



# Valley Regional Transit Orchard Facility

Master Plan Report

01 | 2

July 2022

Valley Regional Transit



## Valley Regional Transit Orchard Facility

Project No: D3470400  
Document Title: Master Plan Report  
Document No.:  
Revision:  
Date: July 2022  
Client Name: Valley Regional Transit  
Project Manager: Betsy Roberts

Jacobs Engineering Group Inc.

999 W. Main St  
Suite 1200  
Boise, ID 83702  
United States  
T +1.208.383.6208

[www.jacobs.com](http://www.jacobs.com)

© Copyright 2022 Jacobs. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright.

Limitation: This document has been prepared on behalf of, and for the exclusive use of Jacobs' client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this document by any third party.

## Contents

|       |                                               |      |
|-------|-----------------------------------------------|------|
| 1.    | Background .....                              | 1-1  |
| 1.1   | Introduction.....                             | 1-1  |
| 1.2   | Process .....                                 | 1-2  |
| 1.3   | Overview of Existing Planning Documents ..... | 1-2  |
| 2.    | Existing Conditions.....                      | 2-1  |
| 2.1   | Orchard Facility.....                         | 2-1  |
| 2.1.1 | Site Access and Circulation.....              | 2-1  |
| 2.1.2 | Parking.....                                  | 2-1  |
| 2.1.3 | Fueling Island.....                           | 2-3  |
| 2.1.4 | Facility Operations and Maintenance.....      | 2-3  |
| 2.1.5 | Staff.....                                    | 2-4  |
| 2.1.6 | Known Deficiencies.....                       | 2-5  |
| 2.2   | Vehicles.....                                 | 2-6  |
| 2.2.1 | Revenue Fleet and Service.....                | 2-6  |
| 2.2.2 | Nonrevenue Fleet.....                         | 2-6  |
| 3.    | Future Needs.....                             | 3-1  |
| 3.1   | Fleet Changes.....                            | 3-1  |
| 3.2   | Building and Site Needs .....                 | 3-4  |
| 4.    | Improvement Alternatives .....                | 4-1  |
| 4.1   | Phase 1A.....                                 | 4-1  |
| 4.1.1 | Site .....                                    | 4-1  |
| 4.1.2 | Facilities .....                              | 4-2  |
| 4.2   | Phase 1B.....                                 | 4-2  |
| 4.2.1 | Site .....                                    | 4-2  |
| 4.3   | Phase 1C.....                                 | 4-3  |
| 4.3.1 | Site .....                                    | 4-3  |
| 4.3.2 | Facilities .....                              | 4-3  |
| 4.4   | Phase 2A.....                                 | 4-5  |
| 4.4.1 | Site .....                                    | 4-5  |
| 4.4.2 | Facility.....                                 | 4-5  |
| 4.5   | Phase 2B.....                                 | 4-7  |
| 4.5.1 | Site .....                                    | 4-7  |
| 4.5.2 | Facility.....                                 | 4-8  |
| 4.6   | Phase 3.....                                  | 4-9  |
| 4.6.1 | Site .....                                    | 4-10 |
| 4.6.2 | Facilities .....                              | 4-10 |
| 4.7   | Phase 4.....                                  | 4-13 |
| 4.7.1 | Site .....                                    | 4-13 |
| 4.7.2 | Facilities .....                              | 4-13 |
| 5.    | Conclusions and Next Steps.....               | 5-1  |

## Appendixes

- A Onsite Solar Power Generation Review
- B Phase 1 Figures

## Tables

|   |                                                      |     |
|---|------------------------------------------------------|-----|
| 1 | 2021 Revenue Vehicle Fleet .....                     | 2-6 |
| 2 | Revenue Fleet Growth Scenarios and Projections ..... | 3-2 |
| 3 | Space Needs Program Existing to 2041 .....           | 3-4 |

## Figures

|   |                                                                          |      |
|---|--------------------------------------------------------------------------|------|
| 1 | VRT Orchard Facility – Existing Site Map .....                           | 2-2  |
| 2 | VRT Orchard Facility – Operation and Vehicle Maintenance Drawing .....   | 2-4  |
| 3 | VRT Orchard Facility – Phase 1 Site Map .....                            | 4-4  |
| 4 | VRT Orchard Facility – Phase 2A Office, Shop, and Storage Building ..... | 4-6  |
| 5 | VRT Orchard Facility – Phase 2 Site Map .....                            | 4-9  |
| 6 | VRT Orchard Facility – Phase 3 Site Map .....                            | 4-12 |
| 7 | VRT Orchard Facility – Phase 4 Site Map .....                            | 4-15 |

# 1. Background

## 1.1 Introduction

Valley Regional Transit (VRT) and Jacobs entered into an agreement on January 12, 2021, to provide master planning services for the VRT Orchard Facility and design and construction services to complete Phase I construction of a multiphase improvement process.

The Orchard Facility Master Plan serves to outline improvements needed over the next 20 years to address additional site and building limitations in the face of growing and changing revenue fleet needs. VRT took initial delivery in 2021 of its first fleet of battery electric buses (BEBs) to replace existing compressed natural gas (CNG) buses and begin to expand its overall fleet of full-size transit buses to prepare for planned service expansion. The process and results of this effort are provided in more detail in the following sections.

VRT initiated the Phase I construction project concurrently with development of the overall master plan to address known site limitations and to expand the site in preparation for future investments. Phase I generally consists of development of approximately one acre in the southeast corner of the current leased property into a paved space for new bus parking and other facility needs, including drainage improvements, power supply to support future battery electric buses (BEBs) in the Phase I area, and environmental clearance.

The Phase II project has been identified and will be implemented over the coming 2 years, which is focused on State of Good Repair investments more than expansion. Phase II will consist of rehabilitation of existing pavement over the entire remaining site to achieve a state of good repair and will utilize the data collected from the survey and geotechnical work conducted for Phase I improvements.

Support for Phase I and II construction included obtaining survey for the identified area and development of a topographic map to be used for the project base, as well as subsurface field investigation and a geotechnical evaluation to inform development of a pavement section. Environmental clearance was achieved on January 3, 2022, when the VRT received documentation from the Federal Transit Authority confirming that the Phase I and II projects qualified as Categorical Exclusion. Additional environmental documentation will be required as later phases of the Master Plan are implemented.

Elements of work that bridge between the construction project and the Master Plan include the drainage study and the evaluation of the power supply and its placement under the new asphalt. A drainage study was conducted over the entire site to support both the immediate Phase I and Phase II construction projects as well as ensure adequate stormwater facilities and drainage patterns were available to support the expansion concepts identified in the Facility Master Plan. Coordination with the City of Boise was an essential element in the drainage study process. Ultimately, the City of Boise concluded that offsite flow entering the VRT Orchard site should be handled separately from the site flows and should be routed through the site without mingling with site runoff as is currently occurring. A copy of the Stormwater Report is included in Appendix C. The existing power supply was evaluated, and needs to be calculated to support the future growth identified in the Master Plan. Conduit necessary to accommodate Master Plan growth with least interruption to existing infrastructure was designed for Phase I and will be designed for Phase II construction projects.

## 1.2 Process

The team developed the Facility Master Plan in collaboration with the VRT project manager and key staff by conducting the following key activities:

- Baseline functional review of the existing site and operation, including a review of existing planning documents; a tour of the existing facility site; recurring meetings to gather information on VRT and city projected growth, fleet changes, operational contracts, staffing, and verify current site circulation at Orchard site; and documentation of existing site and building areas, staffing, revenue and nonrevenue vehicles, and maintenance, office and/or operational needs.
- Quantification and evaluation of anticipated changes to the bus, nonrevenue vehicles, staffing levels, and yard storage needs (short and long term) to accommodate projected fleet size against current site and potential expansion areas.
- Modeling BEB operations to estimate fleet and power requirements (see Appendix B).
- Summarization of building and site program based on future needs.
- Development and evaluation of improvement alternatives to select final site plans.
- Identification and organization of major milestones and actions to implement the necessary facility upgrades.

## 1.3 Overview of Existing Planning Documents

VRT's existing transportation planning document, Valley Connect 2.0, informed the study. The plan set out within Valley Connect 2.0 includes a transit future with four times the amount of fixed-route service with more frequent, late night, and weekend service. It outlines current, intermediate, and growth scenarios with impacts by route.

VRT's first ever Transportation Development Plan (TDP) for Fiscal Years 2021–2025 is currently in draft form and has been presented to the board. The TDP will serve as VRT's 5-year service and capital work plan. The TDP outlines fixed-route fleet growth plans. VRT is also in preliminary discussions around expanding the geography of the fixed-route network, served by its access fleet.

The study team used the above information to extrapolate fleet growth and associated future needs over the 20-year study timeline as outlined in Section 3.

## 2. Existing Conditions

### 2.1 Orchard Facility

The existing Orchard site is comprised of bus parking, fueling, charging, staff spaces for site administration, bus operators, maintenance staff, bus servicing, and cleaning. The facility was originally designed for a mix of 40- and 30-foot buses, and shorter 25-foot vehicles for on demand needs and paratransit. There is one main building that houses administration, staff needs, and vehicle maintenance. A gantry style wash is located at the west entrance off Orchard Street. Currently there are four Conex containers for the purpose of general storage along the north property line. Currently, bus capacity is sufficient. VRT's revenue service bus fleet is stored and maintained at the Orchard Facility, along with some nonrevenue support vehicles. VRT recently purchased 12 BEBs and constructed a new parking island with infrastructure for charging these 12 vehicles and a capacity for a fleet of 36 BEB vehicles.

#### 2.1.1 Site Access and Circulation

There are two main access and egress points to the facility, a west entrance located on Orchard Street and a south exit on Harvard Street. There is a third visitor entrance on Northup Street on the east side of the site to increase security. Previously, Homeland Security requirements mandated fences and gates for increased security. There are two additional gates that allow access through the visitors parking and all three of these gates are manually operated and visually monitored by dispatch. Homeland Security requires the two through access gates remain locked during the day; however, that is not always feasible to maintain a constantly moving bus facility. Automatic gates would solve this issue.

Circulation onsite is mixed with a clockwise flow around the maintenance and operation buildings and counterclockwise around the parking lot. There is two-way traffic on the east and west aisle of bus parking. When operators return, they park their buses and a night service worker performs an array of service activities, including fare pull, fueling, fluid checks, interior cleaning, and exterior bus wash. Services workers also perform bus detail cleaning that includes cleaning windows, mopping floors, and disinfecting surfaces. Fares are pulled on the west side of the operations, which VRT considers a convenient location. Suppliers and vendors visit the site daily and typically exit onto Harvard Street, which can take time due to traffic.

#### 2.1.2 Parking

Lobby parking is located adjacent on the south and east side of the operations building. There are 13 parking spaces for automobiles and three spaces for motorcycles. Lobby parking is fenced and is typically used by delivery drivers, visitors, lobby staff, and cleaning crews. The gate and fencing at lobby parking currently are for security; however, it does not allow a flow of bus traffic at night around the operation and maintenance building. This requires backing and turning the buses around west side of the building.

Employee parking is located primarily on the west side of the designated bus parking area. There is no separation between buses and private vehicles. The number of available employee parking spaces has been reduced and employee motorcycle parking has been relocated to the lobby parking area to accommodate staff and visitors. Employee parking currently crosses main bus drive aisles and regardless of final location needs a clearly marked crosswalks to the Operations Centers.

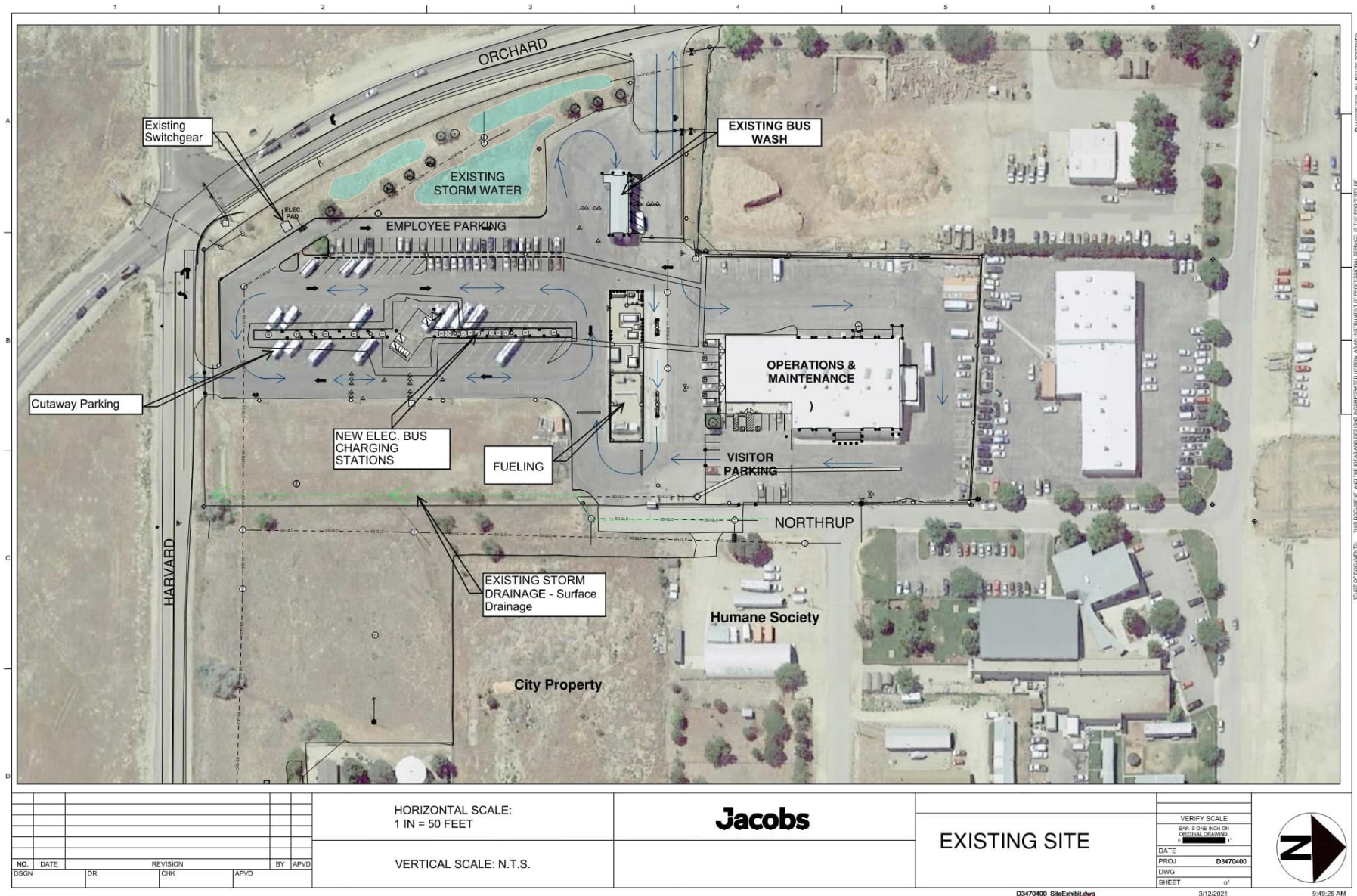


Figure 1. VRT Orchard Facility – Existing Site Map

### 2.1.3 Fueling Island

The existing fueling island provides CNG, diesel, and gasoline fuels for the existing fleet and other service vehicles. The island is located centrally on the site and includes a small building to accommodate staff and equipment, tanks, compressors, and fueling pumps. A natural gas main, owned and maintained by Williams, comes directly to the island from Orchard Street. A cathodic protection system was installed for the fueling island many years ago and has been inspected on a fairly routine basis. However, after the most current inspection in 2020, VRT staff had concerns about the integrity of the system and requested a more in-depth investigation of the system. In general, that investigation included:

