ATTACHMENT A

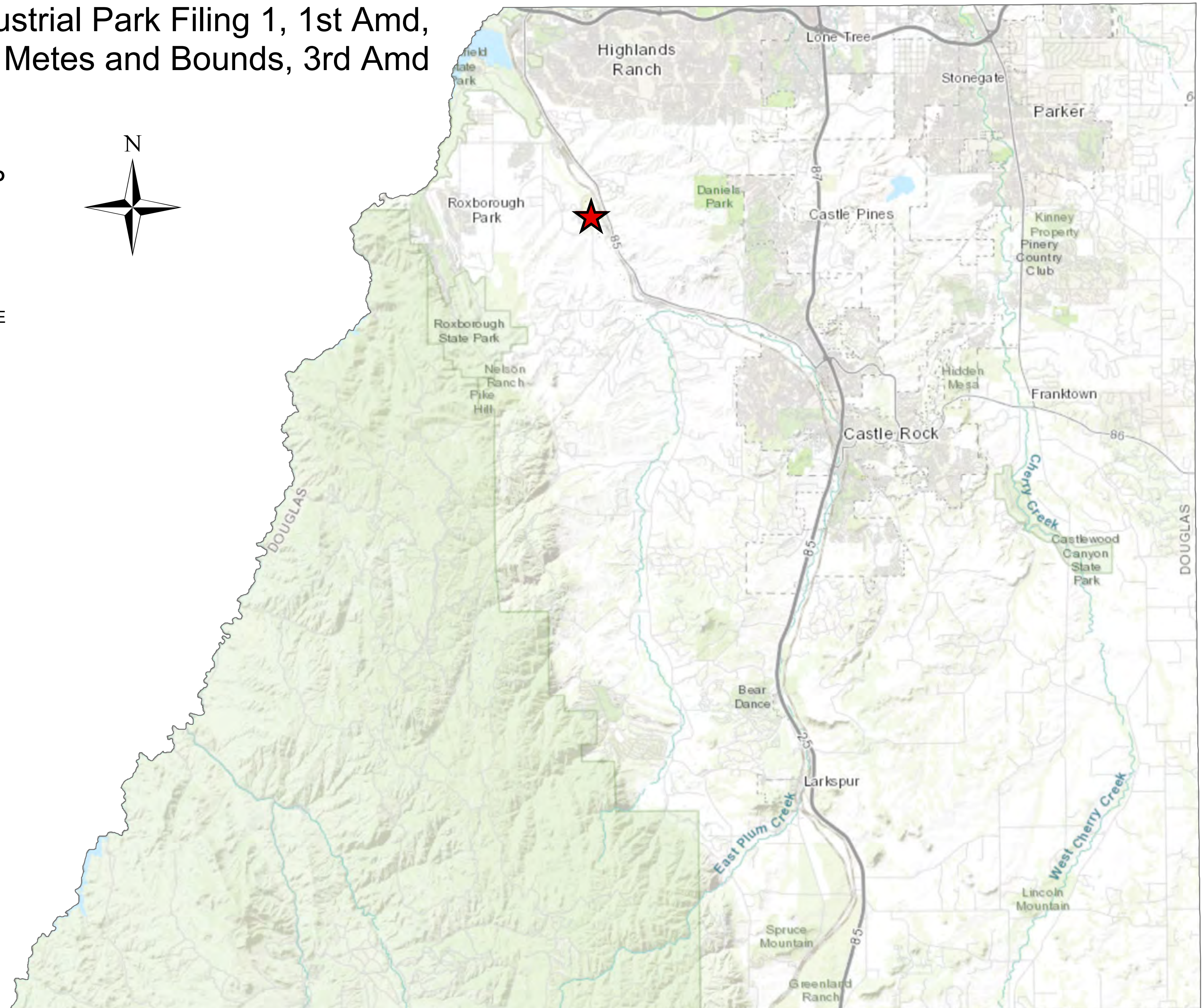
Owens Industrial Park Filing 1, 1st Amd, Lot 1A and Metes and Bounds, 3rd Amd

