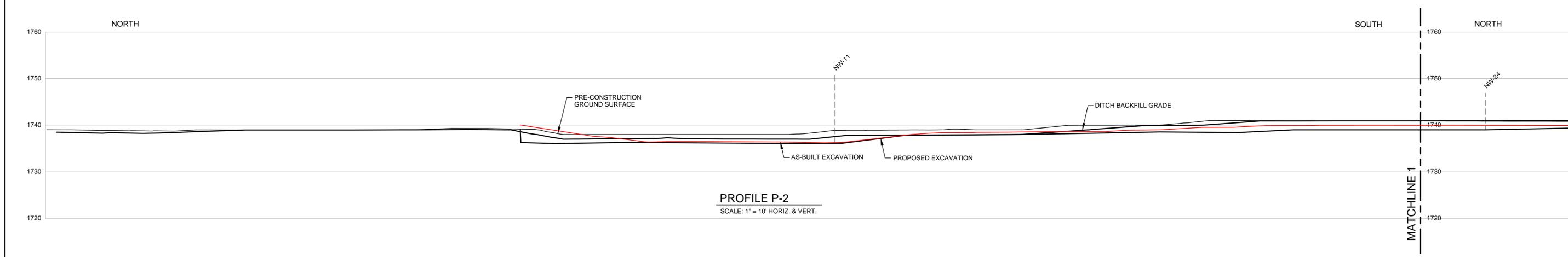
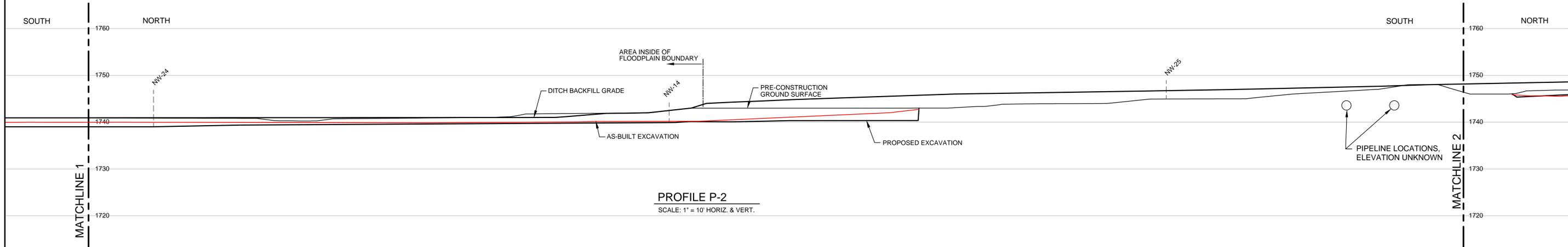
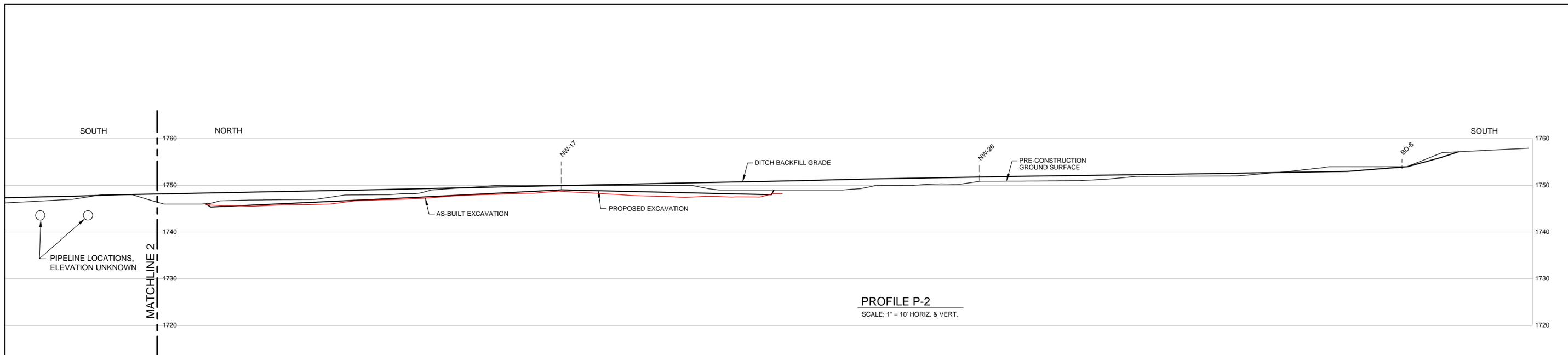
Designed: R. Truax  
 Checked: R. Truax  
 Drawn: K. Curtin  
 Submittal Date: 11/22/2013