- Location of buried pipelines and galvanic anodes
- Identification of failed anodes for future removal from pipeline
- Verification that insulating joints on pipelines were working properly
- Testing of pipe-to-soil potentials on pipelines
- Testing of current impression on pipelines
- Investigation and evaluation of potential new anode and test station sites

Results of the 1-day site investigation indicate that the cathodic protection system is not working properly. The Phase II construction project includes pavement rehabilitation around the fueling island. Cathodic protection system improvements will be designed and implemented as part of that project. The CNG system has also been recently upgraded.

### 2.1.4 Facility Operations and Maintenance

The Operations and Maintenance building is a prefabricated rigid frame metal building with metal roof and siding in good to fair condition. Operations is built out with metal studs and drywall with carpet and vinyl flooring. Maintenance areas are exposed rigid frame steel structure with exposed insulation, and interior metal liner wall panel. Masonry separates operations from maintenance and encloses a storage and shop area in the middle of the building.

Operations on the south half of the existing building provides space for the base administration, operators, and maintenance staff support areas. It currently meets staff needs but is tight on space and as the fleet grows operation areas will require more space. Locker space and restrooms are the most limited. There is no separation between operators' areas and the main administrative spaces. There is limited area for drivers between shifts, no personal lockers for operators, separate rooms for training, or isolated quiet areas, TV room, or other staff amenities typical of such facilities. There is a need for some outside staff break space when the weather is nice. These missing amenities typically help attract and retain staff. As the fleet grows, dispatch will take on a larger role including managing the state of charge for buses. Fixed-route dispatch will need an office with walls and windows to the exterior, as well as a walk-up window for drivers on the interior. The room should provide space for private conversation in a way that does not interfere with other services. The existing Access Services office also requires a walk-up window for drivers, as well as adequate space for private conversation so as to not interfere with other services. The existing door between fixed-route dispatch and Access Services should remain as is.

Vehicle Maintenance maintains the VRT fleet which includes Canyon County Transit, Specialized Transit, and nonrevenue vehicles. Vehicle Maintenance provides inspections, preventive maintenance, and repairs of all revenue and nonrevenue fleet vehicles. It does no body work, engine or transmission rebuild. At present, there are eight maintenance bays with four located on each side of the building. The bays are approximately 20 feet wide by 50 feet long and have bay doors which are 16 feet wide. One of the bays has a dedicated four-post lift, another has a two-post in-ground lift for brake jobs, and the other six bays are equipped with portable lifts for miscellaneous repairs. In addition to the maintenance bays, this area

houses two staff offices and a parts room. Staff in this space include mechanics and a supervisor. There is a mezzanine that is generally used for storing parts, but due to the lack of meeting space in the administration portion of the building, this space is often used for meetings.

VRT uses a WestMatic gantry system to wash their buses each night, as feasible. The gantry system was upgraded 5 years ago. The building enclosing the wash is a metal building similar to the main operations and maintenance building. The pressure sensor at the entrance controlling red and green lights to monitor entry does not function and needs to be replaced. Due to cost constraints, there is no water recycling system (only oil water separator), controls are limited, there is no guiding rail system, or heated water stripping blowers. Future water recycling system for bus wash is needed. The lack of water stripping blowers limits bus washing to temperature above freezing to avoid icing. Each wash session uses approximately 100 gallons of water, and the local water hardness causes spots on the windshields. Access to the washing station is awkward as it must be entered by the Orchard side and takes up a lot of space. The remaining lifespan and location of the wash station is in question with new entrances and bus circulation. The wastewater from the wash was piped to the sanitary sewer system in 2015. Prior to that, wash water was released to the stormwater ponds on the west side of the facility.

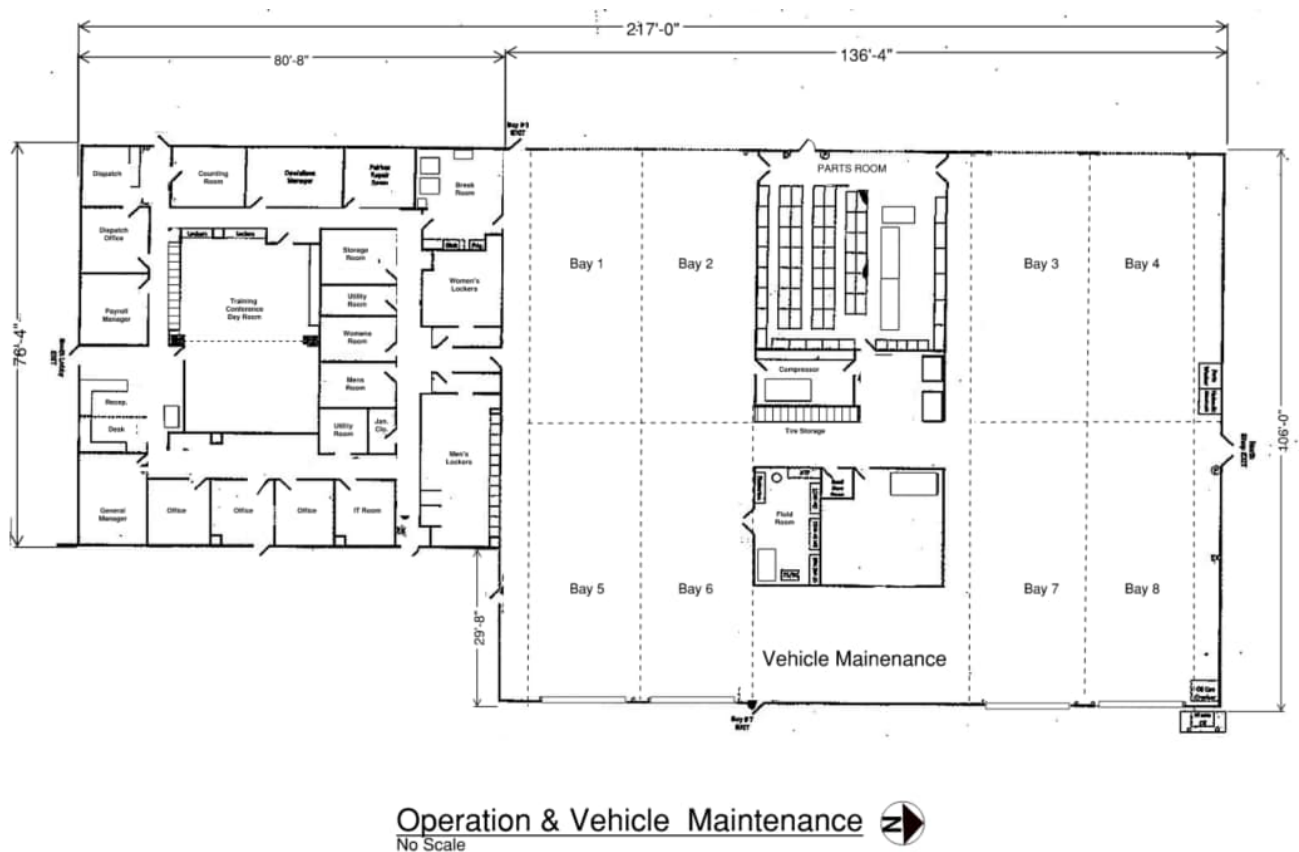


Figure 2. VRT Orchard Facility – Operation and Vehicle Maintenance Drawing

### 2.1.5 Staff

The Orchard Facility currently operates with approximately 100 employees. Fuelers and night crew staff work from 4:00 p.m. to 12:00 a.m. VRT outsources the management of the facilities to the subcontractor First Transit, a well-known national vendor for such services. There are generally two shifts for operators that currently total  $\pm 100$  (part and full time) plus a management staff of 12. Mechanics work in two shifts:

early and late. There are seven Service staff that provide fueling, cleaning, and daily inspection of fluids that work afternoons and at night from 4:00 p.m. to 12:00 a.m. The labor union ensures that employee responsibilities remain separate. For example, driver responsibilities do not include bus washing and there is a separate crew for cleaning. Any increase in the bus fleet will increase staffing needs and pressure to expand the Operations Center which is currently limited in handling even the existing fleet.

#### 2.1.6 Known Deficiencies

The existing VRT Orchard site has known deficiencies, concerns, and challenges, including the following:

- The site was built in the 1990s and requires upgrades to meet staff needs, efficiently run an expanding fleet, and in preparation of information and data system for new more electronic focused fleet.
- The existing open surface drainage system near the maintenance facility continues to be an issue, volume and site grades are inadequate and leave an icy slip hazard during winter.
- There are an inadequate number of lockers, restrooms, and break area for current staff. There are insufficient rooms to conduct personnel training and staff meetings. Currently all meetings are held in a shared space with no privacy or confidentiality.
- Security would be greatly enhanced with powered remotely controlled gates and a more focused security camera system.
- There is insufficient visitor and employee parking spaces and the current fenced in yard east of operations restricts bus circulation around the main building for easy and efficient flow of buses accessing fair drop, maintenance and fueling areas.
- The existing employee parking is not isolated from bus parking and shares the same site entrances and exits. This is a potential safety issue.
- The new 12-foot-wide charging island reduced the length of bus parking spaces, which has made backing in and out of the parking spaces more challenging. As the fleet switches to BEB vehicles there will be less need for the fueling island. This space should be kept however for a future site generator(s), service staff space or future zero carbon fuel systems such as hydrogen fuel cells. Currently fueling is needed for diesel, gasoline for nonrevenue vehicles and CNG for offsite fleet.
- Manual gate operations poses challenges for employees and visitors. Locked gates that require manual operation disrupts the ability to move buses around the maintenance building during normal working hours. VRT prefers all gates to be automated and opened on a clock schedule, remotely, or through key-card access. Visitor access should be done by communicating to dispatch in the operational center to either allow visitors to access a personnel gate or vehicle gate on the east side of the facility. This can be done with cameras and audio connections at the east gate.
- There is a need for signal-controlled left turn access to the interstate 84 and Orchard for buses.
- The existing wash does not provide for a spot free wash, has no water recycle system, and because it is a gantry system has more mechanical parts to repair. The buses do not have the water stripping blowers after the wash and ice builds up on the pavement outside during the winter causing slip and skid hazards. With addition of a water purification system and water stripping blowers a better spot free wash can be achieved.
- There is a lack of storage space in the yard; some supplies and equipment are currently scattered in smaller sheds or left out in the weather. Currently there is no available storage space available for contractors, either covered or not. Additional storage space is needed for both contractors and VRT.
- Site safety can be enhanced by separating employee and bus parking, and one way bus circulation (counterclockwise preferred).

## 2.2 Vehicles

### 2.2.1 Revenue Fleet and Service

VRT operates transit service with two revenue vehicle fleets: fixed-route (comprised of 35- and 40-foot battery electric buses [BEBs] and CNG transit buses, as well as CNG and diesel cutaways) and access (comprised of CNG and gasoline cutaways) outlined in Table 1. All operate in revenue service with six buses reserved as spares (less than 20 percent of the fleet size).

Table 1. 2021 Revenue Vehicle Fleet

| Fleet                 | Vehicle Type             | Vehicle Quantity |
|-----------------------|--------------------------|------------------|
| Access                | CNG cutaway              | 14               |
|                       | Gasoline cutaway         | 4                |
|                       | <i>Access total</i>      | <i>18</i>        |
| Fixed Route           | Diesel cutaway           | 2                |
|                       | CNG cutaway              | 3                |
|                       | CNG 35 feet              | 26               |
|                       | CNG 40 feet              | 6                |
|                       | BEB 35 feet              | 12               |
|                       | <i>Fixed route total</i> | <i>49</i>        |
| Service Vehicle Total |                          | 67               |

The fleet serves 17 fixed routes in Boise. Bus pull-out begins at 4:30 a.m. and, typically, all buses are on route by 6:30 a.m. Buses begin to return around 4:00 p.m. and all buses finish their routes by 10:00 p.m. Tripper buses run from 6:00 to 9:00 a.m. and from 3:30 to 6:30 p.m.