US2021-002
VICINITY MAP

N

LEGEND

PROJECT SITE



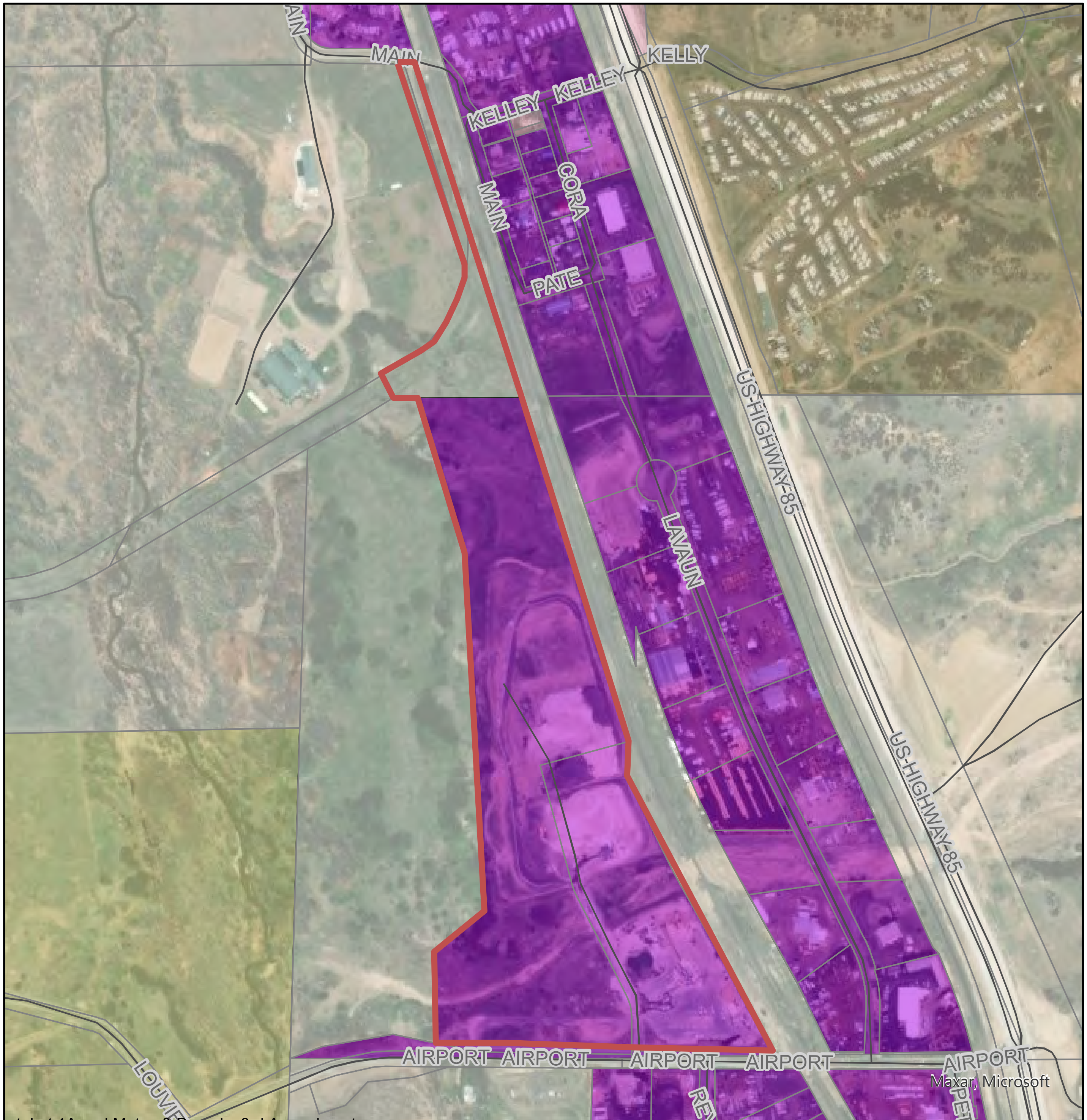
Owens Industrial Park Filing 1, 1st Amd, Lot 1A and Metes and Bounds

Zoning Map
US2021-002

N

LEGEND

- Roads
- Major Roads
- Parcels - PARCELS
- A1 - AGRICULTURAL ONE
- RR - RURAL RESIDENTIAL
- B - BUSINESS
- GI - GENERAL INDUSTRIAL
- PD - PLANNED DEVELOPMENT



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DOUGLAS COUNTY COLORADO

Owens Industrial Park Filing 1, 1st Amd, Lot 1A and Metes and Bounds

US2021-002
Aerial Map

LEGEND

- Roads
- Major Roads
- Parcels - PARCELS

N

DOUGLAS COUNTY
DEPARTMENT OF
COMMUNITY DEVELOPMENT

LAND USE APPLICATION

Please fill in this application form completely. An incomplete application will not be processed.

Note: Neither the Planning Commission nor the Board of County Commissioners should be contacted regarding an open application.