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BMI BETA / NORTHWEST DITCH EXCAVATION PROJECT  
 AS-BUILT EXCAVATION PROFILE 1

FIG. NO. 7



|            |          |                                    |     |  |
|------------|----------|------------------------------------|-----|--|
| Attention: |          |                                    |     |  |
|            |          |                                    |     |  |
|            |          |                                    |     |  |
|            |          |                                    |     |  |
| 1          | 11/20/13 | AS-BUILT EXCAVATION CROSS-SECTIONS | KJC |  |
| NO.        | DATE     | ISSUE/REVISION                     | APP |  |

Designed: R. Truax  
 Checked: R. Truax  
 Drawn: K. Curtin  
 Submittal Date: 11/22/2013



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 GEI Project 1323080

BMI BETA / NORTHWEST DITCH EXCAVATION PROJECT  
 AS-BUILT EXCAVATION PROFILE 2

FIG. NO. 8

## Tables

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**Table 1. Beta Ditch Confirmation Samples**  
**Beta Ditch Remediation**  
**TIMET, Henderson, NV**

| Location Name                             |       |                   | BD-1       | BD-13     | BD-16       | BD-17     | BD-2        | BD-2                   | BD-3        | BD-4      | BD-5        | NW-1      |             |   |              |   |              |   |           |    |              |   |
|---|-------|-------------------|------------|-----------|-------------|-----------|-------------|------------------------|-------------|-----------|-------------|-----------|-------------|---|--------------|---|--------------|---|-----------|----|--------------|---|
| Sample Name                               |       |                   | BD-1       | BD-13     | BD-16       | BD-17     | BD-2        | Duplicate Beta Ditch 2 | BD-3        | BD-4      | BD-5        | NW-1      |             |   |              |   |              |   |           |    |              |   |
| Sample Date                               |       |                   | 9/25/2013  | 9/23/2013 | 9/25/2013   | 9/25/2013 | 9/25/2013   | 9/25/2013              | 9/25/2013   | 9/25/2013 | 9/23/2013   | 9/23/2013 |             |   |              |   |              |   |           |    |              |   |
| Analyte                                   | Units | Outdoor           |            |           |             |           |             |                        |             |           |             |           |             |   |              |   |              |   |           |    |              |   |
|   |       | Industrial Worker |            |           |             |           |             |                        |             |           |             |           |             |   |              |   |              |   |           |    |              |   |
| BCL                                       |       |                   |            |           |             |           |             |                        |             |           |             |           |             |   |              |   |              |   |           |    |              |   |
| <b>PCB CONGENERS</b>                      |       |                   |            |           |             |           |             |                        |             |           |             |           |             |   |              |   |              |   |           |    |              |   |
| Total PCBs (Lab calculated)               | mg/kg | 0.83              | 0.0549     | J         | 0.0202      | J         | 0.513       | J                      | 0.814       | J         | 0.761       | J         | 0.515       | J | <b>6.28</b>  | J | <b>1.06</b>  | J | 0.118     | J  | <b>0.883</b> | J |
| Total TEQ-PCB Congener Only               | mg/kg | NS                | 0.00000602 | J         | 0.000000108 |           | 0.0000618   |                        | 0.000105    |           | 0.0000713   |           | 0.0000542   | J | 0.000852     |   | 0.000114     |   | 0.0000189 | J  | 0.000101     |   |
| <b>METALS</b>                             |       |                   |            |           |             |           |             |                        |             |           |             |           |             |   |              |   |              |   |           |    |              |   |
| Niobium                                   | mg/kg | 114               | NT         |           | NT          |           | NT          |                        | NT          |           | NT          |           | NT          |   | NT           |   | NT           |   | NT        |    | NT           |   |
| <b>SVOCs</b>                              |       |                   |            |           |             |           |             |                        |             |           |             |           |             |   |              |   |              |   |           |    |              |   |
| Hexachlorobenzene                         | mg/kg | 1.2               | 0.27       | J         | 0.35        | U         | NT          |                        | NT          |           | NT          |           | NT          |   | <b>55</b>    |   | NT           |   | 0.49      | J+ | NT           |   |
| <b>DIOXINS &amp; FURANS</b>               |       |                   |            |           |             |           |             |                        |             |           |             |           |             |   |              |   |              |   |           |    |              |   |
| Total TEQ-Dioxin/Furan only               | mg/kg | NS                | NT         |           | 0.00000193  |           | 0.00575     | J                      | 0.00528     |           | 0.00593     |           | 0.00466     |   | 0.0956       |   | 0.0104       |   | 0.00135   |    |              |   |
| Total TEQ - Dioxin/Furan and PCB Congener | pg/g  | 2700              | 6.02       |           | 2.04        |           | <b>5812</b> | J                      | <b>5385</b> |           | <b>6001</b> |           | <b>4714</b> |   | <b>96452</b> |   | <b>10514</b> |   | 1369      |    | 101          |   |