#### 2.2.1.1 Battery Electric Buses

Delivery of the fleet of (12) 35-foot Proterra BEBs is nearing completion. VRT currently has a charging infrastructure (Proterra dispensers) system capable of charging 12 buses sequentially. There is room to expand this infrastructure to allow charging a total of 36 BEB's. To serve power to the Proterra charging system and future loads, a new 2,500 kilovolt-ampere (kVA) pad-mounted power transformer was installed in the electric bus infrastructure project. The new transformer is fed from the 34.5 kilovolt (kV) primary power distribution circuit that is dedicated to the VRT campus. An underground, spare 5-inch conduit was installed between the new transformer and a point just south of the electric bus-charging island. The spare 5-inch conduit, which is stubbed out about 12-inches from the south end of the island, provides a pathway from the existing transformer to supply 34.5 kV power to a future transformer or transformers as planned for Phase 2. The exact location of the conduit stub is not known.

### 2.2.2 Nonrevenue Fleet

VRT also houses and shelters snowplow, service truck, sedans, and pickups to support operations at Orchard site, at bus stops or other facility locations. Space for five or six vehicles should be sufficient. Nonrevenue fleet is maintained primarily in the maintenance facilities. At this time outside parking for these facilities should be sufficient. Since the nonrevenue fleet is driven by contract staff, there is no reason to separate these vehicles from employee parking.

### 3. Future Needs

#### 3.1 Fleet Changes

VRT plans to replace the remaining fossil-fueled fixed-route fleet vehicles with 35-foot BEBs and the remaining CNG access fleet vehicles with gasoline cutaways when the vehicles reach the end of expected useful life. The transition from fossil-fuel to battery electric operations will have major impacts on the building and site needs at the Orchard Facility, outlined in Section 3.2. For planning purposes, VRT directed the team to assume gasoline access cutaways would be replaced with battery electric cutaways starting in 2023.

The plan outlined in the draft TDP is to grow the fixed-route bus fleet by seven vehicles during the 5-year plan period. This includes two growth vehicles already included in the 2021 Proterra fleet, plus the two CNG buses (being replaced by the Proterra buses) slated for retrofit as battery buses. The retrofitted CNG to BEB buses will return to the fleet as expansion vehicles.

To account for the remainder of the 20-year Facility Master Plan timeline, the study team extrapolated low and high fleet growth scenarios with input from the VRT team. These scenarios were intended to address the growth outlined in Valley Connect 2.0, while considering the uncertainty posed by the COVID-19 pandemic. The scenarios include additional growth buses added to the fixed-route fleet according to planned fleet procurements through 2030 as programmed by fleet ages, then every other year until the end of the study timeline (Fiscal Year 2041). The access fleet growth scenarios are proportional to the fixed-route growth. The low growth scenario assumes two fixed-route growth buses are added at the designated milestones (procurements, then every other year). The high growth scenario assumes four growth buses. The low and high growth scenarios are outlined over the 20-year study period in Table 2 with a no-growth scenario included for reference. This exercise assumed an expected useful life of 14 years for a full-size transit bus and 10 years for a cutaway.

In addition to these fleet growth scenarios, VRT indicated a potential future need for introducing 60-foot articulated buses into revenue service. The fleet size is unknown, but the study team incorporated this possibility into the development and evaluation of improvement alternatives for the Orchard Facility and site.

These scenarios outline the lower and upper fleet ranges for the purposes of the Facility Master Plan. The scenarios inform the remaining elements of this plan.

## Master Plan Report

Table 2. Revenue Fleet Growth Scenarios and Projections

| Scenario                       | FY22      | FY23      | FY24      | FY25      | FY26      | FY27      | FY28      | FY29      | FY30      | FY31      | FY32      | FY33      | FY34      | FY35      | FY36      | FY37      | FY38      | FY39      | FY40      | FY41      |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>No Growth</b>               |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| CNG cutaway                    | 14        | 6         | 5         | 5         | 5         | 5         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Gasoline cutaway               | 4         | 12        | 13        | 13        | 13        | 13        | 18        | 18        | 18        | 18        | 18        | 10        | 9         | 9         | 9         | 9         | 4         | 4         | 4         | 0         |
| Electric cutaway               | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 8         | 9         | 9         | 9         | 9         | 14        | 14        | 14        | 18        |
| <i>Access Fleet Total</i>      | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> | <i>18</i> |
| Diesel cutaway                 | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| CNG cutaway                    | 3         | 3         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| CNG 35 feet                    | 26        | 18        | 20        | 20        | 20        | 12        | 8         | 8         | 3         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| CNG 40 feet                    | 6         | 6         | 6         | 6         | 6         | 3         | 1         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| BEB 35 feet                    | 12        | 12        | 17        | 17        | 17        | 28        | 34        | 34        | 38        | 41        | 41        | 41        | 41        | 41        | 41        | 41        | 41        | 41        | 41        | 41        |
| <i>Fixed-Route Fleet Total</i> | <i>49</i> | <i>39</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>41</i> |
| <b>Overall Vehicle Total</b>   | <b>67</b> | <b>57</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> | <b>59</b> |
| <b>Low Growth</b>              |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
| CNG cutaway                    | 14        | 6         | 5         | 5         | 5         | 5         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| Gasoline cutaway               | 4         | 13        | 15        | 15        | 15        | 16        | 22        | 22        | 22        | 22        | 22        | 12        | 11        | 11        | 11        | 10        | 4         | 4         | 4         | 0         |
| Electric cutaway               | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 10        | 11        | 12        | 12        | 14        | 20        | 21        | 22        | 28        |
| <i>Access Fleet Total</i>      | <i>18</i> | <i>19</i> | <i>20</i> | <i>20</i> | <i>20</i> | <i>21</i> | <i>22</i> | <i>22</i> | <i>23</i> | <i>24</i> | <i>24</i> | <i>24</i> | <i>24</i> | <i>25</i> | <i>25</i> | <i>26</i> | <i>26</i> | <i>27</i> | <i>27</i> | <i>28</i> |
| Diesel cutaway                 | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| CNG cutaway                    | 3         | 3         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| CNG 35 feet                    | 26        | 18        | 20        | 20        | 20        | 12        | 8         | 8         | 3         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| CNG 40 feet                    | 6         | 6         | 6         | 6         | 6         | 3         | 1         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |
| BEB 35 feet                    | 12        | 12        | 17        | 17        | 17        | 30        | 38        | 38        | 44        | 49        | 49        | 51        | 51        | 53        | 53        | 55        | 55        | 57        | 57        | 59        |
| <i>Fixed-Route Fleet Total</i> | <i>49</i> | <i>39</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>43</i> | <i>45</i> | <i>45</i> | <i>47</i> | <i>49</i> | <i>49</i> | <i>51</i> | <i>51</i> | <i>53</i> | <i>53</i> | <i>55</i> | <i>55</i> | <i>57</i> | <i>57</i> | <i>59</i> |
| <b>Overall Vehicle Total</b>   | <b>67</b> | <b>58</b> | <b>61</b> | <b>61</b> | <b>61</b> | <b>64</b> | <b>67</b> | <b>67</b> | <b>70</b> | <b>73</b> | <b>73</b> | <b>75</b> | <b>75</b> | <b>78</b> | <b>78</b> | <b>81</b> | <b>81</b> | <b>84</b> | <b>84</b> | <b>87</b> |

Table 2. Revenue Fleet Growth Scenarios and Projections

| Scenario                       | FY22      | FY23      | FY24      | FY25      | FY26      | FY27      | FY28      | FY29      | FY30      | FY31      | FY32      | FY33      | FY34      | FY35      | FY36      | FY37       | FY38       | FY39       | FY40       | FY41       |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| <i>High Growth</i>             |           |           |           |           |           |           |           |           |           |           |           |           |           |           |           |            |            |            |            |            |
| CNG cutaway                    | 14        | 6         | 5         | 5         | 5         | 5         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0          | 0          | 0          | 0          | 0          |
| Gasoline cutaway               | 4         | 13        | 15        | 15        | 15        | 17        | 22        | 22        | 22        | 22        | 22        | 21        | 20        | 20        | 20        | 18         | 18         | 18         | 18         | 18         |
| Electric cutaway               | 0         | 1         | 2         | 2         | 2         | 4         | 6         | 6         | 8         | 10        | 10        | 20        | 21        | 23        | 23        | 25         | 30         | 32         | 30         | 36         |
| <i>Access Fleet Total</i>      | <i>18</i> | <i>19</i> | <i>20</i> | <i>20</i> | <i>20</i> | <i>22</i> | <i>24</i> | <i>24</i> | <i>26</i> | <i>28</i> | <i>28</i> | <i>30</i> | <i>30</i> | <i>32</i> | <i>32</i> | <i>34</i>  | <i>34</i>  | <i>36</i>  | <i>34</i>  | <i>36</i>  |
| Diesel cutaway                 | 2         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0          | 0          | 0          | 0          | 0          |
| CNG cutaway                    | 3         | 3         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0          | 0          | 0          | 0          | 0          |
| CNG 35 feet                    | 26        | 18        | 18        | 18        | 18        | 10        | 6         | 6         | 3         | 0         | 0         | 0         | 0         | 0         | 0         | 0          | 0          | 0          | 0          | 0          |
| CNG 40 feet                    | 6         | 6         | 6         | 6         | 6         | 3         | 1         | 1         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0          | 0          | 0          | 0          | 0          |
| BEB 35 feet                    | 12        | 12        | 17        | 17        | 17        | 32        | 42        | 42        | 47        | 54        | 54        | 58        | 58        | 62        | 62        | 66         | 66         | 70         | 70         | 74         |
| <i>Fixed-Route Fleet Total</i> | <i>49</i> | <i>39</i> | <i>41</i> | <i>41</i> | <i>41</i> | <i>45</i> | <i>49</i> | <i>49</i> | <i>50</i> | <i>54</i> | <i>54</i> | <i>58</i> | <i>58</i> | <i>62</i> | <i>62</i> | <i>66</i>  | <i>66</i>  | <i>70</i>  | <i>70</i>  | <i>74</i>  |
| <i>Overall Vehicle Total</i>   | <i>67</i> | <i>58</i> | <i>61</i> | <i>61</i> | <i>61</i> | <i>67</i> | <i>73</i> | <i>73</i> | <i>76</i> | <i>82</i> | <i>82</i> | <i>88</i> | <i>88</i> | <i>94</i> | <i>94</i> | <i>100</i> | <i>100</i> | <i>106</i> | <i>104</i> | <i>110</i> |

### 3.2 Building and Site Needs

There are several existing needs for the VRT Orchard site. The expansion of dedicated and secure parking for staff is a clear necessity. In general, there is not enough employee parking. On any given workday, the number of employee vehicles onsite can exceed 80-plus vehicles. Employees driving motorcycles have been forced to park in the lobby parking area which can only accommodate 12 to 14 vehicles. With the projected fleet, employee parking required will need to be  $\pm 150$ . Determining the location for the installation of an additional electrical capacity for a permanent, consolidated storage space, and for an essential backup, gas powered generator are additional site needs; a likely long-term alternative as the fleet transitions will be the current fueling island when CNG is no longer needed. It is likely that diesel fueling will always be needed for equipment purposes, as well as to meet onsite fueling needs for agencies outside of VRT.

There is a potential opportunity for site expansion through the Orchard Road realignment. The 30 percent design plans were finalized in May 2021, with construction starting as soon as 2024 or 2025. If this roadway realignment does not proceed it will place more emphasis in obtaining City property to the east to sustain space for long-term growth at the Orchard site.

Future expansion beyond 36 BEB fleet will require additional electrical site capacity, switch gear, chargers, dispensers, and electrical site distribution. Determining the location of an additional electrical capacity, will require permanent, consolidated bus parking yard. In addition, for essential backup, a gasoline- or diesel-powered generator is also needed for long-term operation. For the time being as the fleet transitions the current fueling island with diesel and CNG will provide backup.

Part of this study was to estimate required administrative, staff operation support, and maintenance requirements are needed for the bus fleet projected to the year 2041. Table 3 provides summary of existing site and building spaces currently and what is expected in the year 2041. The projected building and site staff and spaces are based on current operations and existing site. It also shows the additional site, parking, utility needs, vehicle circulation, setbacks, and building needs for operations and maintenance over the 20 year planning horizon. The 2041 column shows spaces required to accommodate the Master Plan's expected bus capacity of 74 fixed fleet BEB and 36 Access fleet.