OFFICE USE ONLY

PROJECT NAME: Owens Industrial Park Filing 1, 1st Amd, Lot 1A and Metes & Bounds Parcel 3rd Amd

PROJECT FILE #: US2021-002

PLANNING FEES: $1,200.00

ENGINEERING FEES: $9,500.00

TOTAL FEES: $10,700.00

RELATED PROJECTS: US1996-053, PS2020-204, SP2018-004, US2014-009

PROJECT TYPE: Use by Special Review

MARKETING NAME: Dougco APM

SITE ADDRESS: 5775 Airport Rd Sedalia, CO 80135

OWNER(S):

Name(s): c/o Alex Schatz, Brannan Sand and Gravel Company, LLC

Address: 2500 Brannan Way, Denver, CO 80229

Phone: Fred Marvel, 303-534-1231

Email: Fred Marvel at fmarvel@brannan1.com

AUTHORIZED REPRESENTATIVE *(requires notarized letter of authorization if other than owner)*

Name: Jessica Alizadeh

Address:

Phone: Direct: (303)550-8593

Email: Jessica@jalizadehlaw.com

LEGAL DESCRIPTION: Owens Industrial Center Filing 1, 1st Amendment, Lot 1A and Metes and Bounds Parcel

Subdivision Name: Owens Industrial Center

Filing #: 1 Lot #: 1A Block #: Section #: 3 and 4 Township: 75 Range: 68W

STATE PARCEL NUMBER(S): 2353-032-00-004

ZONING:

Present Zoning: GI Proposed Zoning: GI Gross Acreage: 28.97

Gross Site Density (DU per AC): N/A # of Lots or Units Proposed:

SERVICE PROVIDERS:

Fire District: South Metro Fire Rescue Metro District: None Gas: Xcel

Water: Sedalia Water & Sanitation Sewer: onsite wastewater treatment Electric: Xcel

Roads: ☐ Public ☒ Private (please explain): No public roads planned

To the best of my knowledge, the information contained on this application is true and correct. ***I have received the County's information sheet regarding the Preble's Meadow Jumping Mouse.***

Applicant Signature

6.27.2025
Date

PREBLE'S MEADOW JUMPING MOUSE

What is the Prebles' meadow jumping mouse?

The Preble's meadow jumping mouse is a rare mouse designated by the United States Fish and Wildlife Service as a "threatened species" under the Endangered Species Act. The federal threatened species designation prohibits the unlawful "take" of the Preble's meadow jumping mouse or its habitat.

Where does the mouse live?

The Preble's meadow jumping mouse lives primarily in heavily vegetated riparian habitats. In Douglas County, the mouse has been located in or near many drainages, including tributaries and the main stream reaches, of East and West Plum Creek. However, ***any*** stream reach or potential habitat within Douglas County may be subject to the requirements of the Endangered Species Act.

The mouse has also been found in Boulder, Elbert, El Paso, Jefferson and Larimer counties and in parts of Wyoming.

What activities may be considered a violation of the Endangered Species Act?

In its listing decision, the United States Fish and Wildlife Service identified activities that may result in violation of the Endangered Species Act to include:

1. Unauthorized or unpermitted collection, handling, harassing, or taking of the species;

ANY APPROVAL GIVEN BY DOUGLAS COUNTY DOES NOT OBVIATE THE NEED TO COMPLY WITH APPLICABLE FEDERAL, STATE, OR LOCAL LAWS AND/OR REGULATIONS.

2. Activities that directly or indirectly result in the actual death or injury death of the mouse, or that modify the known habitat of the species, thereby significantly modifying essential behavioral patterns (e.g., plowing, mowing, or cutting; conversion of wet meadow or riparian habitats to residential, commercial, industrial, recreational areas, or cropland; overgrazing; road and trail construction; water development or impoundment; mineral extraction or processing; off-highway vehicle use; and, hazardous material cleanup or bioremediation); and;

3. The application or discharge of agrichemicals, or other pollutants, and pesticides, onto plants, soil, ground water, or other surfaces in violation of label directions or any use following Service notification that such use, application or discharge is likely to harm the species; would be evidence of unauthorized use, application or discharge.

How to determine if a proposed activity would violate the Endangered Species Act.

Any questions regarding whether an activity will impact the Preble's meadow jumping mouse or its habitat should be directed to:

Liisa Niva
Fish and Wildlife Biologist
Ecological Services
Colorado Field Office
P.O.Box 25486, DFC (MS 65412)
Denver, CO 80225-0486
303-236-4773

Where to find more information on the Preble's meadow jumping mouse.