**General Notes:**

1. NT = Not tested for this analyte.
2. mg/kg = milligrams per kilogram
3. pg/g = picograms per gram
4. PCBs - polychlorinated biphenyls
5. SVOCs = semi-volatile organic compounds
6. NS = No standard established
7. BCL for Niobium is from April 2013 NDEP Basic Comparison Levels (BCLs) Update, other BCLs are from the January 2013 document.
8. Gray shading and bolding indicates that the detected result value exceeds the BCL.

**Data Qualifiers:**

- J - estimated value
- U - indicates not detected to the reporting limit

**Table 1. Beta Ditch Confirmation Samples**  
**Beta Ditch Remediation**  
**TIMET, Henderson, NV**

| Location Name                             |       |                               | NW-11    | NW-17     | NW-2      | NW-20     | NW-23     | NW-24     | NW-5     | NW-8       | NW-9     |           |          |          |           |          |         |     |         |    |      |   |
|---|-------|-------------------------------|----------|-----------|-----------|-----------|-----------|-----------|----------|------------|----------|-----------|----------|----------|-----------|----------|---------|-----|---------|----|------|---|
| Sample Name                               |       |                               | NW-11    | NW-17     | NW-2      | NW-20     | NW-23     | NW-24     | NW-5     | NW-8       | NW-9     |           |          |          |           |          |         |     |         |    |      |   |
| Sample Date                               |       |                               | 9/4/2013 | 8/23/2013 | 9/23/2013 | 9/23/2013 | 9/12/2013 | 8/23/2013 | 9/4/2013 | 8/23/2013  | 9/4/2013 |           |          |          |           |          |         |     |         |    |      |   |
| Analyte                                   | Units | Outdoor Industrial Worker BCL |          |           |           |           |           |           |          |            |          |           |          |          |           |          |         |     |         |    |      |   |
| <b>PCB CONGENERS</b>                      |       |                               |          |           |           |           |           |           |          |            |          |           |          |          |           |          |         |     |         |    |      |   |
| Total PCBs (Lab calculated)               | mg/kg | 0.83                          | 1.03     | J         | 0.523     | J         | 0.885     | J         | NT       | 0.00931    | J        | 0.359     | J        | 0.384    | J         | 0.00515  | J       | NT  | NT      |    |      |   |
| Total TEQ-PCB Congener Only               | mg/kg | NS                            | 0.000195 | J         | 0.000138  |           | 0.000114  |           | NT       | 0.00000115 |          | 0.0000636 |          | 0.000057 |           | 5.03E-09 | J       | NT  | NT      |    |      |   |
| <b>METALS</b>                             |       |                               |          |           |           |           |           |           |          |            |          |           |          |          |           |          |         |     |         |    |      |   |
| Niobium                                   | mg/kg | 114                           | 34       | J+        | NT        |           | NT        |           | NT       |            | NT       |           | 12       |          | 14        |          | NT      |     | 2       |    | NT   |   |
| <b>SVOCs</b>                              |       |                               |          |           |           |           |           |           |          |            |          |           |          |          |           |          |         |     |         |    |      |   |
| Hexachlorobenzene                         | mg/kg | 1.2                           | NT       |           | NT        |           | NT        |           | NT       | 0.16       | J        | 0.36      | U        | 0.37     | U         | 0.37     | U       | 5.2 |         | NT |      |   |
| <b>DIOXINS &amp; FURANS</b>               |       |                               |          |           |           |           |           |           |          |            |          |           |          |          |           |          |         |     |         |    |      |   |
| Total TEQ-Dioxin/Furan only               | mg/kg | NS                            |          |           | 0.0105    |           | 0.0148    |           | 0.000087 | J          | 0.000468 |           | 0.000542 | J        | 0.0000412 |          | 0.00632 |     | 0.00146 | J  |      |   |
| Total TEQ - Dioxin/Furan and PCB Congener | pg/g  | 2700                          | 195      |           | 138       |           | 10614     |           | 14800    |            | 88.2     | J         | 532      |          | 599       | J        | 41.2    |     | 6320    |    | 1460 | J |

**General Notes:**

1. NT = Not tested for this analyte.
2. mg/kg = milligrams per kilogram
3. pg/g = picograms per gram
4. PCBs - polychlorinated biphenyls
5. SVOCs = semi-volatile organic compounds
6. NS = No standard established
7. BCL for Niobium is from April 2013 NDEP Basic Comparison Levels (BCLs) Update, other BCLs are from the January 2013 document.
8. Gray shading and bolding indicates that the detected result value exceeds the BCL.