Table 3. Space Needs Program Existing to 2041

|                               | Existing Program |         |               | 2041       |         |                |
|-------------------------------|------------------|---------|---------------|------------|---------|----------------|
|                               | Quantity         | SF Each | Area (SF)     | Quantity   | SF Each | Area (SF)      |
| <b>Site Requirements</b>      |                  |         |               |            |         |                |
| <b>Parking</b>                |                  |         |               |            |         |                |
| <b>Fleet Vehicle Parking</b>  |                  |         |               |            |         |                |
| 40-foot Buses – 43 by 12 feet | 6                | 774     | 4,644         | 70         | 774     | 54,180         |
| 30-foot Buses – 33 by 12 feet | 26               | 594     | 15,444        | 4          | 594     | 2,376          |
| 63-foot Buses – 63 by 12 feet | 0                | 1,134   | 0             | 0          | 1,134   | 0              |
| Cutaway – 26 by 10 feet       | 23               | 375     | 8,625         | 30         | 375     | 11,250         |
| Employee/Visitor Parking      | 82               | 243     | 16,400        | 170        | 243     | 41,310         |
| ADA Parking                   | 7                | 450     | 3,150         | 6          | 450     | 2,700          |
| <b>Other Vehicles</b>         |                  |         |               |            |         |                |
| Truck                         | 3                | 720     | 2,160         | 4          | 720     | 2,880          |
| Cars/Pickups                  | 4                | 243     | 972           | 6          | 243     | 1,458          |
| <b>Parking Totals</b>         | <b>151</b>       |         | <b>51,395</b> | <b>290</b> |         | <b>116,154</b> |

Table 3. Space Needs Program Existing to 2041

|                                         | Existing Program |              |                | 2041      |         |                |
|-----------------------------------------|------------------|--------------|----------------|-----------|---------|----------------|
|                                         | Quantity         | SF Each      | Area (SF)      | Quantity  | SF Each | Area (SF)      |
| <b>Other Yard Spaces</b>                |                  |              |                |           |         |                |
| Building                                | Scaled           | 1            | 21,300         | Estimated | 1       | 39,200         |
| Storage (Open)                          | Estimated        | 1            | 10,000         | Estimated | 1       | 20,000         |
| Fueling                                 | Scaled           | 1            | 12,000         | Charging  | 1       | 12,000         |
| Bush Wash                               | Scaled           | 1            | 1,590          | Estimated | 1       | 3,180          |
| Landscaping/stormwater                  | Estimated        | 28%          | 100,800        | Estimated | 20%     | 69,780         |
| Circulation/Pavement                    | % Factor         | 45%          | 161,405        | % Factor  | 48%     | 240,000        |
| <b>Subtotal SF (rounded)</b>            |                  |              | <b>356,900</b> |           |         | <b>500,000</b> |
| <b>Total Site (fenced area) Acres</b>   |                  | <b>Acres</b> | <b>8.19</b>    |           |         | <b>11</b>      |
| <b>Building Spaces</b>                  |                  |              |                |           |         |                |
| <b>Operations</b>                       |                  |              |                |           |         |                |
| Reception/Lobby                         | 1                | 154          | 154            | 1         | 250     | 250            |
| HR Manager                              | 1                | 150          | 150            | 1         | 250     | 250            |
| General Manager                         | 1                | 233          | 233            | 1         | 240     | 240            |
| Open Workstation                        | 2                | 88           | 176            | 4         | 90      | 360            |
| Payroll Manager                         | 1                | 177          | 177            | 1         | 250     | 250            |
| Dispatch and Office Plus Drivers Window | 2                | 163          | 326            | 3         | 250     | 750            |
| Small Conference Room                   | 0                | 0            | 0              | 1         | 150     | 150            |
| Safe Room                               | 1                | 161          | 161            | 1         | 240     | 240            |
| Operations Manager                      | 1                | 214          | 214            | 1         | 250     | 250            |
| Shared Office                           | 1                | 157          | 157            | 1         | 160     | 160            |
| Women's Locker                          | 1                | 287          | 287            | 1         | 700     | 700            |
| Men's Locker                            | 1                | 492          | 492            | 1         | 1,000   | 1,000          |
| Accounting                              | 1                | 142          | 142            | 1         | 250     | 250            |
| Mechanical Room                         | 1                | 87           | 87             | 1         | 100     | 100            |
| Women's Restroom                        | 1                | 128          | 128            | 1         | 280     | 280            |
| Men's Restroom                          | 1                | 130          | 130            | 1         | 280     | 280            |
| Furnace Room                            | 1                | 80           | 80             | 1         | 80      | 300            |
| <i>Operations (Total)</i>               |                  |              | <b>3,094</b>   |           |         | <b>5,810</b>   |
| <b>Maintenance</b>                      |                  |              |                |           |         |                |
| Director of Maintenance                 | 1                | 168          | 168            | 1         | 170     | 170            |
| Oil Room                                | 1                | 286          | 286            | 1         | 350     | 350            |
| Maintenance Bays                        | 8                | 1,097        | 8,776          | 8         | 1,100   | 8,800          |
| Tires Shop/Storage                      | 1                | 227          | 227            | 1         | 350     | 350            |
| Common Work Area                        | 1                | 509          | 509            | 1         | 750     | 750            |
| Parts Room                              | 1                | 1,345        | 1,345          | 1         | 1,500   | 1,500          |
| Extra Bay (current wash pad)            | 0                | 1,600        | 0              | 1         | 1,600   | 1,600          |
| <i>Maintenance (Total)</i>              |                  |              | <b>11,311</b>  |           |         | <b>13,520</b>  |

Table 3. Space Needs Program Existing to 2041

|                               | Existing Program |         |               | 2041     |         |               |
|-------------------------------|------------------|---------|---------------|----------|---------|---------------|
|                               | Quantity         | SF Each | Area (SF)     | Quantity | SF Each | Area (SF)     |
| <b>Common Areas</b>           |                  |         |               |          |         |               |
| Lunch Room / Kitchen          | 1                | 305     | 305           | 1        | 500     | 500           |
| Driver's Ready Room           | 1                | 602     | 602           | 1        | 750     | 750           |
| Meeting/Break Room            | 1                | 422     | 422           | 1        | 750     | 750           |
| Storage Room                  | 1                | 158     | 158           | 1        | 200     | 200           |
| Training/Conference Room      | 0                | 0       | 0             | 2        | 500     | 1,000         |
| <i>Common Areas (Total)</i>   |                  |         | <i>1,487</i>  |          |         | <i>3,200</i>  |
| <b>Support Spaces</b>         |                  |         |               |          |         |               |
| IT Closet                     | 1                | 146     | 146           | 2        | 150     | 300           |
| Janitor Closet                | 1                | 50      | 50            | 1        | 50      | 50            |
| General Circulation/Utility   |                  | 25%     | 3,912         | 1        | 25%     | 5,720         |
| Drive Through Wash (Total)    | 1                | 1,600   | 1,600         | 1        | 3,800   | 3,800         |
| Storage/Shop Building (Total) |                  |         | 0             | 1        | 6,800   | 6,800         |
| <i>Support Spaces (Total)</i> |                  |         | <i>5,708</i>  |          |         | <i>16,670</i> |
| <b>TOTAL Building Space</b>   |                  |         | <b>21,600</b> |          |         | <b>39,200</b> |

Phasing of both site and buildings over the 20-year Master Plan window is described in the next Section 4 Recommended Alternative Implementation. The building requirements are considered a minimum to keep operations and maintenance efficient. Staffing numbers required, fleet needs, and maintenance will need to be monitored. It is assumed that the BEBs will require less maintenance so the impact on maintenance staff as the fleet grows is minor. However, staff needs for administration, operations and service work will be significant. The current footprint of the existing building by the end of Master Plan window will again be stretched.

When expansion or renovation of the current operations building is needed some consideration should be made to adequately size Administration and Operations portions of the building with two stories or relocation for growth beyond the 2041 projections with additional space such as the City Property south of the existing site. There is a potential opportunity for site expansion through the Orchard Road realignment. The 30 percent design plans were finalized in May 2021, with construction starting as soon as 2024 or 2025. The lack of expansion to the west will need to be offset by purchasing or leasing the City Property to the east adjacent to the Humane Society and other leased space to meet the Master Plan space needs (parking and building space).

## 4. Improvement Alternatives

The use of diagonal parking spaces created enough space to accommodate 76 buses. It is possible to expand the number of parking spaces to 92 spaces through the use of stacked parking. If the diagonal charging stations are replaced, it is possible to increase the available large-bus parking to 116 spaces.

The projected needs over 20 years will be a condition of fleet growth; therefore, this study developed a phasing plan. Phasing starts with immediate site improvements and laying the groundwork and underground electrical distribution for future phases, electrification, and bus circulation and parking. This section provides a description of these proposed phases in major milestones and subphases of development. The following notes apply to the associated project cost estimates outlined below:

- All costs are in 2021 dollars; no escalation has been applied.
- Cost ranges are used for building improvement phases due to unknowns in building renovation costs.
- All costs include consultant design (except Phase 1A), construction contingency, and construction management costs.

### 4.1 Phase 1A

#### 4.1.1 Site

Stormwater improvements for the first phase of the Orchard site improvements include piping the offsite stormwater that enters the site from the north and is currently conveyed in an open channel along the west side of the Northrup Street right-of-way (ROW). After being conveyed south in the open ditch along Northrup Street, the stormwater drains to the west in another open channel that runs parallel to Harvard Street until it reaches Orchard Street, where it enters a pipe and continues west. The City of Boise has indicated through meetings with the VRT Orchard team that this offsite stormwater should remain separated from the VRT Orchard site stormwater. Under this direction, the offsite stormwater will be piped as it enters the site at the current end of the pavement on Northrup Street. The pipe, an 18-inch reinforced concrete pipe, will continue south to Harvard Street along the current alignment of the ditch. At the south end of the site, the pipe will daylight and the offsite stormwater will drop into the open ditch along Harvard Street and continue east as it currently does.

Pavement expansion to the east within the current site boundary will cover approximately 1 acre of unimproved surfacing and will subsequently increase stormwater collection and handling needs. To best utilize the existing site, the recommended solution for handling the increased stormwater is subsurface infiltration. See Figure 3 for the proposed piping of offsite stormwater through the site, expansion of pavement, and subsurface infiltration location. The proposed subsurface system includes construction of a single underground infiltration bed sized approximately 20 by 150 by 10 feet deep. The infiltration bed sizing is intended to accommodate further site expansion to the east outside of the existing site limits and is described in Phases 2 and 3.

Pavement expansion to the east will provide a significant addition to the Orchard operational capability. Approximately 1 acre of land adjacent to the Northrup Street ROW on the east and the Harvard Street ROW on the south, is unimproved. Soils in the area include a layer of lean clay and will require removal of a significant volume to be replaced with new subbase and base course aggregate (14 inches of granular subbase, and 8 inches of ¾-inch minus aggregate base course). A 4-inch asphalt pavement section is recommended. This section has been developed by the geotechnical engineer on the project based on specifications for electrical bus loading and evaluation of existing soil conditions. For Phase 1A, this newly paved area will provide expanded parking space for up to 23 cutoffs, which will be moved from the west side of the parking area to the east side as well as more than 45 additional employee parking spaces.

Site lighting is currently provided from four wooden pole lights along the edge of the existing pavement. Power for these lights originates in the Fueling Station power island to the northwest of the poles. These lights will be removed, and new lights will be installed to provide illumination at what will become the utility core for the future BEB charging island roughly centered in the newly paved acre. The existing 480/277-volt wiring from the existing Fueling Station will be reworked to maintain downstream electrical and lighting loads that may be disrupted by the removal of the existing pole lights.

A new 480/277-volt three-phase circuit will be provided from the existing BEB charging system and will feed power to a new power distribution system at the new BEB island. This power distribution system will provide power to the new pole lights and the electric block heaters planned for the new BEB island.

The existing 5-inch primary power conduit will be intercepted at its stub location and extended along the south boundary of the campus to a point east of the proposed pavement boundary. To permit proper pulling of future 34.5 kV power cables, a utility vault will be installed at the south end of the existing BEB island where the conduit is currently stubbed. From there, two new 5-inch conduits will be routed underground to the east along the south boundary, as previously described. Future phases that require high power for BEB charging stations and other buildings will provide the necessary pad-mounted transformers and 34.5 kV three-phase distribution circuit from the existing 2,500 kVA transformer.

The ability to secure the approximate 2 acres to the east of Northrup Street, south of the Humane Society and trucking facility leases, through the City of Boise is critical to long-term success for the expansion of the VRT Orchard Street Facility, as identified in future phases. Because securing the lease can be a lengthy process, this master plan recommends beginning the process in Phase 1A.

#### 4.1.2 Facilities

No improvements are anticipated for either operations or maintenance during Phase 1A. Although, as noted in Existing Conditions, there is currently a lack of space in the operations building to accommodate all bus drivers.

##### *Phase 1A Pavement Expansion*

| Project Information |                                                                                                                                                                                                                                                              | Project Schedule |              |             |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------|-------------|
| Name                | Description                                                                                                                                                                                                                                                  | Design           | Construction | Cost        |
| Scope               | Pave expanded parking area, extend utilities, pipe existing storm ditch through site, construct subsurface stormwater infiltration system, and relocate lights. Begin process of securing lease from City of Boise for easternmost approximate 2-acre space. | Q1-4 2021        | Q1-3 2022    | \$1,200,000 |

Note: All costs are in 2021 dollars; no escalation has been applied.

## 4.2 Phase 1B

### 4.2.1 Site

Phase 1B builds on the pavement and drainage improvements begun in Phase 1A. Phase 1B will rehabilitate all existing asphalt south of the existing fueling island. Based on the pavement condition review, the anticipated rehabilitation method will consist of portions of a pavement mill and inlay and some areas of reconstruction in areas of very poor soils and/or compromised pavement. Grade corrections will be made if needed, to improve drainage in the vicinity of the existing valley gutter and in the vicinity of

the existing drop inlet located west of the administrative building. Appropriate rehabilitation methods or full depth rebuild will be used as needed to achieve the grade changes.

Just prior to the pavement rehabilitation work, the existing, inadequate corrosion protection system installed below grade at the fuel island will be updated to provide a fully intact and functioning system. New pavement will be placed over the corrosion improvements, and access ports to the system will be installed in the pavement for improved monitoring opportunities.

#### *Phase 1B Pavement Rehabilitation*

| Project Information |                                                                                          | Project Schedule |                   |             |
|---------------------|------------------------------------------------------------------------------------------|------------------|-------------------|-------------|
| Name                | Description                                                                              | Design Time      | Construction Time | Cost        |
| Scope               | Rehabilitate paving in existing paved space and update fuel island corrosion protection. | Q2-4 2022        | Q2-3 2023         | \$1,900,000 |

Note: All costs are in 2021 dollars; no escalation has been applied.

### 4.3 Phase 1C

#### 4.3.1 Site

Security fencing modifications are needed to allow for improved free-flowing bus access around the maintenance and operations facility. Free-flowing access around the facility is interrupted at this time by two gates required to provide secured and separated space for visitor parking off Northrup Street. This block of fenced-off space creates a barrier in the free flow of buses around the facility. By moving the visitor parking to the eastern edge of the VRT property adjacent to the Northrup Street ROW, the fencing and two security gates obstructing the free flow of buses around the facility can be removed.

This change will require the installation of a call button and motorized walk-up gate for the visitor parking as well as a call button and motorized delivery truck gate off of Northrup Street, just south of the new visitor parking.