More information can be found at the US Fish and Wildlife Service website at:
https://ecos.fws.gov/ecp/species/4090

WRITTEN NARRATIVE – USR 2021-002

This Narrative for US2021-002 accompanies the April 5, 2024, resubmittal of documents and comprehensively revises all narrative requirements under Douglas County Zoning Resolution Section 2111.05, as follows:

2111.05(1). General Project Concepts.

This application proposes to locate a new asphalt paving materials production facility within the permit area as depicted in the submittal documents (Permit Area) on a GI-zoned (General Industrial) site located at 5775 and 5779 Airport Road in Sedalia, described as LOT 1A, OWENS INDUSTRIAL CENTER FILING 1, 1st AMD, AND METES AND BOUNDS PARCEL (Property). The applicant is Brannan Sand and Gravel Company, L.L.C. (Brannan), a Colorado-based construction materials business focused on asphalt sales and paving, ready mix concrete, and specification aggregates. Ready Mixed Concrete Company, LLC, owner of the Property, is a subsidiary of Brannan.

This resubmittal completes and fine-tunes a facility that is much needed in Douglas County to support critical infrastructure needs and support the community. It will be built in a manner that promotes the wise use of resources and best practices to contain impacts. Asphalt paving materials (APM) are necessary for the development and maintenance of roadways, trails, parking lots and other basic infrastructure, and are therefore common. Because of their perishable nature, APM must be produced within close proximity to their point of use. These paving materials are also 100 percent recyclable. This is a prime opportunity to create a model facility that upgrades current uses and management practices in the established Louviers industrial development node.

The site layout is consistent with previous submittals. Aggregate material storage piles are located along the eastern perimeter and southern interior of the Permit Area. The plant itself is located on the western portion of the Permit Area. Crushing in the center-south of the Permit Area is now incorporated into the USR as an accessory use, with appropriate limitations on USR plans. Truck circulation is around the perimeter of the Permit Area. All access to the Property and the Permit Area will occur from Airport Road, with outbound and inbound truck traffic split between two entrances to enhance safety and manage truck queuing off the public roadway. Existing grading and drainage of the Permit Area will capture stormwater in the northwest corner of the Permit Area; for the new west access, a smaller new stormwater facility is added at the southwest of the Permit Area. Over the long term, the localized production of construction materials reduces traffic from hauling, promotes the best quality of materials, and leads to cost savings for material purchasers, particularly end users in Douglas County.

The proposed APM facility is capable of producing approximately 400 tons per hour. Based on traffic limits, air permit criteria and other practical considerations, production at the facility will rarely reach this pace. Normal operations at the plant will average less than 250 tons per hour.

This proposal was discussed at a Douglas County pre-proposal meeting on October 8, 2020. The present USR application was initiated by submittal to the County in February 2021. Staff and referral agencies provided a first round of comments on March 24, 2021. In response to the comments, Brannan revised the crushing SIP (SP2018-004) to provide clarity on the uses over the undivided Property. Based on the legal uncertainty of the subsequently approved SIP, Brannan resubmitted with its responses to comments on April 4, 2023, and received a second round of staff and referral comments in May 2023.

After thoughtful analysis and improvements, Brannan is now resubmitting a third time. This resubmittal includes a comprehensive Management Plan that covers multiple uses on the Property, a reduced scope of the crushing operation (making an accessory instead of primary use), a new permanent restroom facility, an option to use remote ticketing and minimize motor vehicle idling, and many other refinements in consideration of nearby residents and other stakeholders. New, specific mitigation measures address noise, air and visual concerns. In addition, as detailed in the Applicant Response letter, external conditions have changed to better accommodate the proposed use.

2111.05(2). Zoning of the Land and Compliance with Zoning Requirements.

The Property is zoned GI – General Industrial. Douglas County Zoning Resolution Section 1404.01 (GI Zone District – Uses Permitted by Special Review) states that "Batch Plant – concrete, asphalt" are permitted, upon approval by the Board, in accordance with Section 21 (Use by Special Review), including referenced provisions of Section 27 (Site Improvement Plan), of the Douglas County Zoning Resolution.