**Data Qualifiers:**

- J - estimated value
- U - indicates not detected to the reporting limit

**Table 2. Wheelwash Station Confirmation Samples**

Beta Ditch Remediation

TIMET, Henderson, NV

|                             |          |       | Location                                 | TMBD-Wheelwash-01 | TMBD-Wheelwash-02 | TMBD-Wheelwash-03 | TMBD-Wheelwash-Dupe |
|-----------------------------|----------|-------|--|-------------------|-------------------|-------------------|---------------------|
|                             |          |       | Sample Date                              | 10/15/2013        | 10/15/2013        | 10/15/2013        | 10/15/2013          |
|                             |          |       | Sample Type                              | Normal            | Normal            | Field Duplicate   | Normal              |
|                             |          |       | Parent Sample                            |                   |                   | BD-2_20130925     |                     |
| Chemical Name               | Method   | Units | NDEP Industrial<br>Outdoor Worker<br>BCL |                   |                   |                   |                     |
| Total PCBs                  | 8082A    | mg/kg | 0.83                                     | <0.0059           | <0.0059           | <0.0058           | <0.0059             |
| Niobium                     | SW 6020A | mg/kg | 114                                      | <1.9              | 16                | <1.9              | <1.8                |
| Manganese                   | SW 6020A | mg/kg | 24900                                    | 570               | 870               | 490               | 640                 |
| Lead                        | SW 6020A | mg/kg | 800                                      | 11                | 16                | 8.6               | 9.9                 |
| Hexachlorobenzene           | SW 8270D | mg/kg | 1.2                                      | 0.2 J             | <0.035            | <0.035            | <0.035              |
| Total TEQ-Dioxin/Furan only | SW 8290  | pg/g  | 2700                                     | 140               | 94                | 21                | 24                  |

## Appendix A

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### **RAWP-Rev2 NDEP Approval Letter & Table 2 from Excavation Technical Memorandum (Appendix B of RAWP-Rev2)**

<https://geiconsultants.sharefile.com/d/sa390c4f82fa46019>

Removal Action Completion Report  
BMI Beta Ditch/Northwestern Ditches Located on the  
Titanium Metals Corporation Plant Site  
BMI Common Areas, Clark County, Nevada  
November 2013

## Appendix B

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### Daily Construction Reports

<https://geiconsultants.sharefile.com/d/sbd7735e21fe4fc49>

## Appendix C

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### Disposal Manifests

<https://geiconsultants.sharefile.com/d/s7855a91561f4cfca>

## Appendix D

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### APEX Summary Table of Material Disposal

<https://geiconsultants.sharefile.com/d/sd03209c743f4708a>

Removal Action Completion Report  
BMI Beta Ditch/Northwestern Ditches Located on the  
Titanium Metals Corporation Plant Site  
BMI Common Areas, Clark County, Nevada  
November 2013

## Appendix E

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### Well Decommission Reports

<https://geiconsultants.sharefile.com/d/s2631a1f72ee4bfb9>

## Appendix F

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### Asbestos Sampling Results and Summary Table

<https://geiconsultants.sharefile.com/d/s53d5350a3ae49329>

Removal Action Completion Report  
BMI Beta Ditch/Northwestern Ditches Located on the  
Titanium Metals Corporation Plant Site  
BMI Common Areas, Clark County, Nevada  
November 2013

## Appendix G

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### Perimeter Air Monitoring Data

<https://geiconsultants.sharefile.com/d/s7d190007ae344289>

## Appendix H

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### As-Built Survey Data

<https://geiconsultants.sharefile.com/d/s92f99f2e8b246d58>

## Appendix I

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### Compaction Testing Data

<https://geiconsultants.sharefile.com/d/s1d179f171864e418>

## Appendix J

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### Analytical Data Packages

<https://geiconsultants.sharefile.com/d/sce4efe18d0540588>

## Appendix K

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### Wheel Wash Soil Sampling Work Plan

<https://geiconsultants.sharefile.com/d/s4a5d158a9ba41f78>