#### 4.3.2 Facilities

As part of the improvements for the facilities in Phase 1C, consideration of additional staff break space is needed. Break space inside the facility is at a premium. Covered outdoor space is an excellent way to inexpensively expand facility space in Boise's mild weather. This effort can range from very simple free-standing covering to a more permanent roof-line expansion. If the permanent roof expansion is desired, this must be designed to be able to be incorporated into the Phase 2 Administration and Operations expansion. This addition can be added at any time during Phase 1 or 2.

#### *Phase 1C Security, Breakroom, and Site Upgrades and Expansions*

| Project Information |                                                                                      | Project Schedule |                   |           |
|---------------------|--------------------------------------------------------------------------------------|------------------|-------------------|-----------|
| Name                | Description                                                                          | Design Time      | Construction Time | Cost      |
| Scope               | Motorize East gate, upgrade security fencing, and provide covered outdoor breakroom. | Q1-2 2023        | Q2-3 2024         | \$300,000 |

Note: All costs are in 2021 dollars; no escalation has been applied.

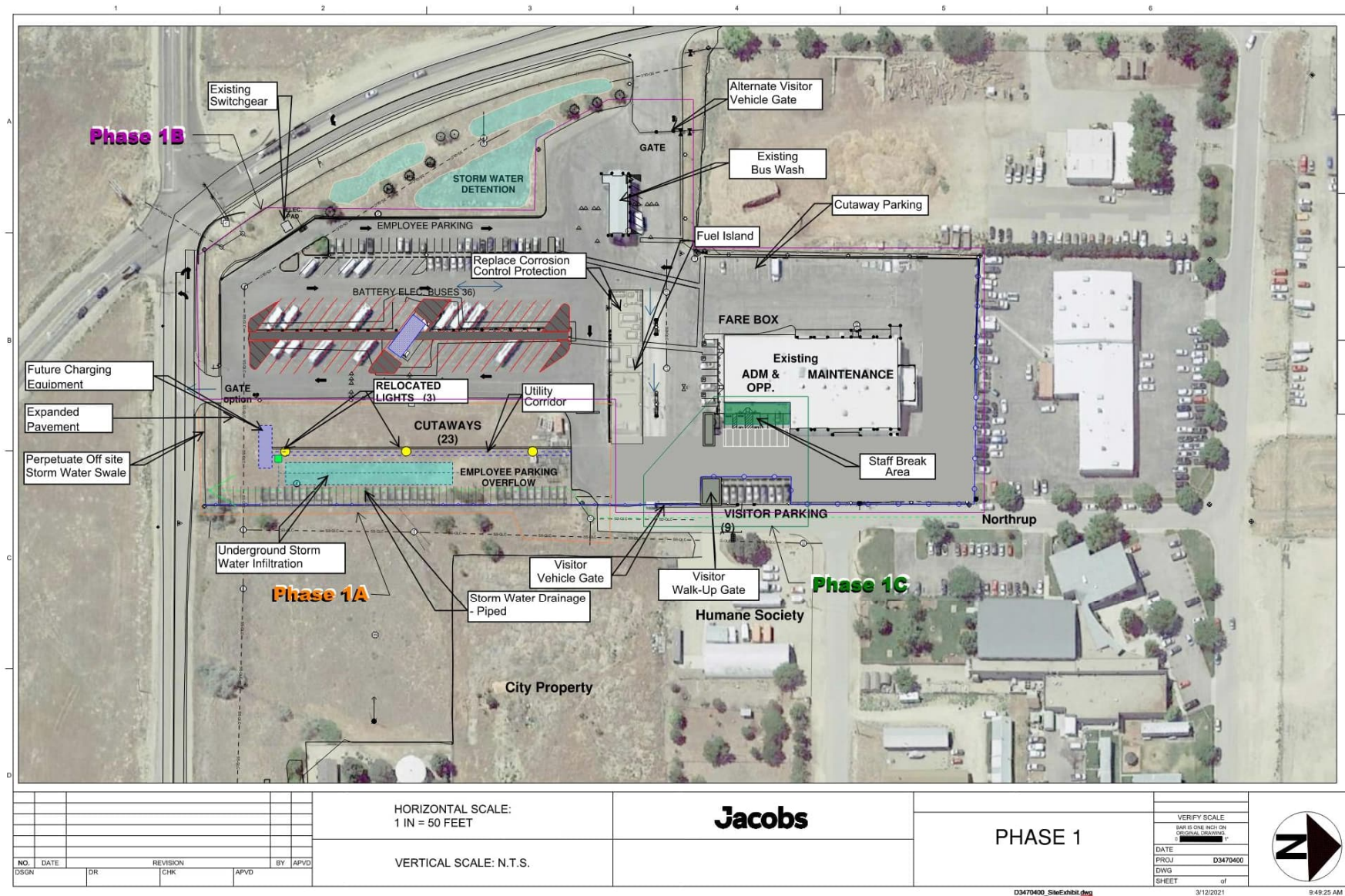


Figure 3. VRT Orchard Facility – Phase 1 Site Map

Appendix B contains individual figures for Phase 1A, Phase 1B, and Phase 1C.

## 4.4 Phase 2A

Phase 2 is the start for focus on operation facilities in addition to anticipated surrounding road realignment with yard improvements and overall site expansion. Phase 2A may overlap some of the final work of Phase 1, depending on the timing of funding. This work is also dependent on securing the lease for the City of Boise property to the east.

### 4.4.1 Site

This work will include expanding the site footprint into the leased area in the southeast corner along Harvard Street. Site work includes expansion of the pavement surface to accommodate a new building to house new offices, conference space, a shop, and storage space.

To facilitate the development of this new building, utilities and services will be extended from the existing site to the location of the proposed building. Utilities and services will include water, sewer, gas, electric, and other communications as needed. Conduit will be included in the pavement section to provide for future needs as well.

Drainage and stormwater from the new pavement and building will be designed to fit into the Orchard site system. Phase 2B will include more extensive changes to the stormwater system as part of the Orchard Street realignment.

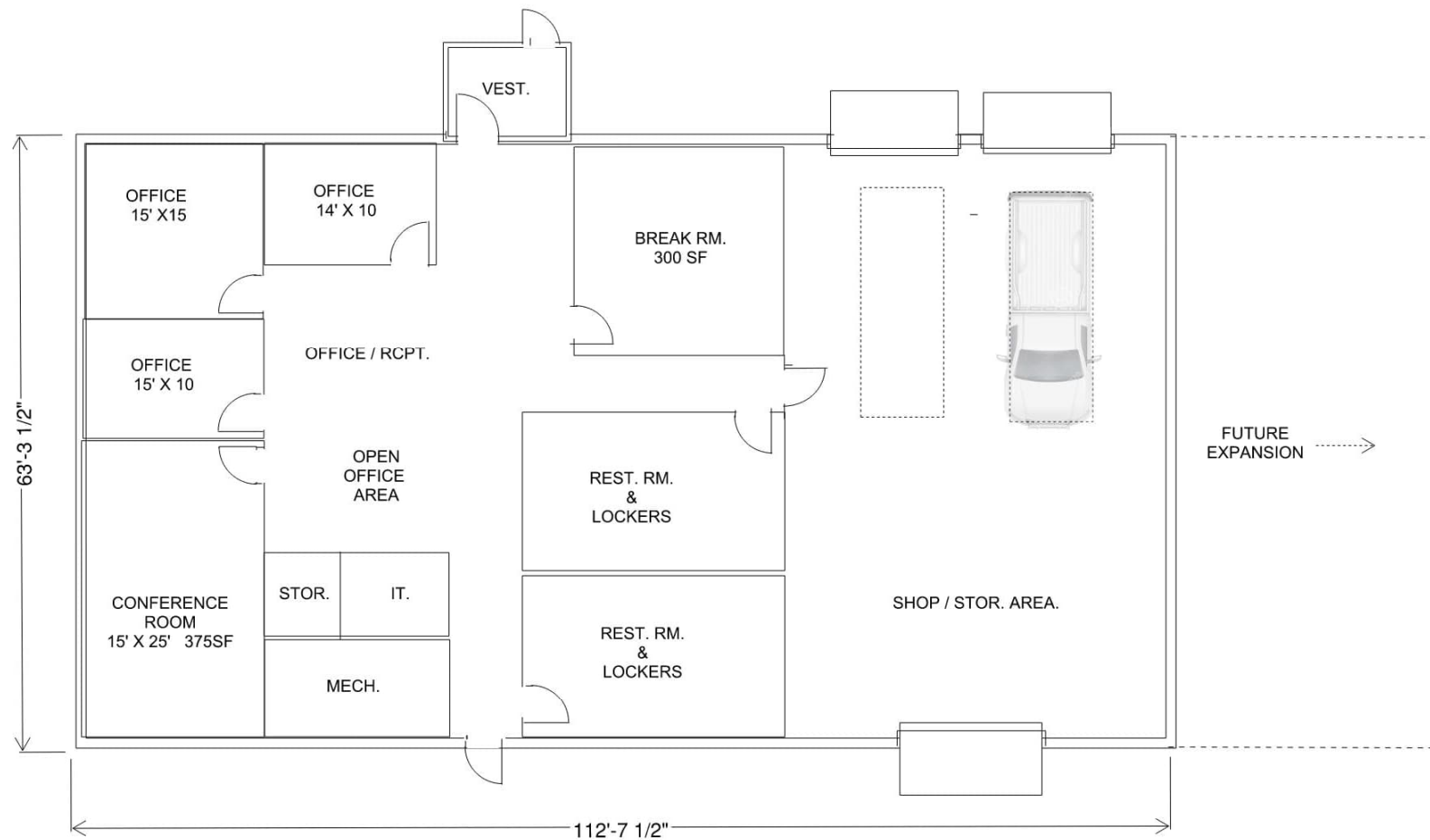
Additional parking will be striped and added to the newly paved lease space. Exact dimensions for the extent of pavement and the available parking will be determined as funding becomes available; pavement for parking can be expanded as long as the lease for the necessary space has been secured. Additional parking for cutaways is shown in Phase 2B, assuming not all of the paving for the lease area can be completed in Phase 2A.

At the visitor parking location, improvements include an entry turnaround for ease in accessing and leaving the site. The preferred layout of the turnaround will require coordination with the Humane Society as it does extend several feet out of the ROW into the Humane Society lot. If coordination with the Humane Society is not feasible, the turnaround will be modified to fit fully within the Northrup Street ROW and VRT's leased space.

### 4.4.2 Facility

The proposed building addresses the current and anticipated increase in ridership resulting in an increase of the BEB fleet beyond 36-foot buses. Currently, conference space inside the existing operations and maintenance facility is at a premium, forcing use of the low headroom, cramped mezzanine between maintenance bays to be used for conference space. This provides no sound or privacy separation. Increased ridership and buses will require additional operators and service workers, who in turn need additional parking, locker space, and restrooms. A new office for fixed routes and shop/storage building will provide flexibility, parking, and storage. This will allow for interim relief of space needs at the main operation center prior to expanding the existing administrative and operation building. Completing Phase 2A will be unaffected by the Harvard and Orchard Street realignment.

Figure 4 shows a preliminary plan for the new Office and Storage Building, including office, storage, and shop space. The proposed building is approximately 4,700 SF. Figure 5 shows this additional building and the pavement on the Site Plan.



### AUXILIARY OFFICE AND STORAGE BUILDING

NO SCALE 4,700 SF

#### GENERAL NOTES:

1. PREFABRICATED METAL BUILDING.
2. CONCRETE SLAB ON GRADE
3. GYP BD. AND ACOUSTICAL CEILING AND VINYL SHEET FLOORING IN OFFICES ONLY
4. GENERAL GAS FORCED AIR HEAT AND AC SYSTEMS OFFICE ONLY GARAGE VENTILATED WITH UNIT HEATERS.
5. TOTAL SF IS 4,700 EXPANDABLE BOTH OFFICE AND SHOP AREA TO THE NORTH BY ADDING MODULAR BAYS. BASED ON LOCATION.



Figure 4. VRT Orchard Facility – Phase 2A Office, Shop, and Storage Building

*Phase 2A Site and Facility Expansion*

| Project Information |                                                                                                                                                                              | Project Schedule |                   |                            |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|----------------------------|
| Name                | Description                                                                                                                                                                  | Design Time      | Construction Time | Cost                       |
| Scope               | Expand site to the east into the new lease space. Install some pavement and construct new Office and Storage Building to relieve growth pressures on main Operations center. | FY2023           | FY 2025           | \$4,000,000 to \$5,000,000 |

## 4.5 Phase 2B

### 4.5.1 Site

Phase 2B will be triggered by the realignment of Harvard and Orchard Streets by the Ada County Highway District (ACHD). The activity has a significant impact on where and how the facility will expand in site and building space. For the purpose of this study, the phases assume this realignment will take place as currently scheduled through ACHD.

The realignment of Orchard and Harvard Streets as well as the expansion of pavement into the City lease space to the east enables the installation of a second bus access gate off Harvard Street. This results in improved flow through the site with a dedicated entrance and exit off Harvard Street.

Stormwater improvements will primarily consist of modifications to existing swales on the west side of the site to accommodate realignment of Harvard Street. Specific improvements to these ponds are dependent on the level of impact of the Harvard Street realignment and may require the addition of underground retention as well. It is anticipated that ACHD would be responsible for the necessary modifications. Stormwater on the east side of the current site for Phases 1 through 3 is accommodated in the Phase 1 subsurface infiltration structure.

With the shift of Orchard Street, and reduction of the stormwater swale on the western side of the project, space becomes available to expand the employee parking on this west side; this expansion will create a parking area consisting of approximately 115 employee parking spaces. Providing security fencing around the new parking will create a safer space for employees and their vehicles. While this is not the long-term employee parking solution, this parking, or a slightly modified version, continues through Phases 2 and 3, making the investment in fencing worthwhile.

As part of the improvements to the east into the expanded lease area, additional cutaway parking can be provided along at least two fence lines to expand cutaway parking to up to about 30 additional spaces.

Through Phase 1, the power corridor has been developed and conduits are in place; power has been extended to the corridor, but not expanded up through the corridor. This phase will power-up the corridor to provide service to the new BEBs as they arrive. As the space is prepared for the BEBs, a concrete island will be constructed above the power corridor for pedestrian access as well as charging stations for the buses. Minor drainage improvements will be needed as the concrete island is construction. The BEB island will accommodate up to 38 BEBs, parked diagonally.

#### 4.5.2 Facility

Facility improvements include expanding and renovating the existing Administration and Operations building. The addition of 38 BEBs will require staff increases that surpass the capacity of the current Administration and Operations building. At a minimum, the Administration and Operations building would be expanded to include the covered break area created in Phase 1 on the east side of the building. Alternatively, if more space is needed, the entire southern portion of the building (Administration, with the lower roof line) would be demolished and reconstructed as a two-story building.

##### *Phase 2B Site and Facility Expansion*

| Project Information |                                                                                                                                                                                                                                                                             | Project Schedule |                   |                            |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|----------------------------|
| Name                | Description                                                                                                                                                                                                                                                                 | Design Time      | Construction Time | Cost                       |
| Scope               | Develop and energize the BEB parking island initiated in Phase 1 to increase charging capability, develop new employee parking on the west, add second Harvard Street approach, remodel existing Administration building, and expand cutaway parking in the new lease area. | FY2025           | FY 2030           | \$5,000,000 to \$8,000,000 |

Note: All costs are in 2021 dollars; no escalation has been applied.

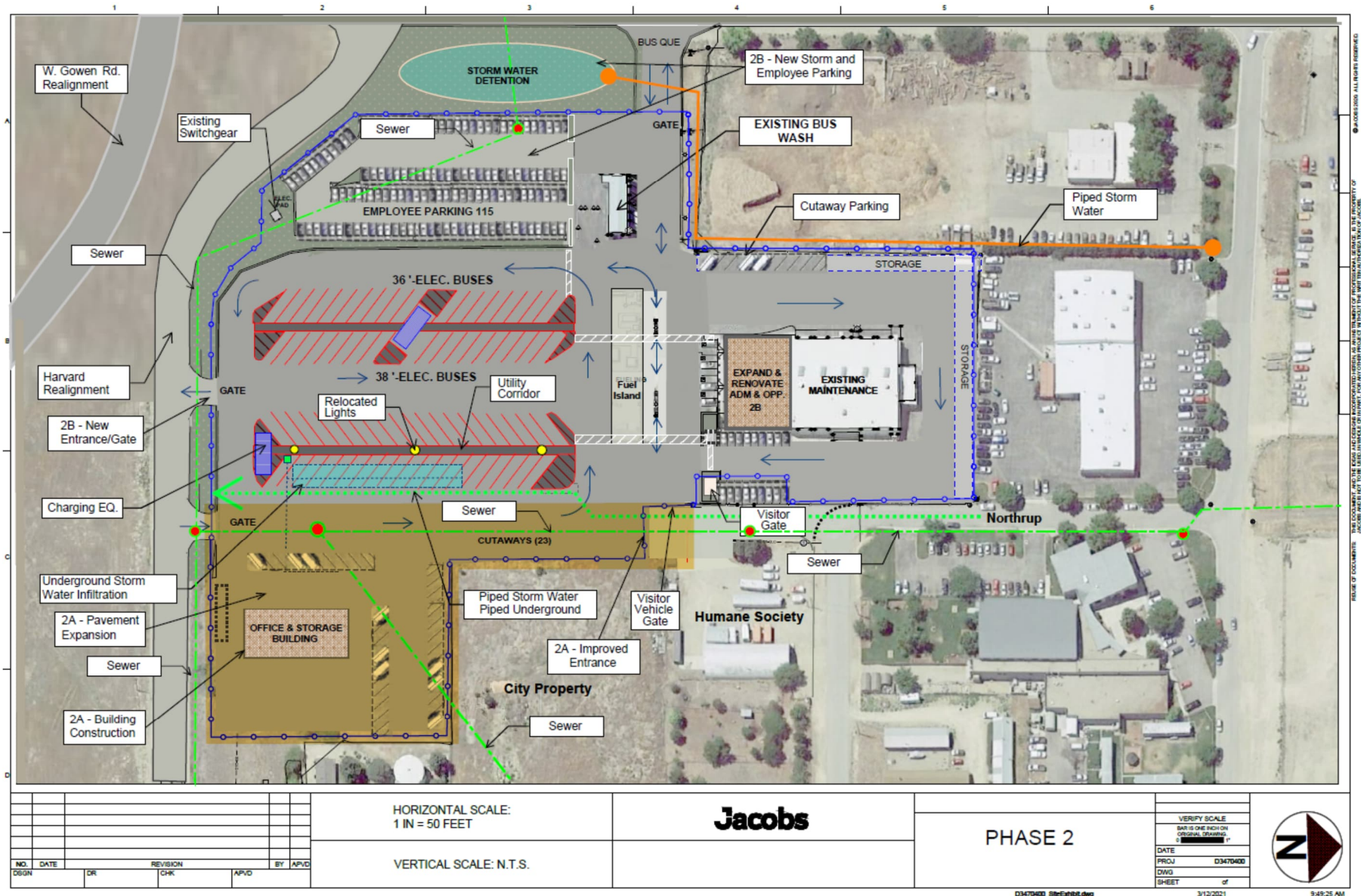


Figure 5. VRT Orchard Facility – Phase 2 Site Map

## 4.6 Phase 3

Triggers that will set Phase 3 in motion include:

- This phase is triggered by full building out of a fleet of plus or minus 76 full-size transit vehicles and cutaways.
- The improvements in Phase 3 are designed to increase efficiency through new bus wash location and to maximize the employee parking and flow through the yard. Bus entry and exit will be primarily to Harvard Street with the Orchard street entrance used for employee parking and emergency access or egress.

### 4.6.1 Site

Site improvements include minor expansion of the employee parking on the west side of the property after the relocation of the drive through wash building. The relocation of the bus wash provides additional space near the Orchard entrance private vehicle access to the employee parking that already exists and less conflict with bus movement. Expansion of the parking will require minor modification of the security fencing around the employee parking lot.

Additionally, by Phase 3, expansion to the east will be necessary to accommodate the relocation of the new pull-through bus wash and storage building. There will be room with site and facility changes for additional cutaway parking in the southeast portion of the site and around the operations and maintenance building. Additional parking will include up to 15 spaces.

A third improvement identified for Phase 3 is the realignment of west entry gate; this gate is used for vendors as well independent access for employee parking. This entrance can be reduced in size and would only be used as a bus emergency egress should there be an issue that blocks traffic on Harvard Street.

It is anticipated that the existing diesel and CNG fueling island will be reduced to providing diesel fuel only by Phase 3. Removal of part of the fueling island could provide additional parking but is also a good location for a natural gas backup power system, or service support areas for hustlers or cleaning crews and their storage needs. Phasing out the current fueling island could also mean switching to a fast charging or hydrogen station for hydrogen fuel cell vehicles, depending on where fuel technology is heading.

### 4.6.2 Facilities

Facility improvements as a part of Phase 3 include expansion of the maintenance building to include a new repair bay on the north side and additional office space, parts storage, and expanded staff facilities on the south end of the building.

The new bus wash in the expansion to the east will be upgraded to provide drying capability and enhanced water recycling system. Site storage has been limited and accommodated in various make-shift areas. The development of a dedicated site storage building will positively support the administration, maintenance, and operations staff.

Please see Figure 6 for a map of the proposed improvements for Phase 3.

*Phase 3 Site Improvements*

| Project Information |                                                                                                                                         | Project Schedule |                   |             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|-------------|
| Name                | Description                                                                                                                             | Design Time      | Construction Time | Cost        |
| Scope               | Minor expansion of Phase 2 employee parking to the west, pavement and drainage, realign west gate entry, relocate bus wash to east side | FY 2039          | FY 2040           | \$2,200,000 |

Note: All costs are in 2021 dollars; no escalation has been applied.

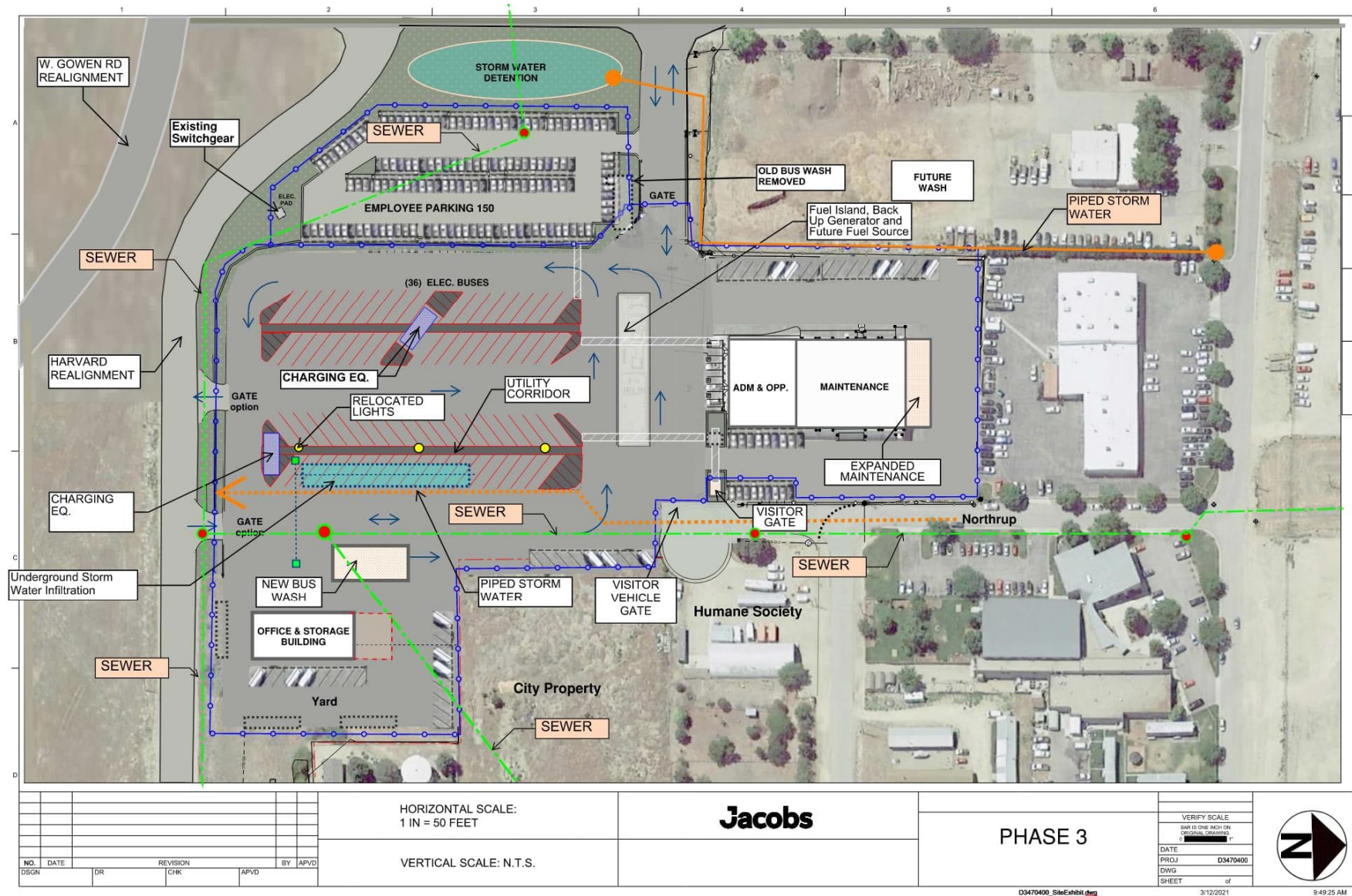


Figure 6. VRT Orchard Facility – Phase 3 Site Map

## 4.7 Phase 4

The following are triggers for Phase 4 which is projected to be beyond the study limits of greater than 85 full-size transit buses and beyond 2041 Master Plan date. It does provide some elements for further expansion if realignment of Harvard and Orchard do not happen, or if ridership exceeds anticipated figures, and to develop options for develop of the base should maintenance or operations need to expand to accommodate additional functions:

- Unanticipated growth or new transit functions or vehicle types
- Addition of other zero carbon fuels like hydrogen generation for hydrogen fuel cell buses.
- Need for a significant addition of articulated buses or the use of double decker buses.
- Alternative if the realignment of Harvard or Orchard is different than currently planned or if it is abandoned.

### 4.7.1 Site

The actual improvements determined at the time of the expansion may be different depending on technology and needs at the time. However, it does appear clear that if VRT wants to continue to grow at the Orchard site, the best approach is to continue to expand to the east on City of Boise property.

Anticipated improvements include the relocation and expansion of employee parking into the additional eastern property. Expansion could serve up to approximately 180 employee vehicles as well as 122 40-foot and articulated 60-foot transit buses. Additional parking is identified for articulated buses, as well as additional 40-foot buses using a stacked parking method. The existing employee parking on the east would be converted to bus parking, requiring very little infrastructure change.

It is anticipated that the existing diesel and CNG fueling island will be completely phased out by Phase 4. Removal of the fueling island provides additional access space but is also a good location for a natural gas backup power system, using the existing gas main that currently serves the island. Phasing out the current fueling island could also mean switching to a fast charging or hydrogen station for hydrogen fuel cell vehicles, depending on where fuel technology is heading.

Additional stormwater space has been shown to the east as well. This is identified as surface space as insurance against unknown changes to stormwater regulations or other site conditions that could preclude use of additional subsurface infiltration.

### 4.7.2 Facilities

Facility improvements may include replacing the Operations & Administration portion of the existing building to a new building on the expanded City property at the east side of the site. Employee Parking would be to the east of such a building that would be accessed from South MacArthur Street.

With the removal of the Operations & Administration function from the existing building bus maintenance specialty shop space and storage could be expanded where operations vacated the building. The existing office, shop, storage building from Phase 2 can be expanded at any time.

Figure 7 provides a map of the proposed improvements for Phase 4.

*Phase 4 Site and Facility Expansion*

| Project Information |                                                                                                                                                                                                                                                                                                              | Project Schedule |                   |              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|--------------|
| Name                | Description                                                                                                                                                                                                                                                                                                  | Design Time      | Construction Time | Cost         |
| Scope               | Using the additional approximate 2-acre lease to the east, relocate all employee parking to east, expand pavement and drainage to east, construct new operations building to east, renovate/remodel existing building to contain all maintenance (no admin), additional stacked bus parking to east and west | FY2040+          |                   | \$23,700,000 |

Note: All costs are in 2021 dollars; no escalation has been applied.

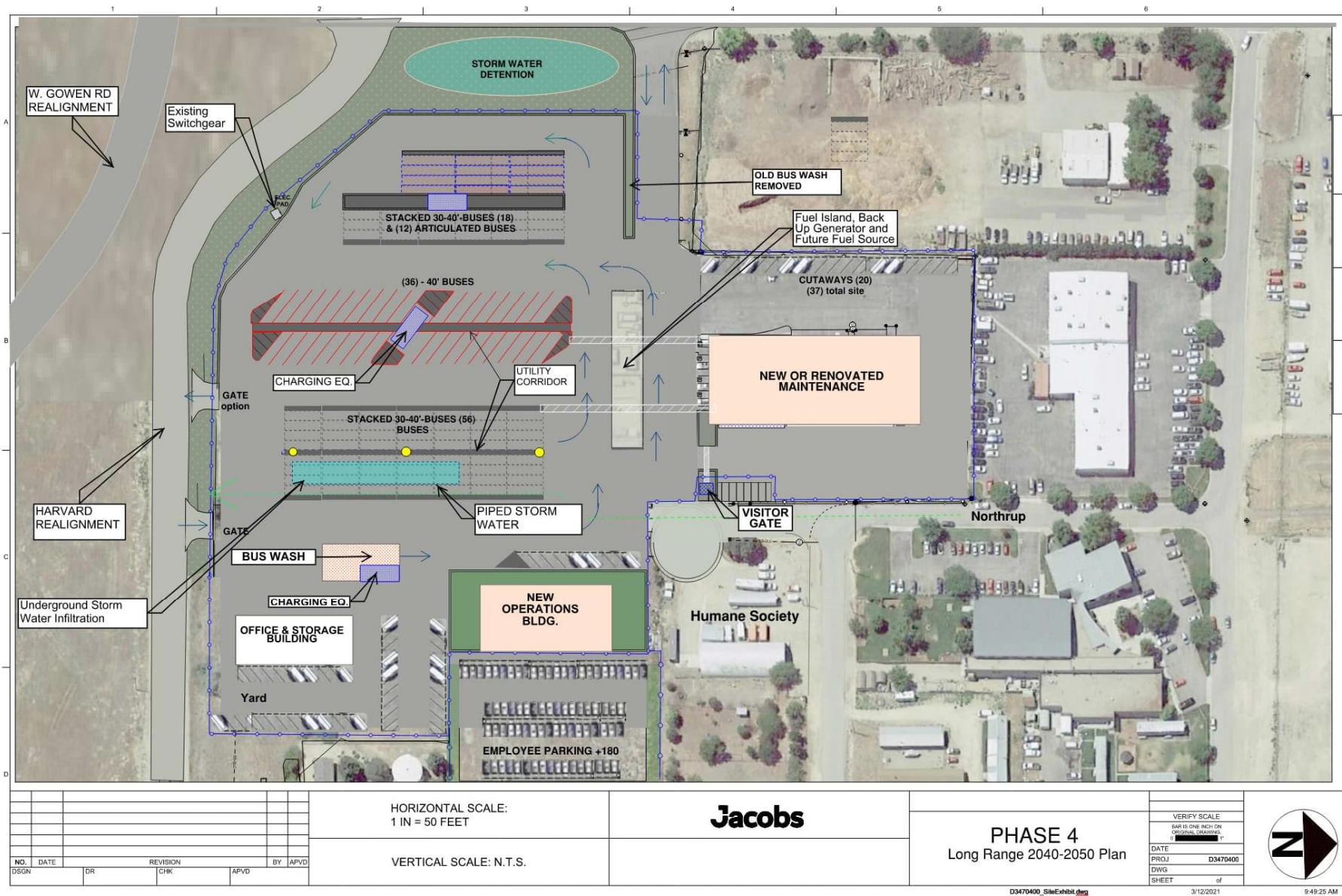


Figure 7. VRT Orchard Facility – Phase 4 Site Map

## 5. Conclusions and Next Steps

In general, the existing Orchard Facility is nearing its capacity with respect to space for both staff and fleet vehicles. Pavement expansion via the Phase I construction project rapidly alleviates the pressure for bus and cutaway storage. However, it does not ease the limited facility space for staff and for bus maintenance. Staff are currently facing a shortage of locker room and breakroom space.

The phased approach outlined in this plan addresses VRT's immediate site needs at the Orchard Facility while also providing flexibility for future growth and transitioning the fleet to battery electric vehicles. The improvements in each phase will culminate in a facility with sufficient operational capacity for even the highest growth scenario projected as part of this activity; of course, this is dependent on the ability of the VRT to secure a lease for property to the east as shown in the conceptual phases.

Expansion to the east will be needed to accommodate anticipated growth beyond the 20-year horizon. Expansion to the east can be accomplished in increments. The Master Plan provides a layout for the desired footprint on the City of Boise property to the east of the current facility, beyond Northrup Street. Early coordination with the City of Boise is critical to maintaining this option for the future. Expansion to the east provides a number of beneficial opportunities and creates future site flexibility in locating a new Operations Center, providing better employee parking close to operations, and creating space for long-term fleet expansion. Negotiations should be started early to ensure that land remains available perhaps even as a right to purchase should the City intend to sell.

The Orchard Street realignment timing is unknown, but the VRT Orchard Facility improvements are needed immediately. Completion of Master Planning and initiation of phased construction must begin without full understanding of the ACHD plans for Orchard Street. The VRT has and will continue to share their plans with ACHD but must move forward at this time to meet system needs and successfully secure grant funding.

The VRT team successfully achieved environmental clearance for the Phase I project and is on track to begin the advertising phase in Spring 2022 with construction planned to occur over the summer and into the fall of 2022. Completion of Phase I is the first step of implementation of the Master Plan for the VRT Orchard facility. Below are specific elements of Phase I and the overall Master Plan that are critical to successful implementation of the plan.

- Per the City of Boise, offsite stormwater will be allowed to continue through the site but will not be combined with VRT Orchard site flow.
- Orchard Facility stormwater can be accommodated onsite through subsurface infiltration as well as relocation and modification of surface stormwater ponds.
- Key elements to site security and safety improvements include:
  - Ultimately separating employee parking from bus space.
  - Separating visitor parking from the access space for buses and providing electronic gate support.
  - Creating dedicated site entrance and exit gates for buses.
  - Providing an additional, electronically controlled, vendor and emergency bus gate.
  - Installing electronic control at all access gates.
- The existing natural gas main that serves the current Fueling Station is an asset that can be used for backup power generation regardless of the final disposition of the island infrastructure.
- Relocation of the bus wash enables multiple benefits: additional space for parking; upgrade and improvement to bus wash system itself; and more efficient movement of the vehicles through the site.

## Appendix A

### Onsite Solar Power Generation Review

## Appendix A. Onsite Solar Power Generation Review

The team conducted a review of potential onsite solar power generation. This included an overview of potential available site space for solar photovoltaic (PV) installations and the estimated amount of power it could provide for use on site.

The review determined that the most applicable type of solar PV installation on the site is parking canopies. Solar PV canopies would be most compatible with existing and future proposed site and building configurations and would allow for use of ground level area to meet vehicle circulation and storage, transportation and maintenance operations infrastructure, as well as site drainage needs. The team assumed that the existing building structures on the site are not rated for solar rooftop installation.

There are two main designs for solar PV parking canopies: single-axis and long-span. Single-axis designs have a fixed canopy tilt and work with single and double-stacked parking rows (Figure A-1). Long-span designs also have a fixed tilt but can span two double-stacked parking rows plus a drive-aisle (Figure A-2). There is also the possibility of utilizing a custom canopy design developed for specific characteristics of the site or parking lot areas that incorporates bus-charging stations (Figure A-3).



Figure A-1. Example of Single-Axis Solar PV Parking Canopy



Figure A-2. Example of Long-Span Solar PV Parking Canopy

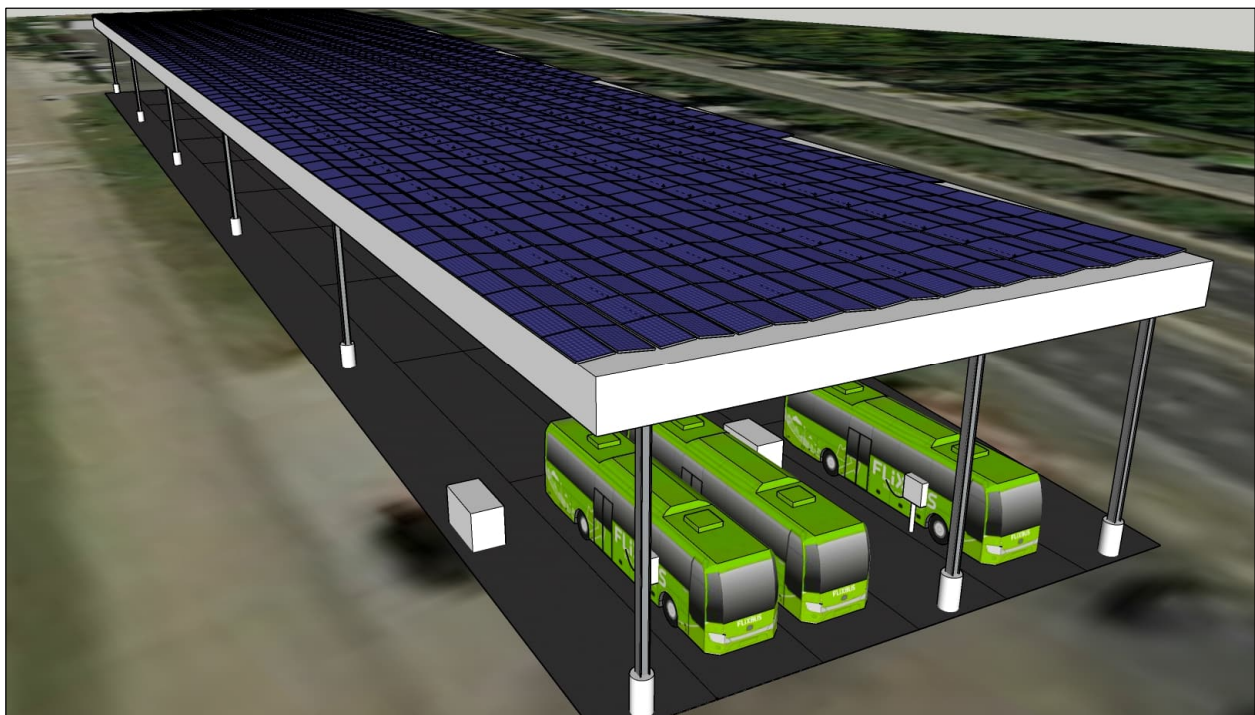


Figure A-3. Site-Specific Solar PV Canopy Design with Charging Stations

Jacobs modeled two example arrangements of solar canopy layouts: one assuming existing site conditions and one assuming the future improved site conditions in Phase 4 outlined in Section 4.6. Figure A-4 includes diagrams of the example solar PV canopy layouts for existing and proposed (Phase 4) conditions with associated number of PV modules, estimated system wattage, estimated annual output, and estimated cost (design and construction). The model assumes each solar PV module is 450 Watts.

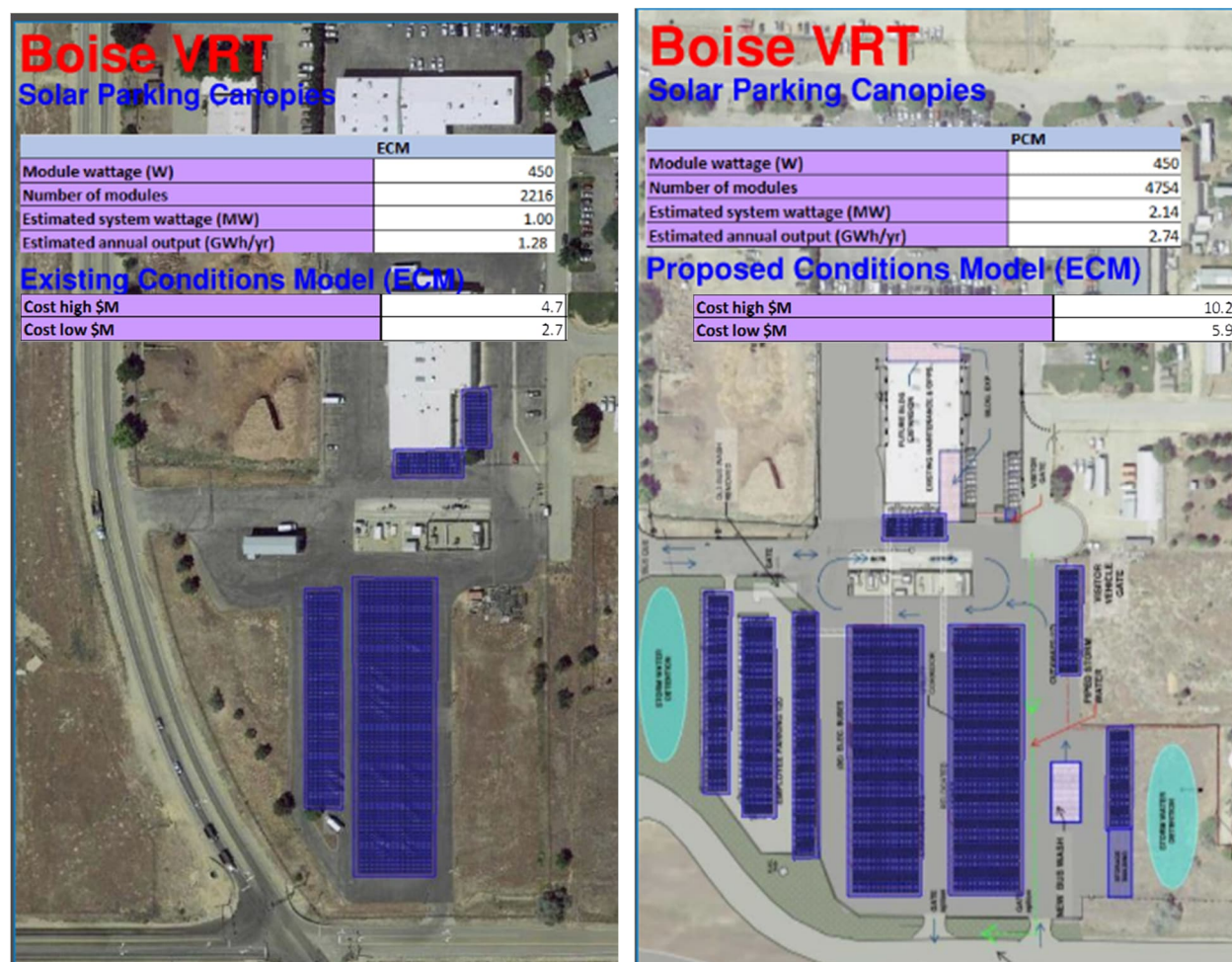


Figure A-4. Existing and Proposed (Phase 4) Conditions Model Solar Layouts

## Net Metering

Net Metering is a special metering and billing agreement between a utility company and participating customer that VRT may consider if the agency installs solar PV canopies on the Orchard Facility site. VRT would connect their power generation system to the utility company's power grid. Net Metering is intended to allow a customer to offset a portion or all of the electrical energy requirements of their operation. The utility company uses a bi-directional meter that tracks energy VRT uses from the electric grid to supplement onsite solar generation (i.e., energy use), as well as excess solar energy not used by the facility operation that goes back to the grid (i.e., energy supply). The result is a net energy calculation, which is equal to the energy produced onsite minus the total energy consumed.

## Appendix B

### Phase 1 Figures

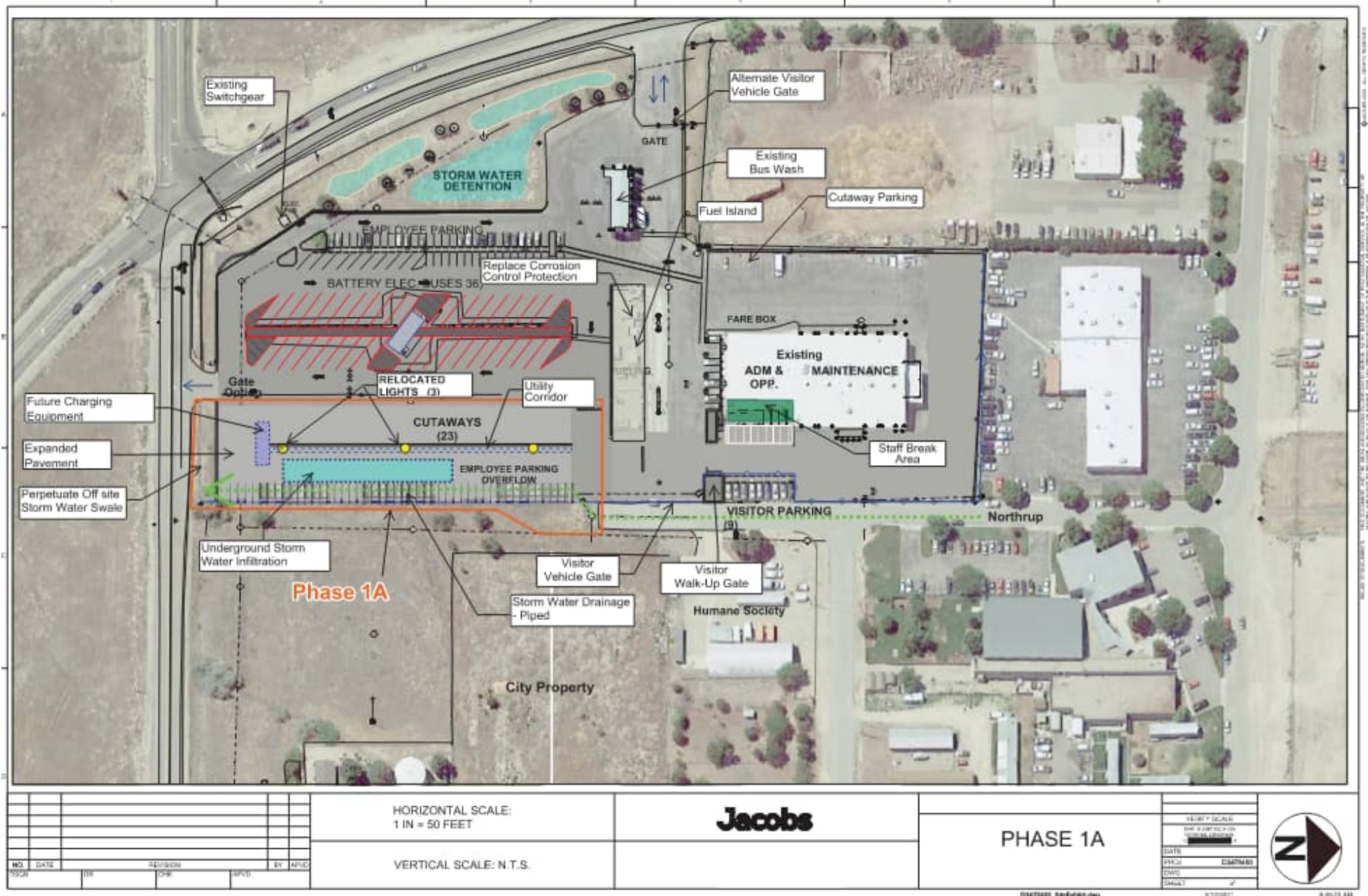


Figure B-1. Phase 1A Improvements

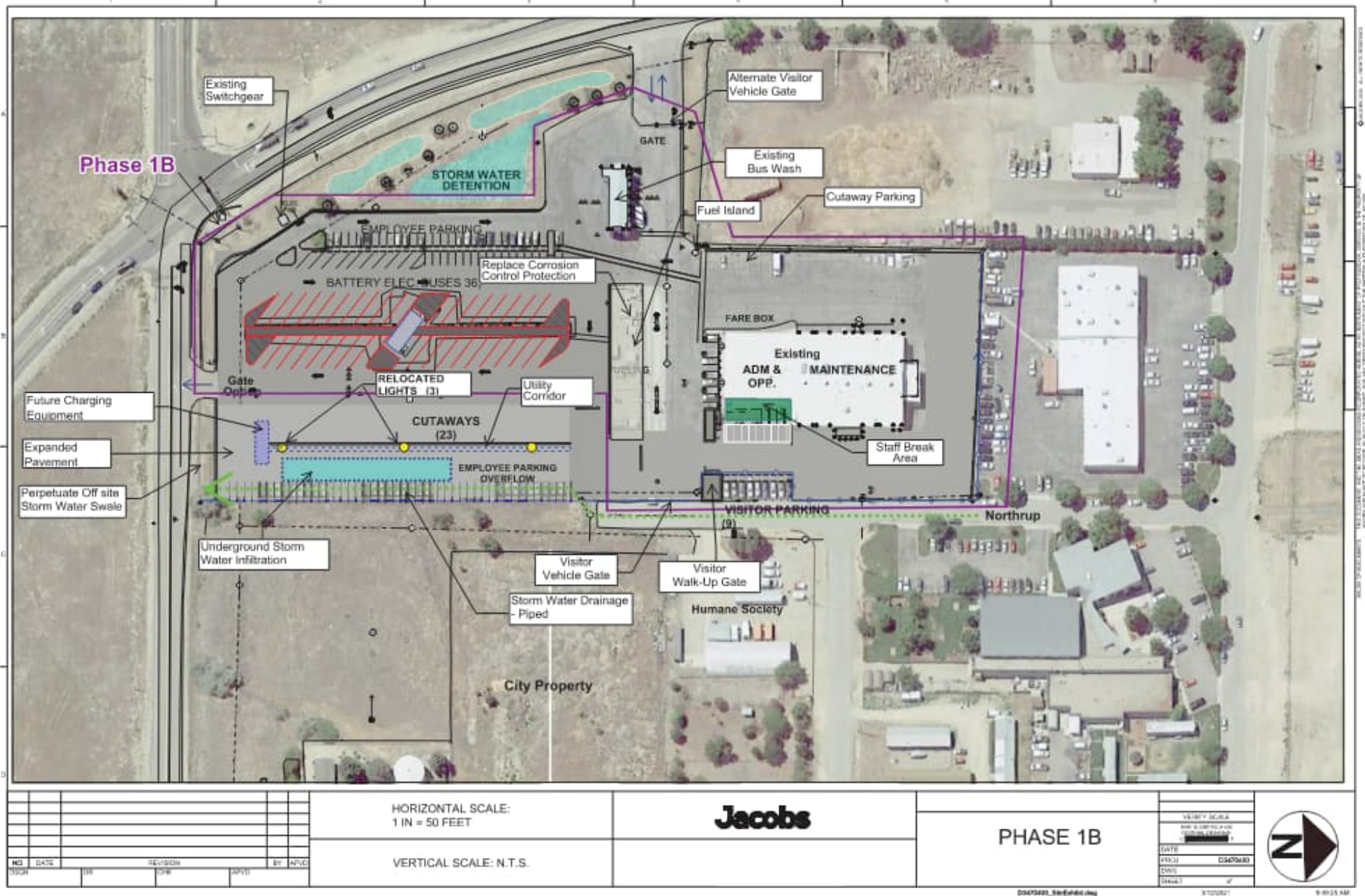


Figure B-2. Phase 1B Improvements

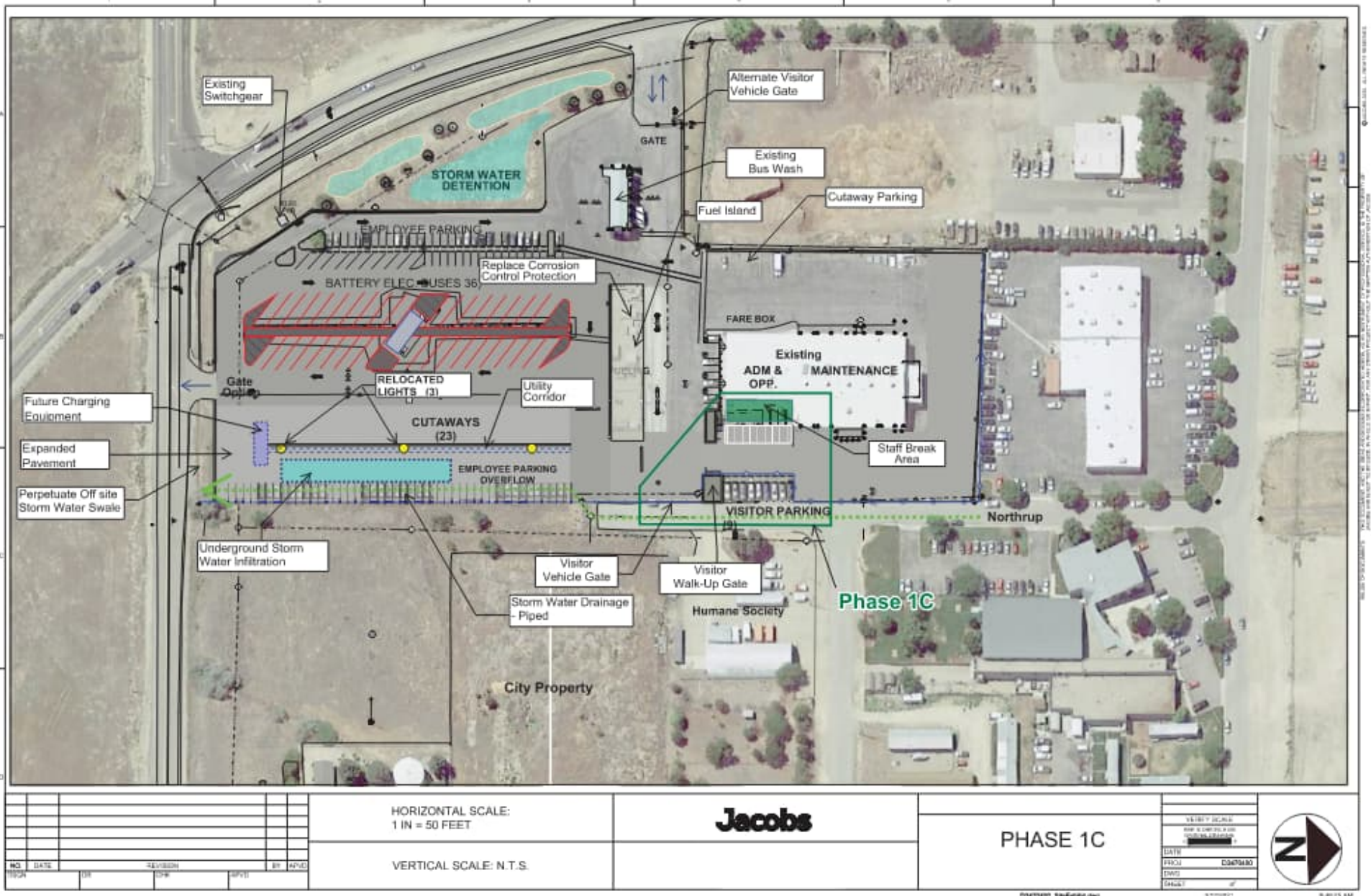


Figure B-3. Phase 1C Improvements