With no noted use-specific additional requirements under DCZR Section 2107, where the use is listed at DCZR§ 2107.03, the primary use of an asphalt batch plant is understood to be compatible with zoning standards and expectations by adhering to generally applicable requirements of the Zoning Resolution. In addition to the primary use, crushing is incorporated as an accessory use, but is itself an allowed use by right in the GI zone district (see DCZR §§ 1402.01, 1302.13). Conservatively, and to allay any question on the permissibility of the crushing use as proposed, it is assumed in this analysis and this resubmittal generally that the crushing use is incorporated into the Use by Special Review and subject to USR standards. All USR use conforms with the following generally applicable zone district requirements, as set forth in Douglas County Zoning Resolution Section 14 (General Industrial Zoning District):

1401 Intent

The proposed facility for handling and manufacturing of basic construction commodities is consistent with Douglas County Zoning Resolution intent that there be a place in the County "for use by the largest manufacturing operations, heavy equipment, construction and fuel yards, major transportation terminals and other basic industrial activities required in an urban economy." As a place for such basic industry, the GI zone district intends that various impacts may be more intensive than allowed in other zone districts in the County. This application systematically follows the intended response under Section 1401, strictly mitigating noise, dust, fumes, odors, refuse, smoke, vapor, lights and other environmental impacts according to prescribed regulatory standards.

1405 Minimum Lot Area:
There is no applicable minimum lot area requirement.

1406 Water and Sanitation Requirement
The proposed asphalt production facility will be served from an existing non-tributary groundwater well #AD-7609 (State permit #63898-F). This well has been dedicated to the Sedalia Water and Sanitation District, subject to continued use on the Property, and is decreed for an annual withdrawal of 50.32 acre-feet. The operational water demand of the Permit Area is between 25.1 and 50.0 acre-feet annually. The current well has been authorized for proposed uses (see Will Serve Letter and Landscape Water Validation exhibits included with this resubmittal). As acknowledged by the Sedalia Water and Sanitation District, assessments of the industrial use and the distance of the Permit Area from the District's central water and sanitation lines warrants water supply by individual well, and a septic system for sanitary needs.

1407 Utilities
No public utility distribution will occur on the Permit Area, but gas and electric lines serving the Permit Area will nonetheless be placed underground. Both will enter the Permit Area from the eastern property line and traverse the Permit Area to serve the USR facility.

1408 Land Dedication
1409 Street Standards and Stormwater Improvements
The USR proposal is not a subdivision, creates no new public streets, and generates no required land dedication. All stormwater improvements are designed in compliance with County regulations.

1410 Parking Standards
A total of 19 parking spots are provided on the Permit Area. This complies with DCZR 2807.20 based on:
- 5 spaces for the APM use, given a maximum of five employees working per shift;
- 3 spaces for crushing activity, utilizing up to three site-based employees when operating;
- 2 spaces for total enclosed and occupied building area less than 1000 square feet (between control room, scale house, and restrooms); and
- 9 spaces for construction equipment, including a limited number of site-based delivery trucks.

1411 Landscaping Requirement
Landscaping is provided adjacent to the public right of way of Airport Road consistent with Section 1411's direction to landscape "within the required setback from the street." Interior areas surrounding the APM and crushing use are also landscaped, including parking and buffer areas as required by the Zoning Resolution and its referenced policies. Buffering is implemented in accordance with defined options at DCZR § 2708.01.1(2).

1412 Minimum Setbacks
All minimum setbacks are exceeded.
Structures are setback 85’ from the south property line, 194’ from the east property line, 147’ from the west property line, and 1044’ from the north property line.

1414 Building Height
No defined structure on the Permit Area exceeds the 60’ height limit of the GI zone. The lime silo and mechanical appurtenances atop product silos are elements specifically noted by DCZR § 1414.01 as being allowed to exceed the 60 foot height limit. At their anticipated maximum, appurtenances may be up to 75 feet in height. As illustrated on the Building Elevation sheet in the USR Plan Set, appurtenances achieve a maximum height of 71’-8” as proposed.

1415 Fencing Standards
A new 6-foot cedar privacy fence is included in the Revised Plan Set on the Airport Road Landscape Plan sheet, consistent with DCZR § 1415.01. The remainder of the USR area, interior to the Permit Area and abutting no public right-of-way utilizes chain link fencing or three-strand, t-post construction, consistent with DCZR § 1415.05.

1416 Outdoor Storage
Outdoor storage of the raw materials for APM and crushing activities are shown on the USR Site Plan sheets, primarily along the eastern edge of the Permit Area and the interior of the Permit Area. Stockpiles are adjacent to the railroad and other industrial development to the east and the other use on the Property to the south. On revised plans, stockpiles are limited to a maximum of 20 feet in height. To the extent outdoor storage is required to screen adjacent uses, options are set forth in landscape provisions at Douglas County Zoning Resolution Section 2708.01.1(2), including deciduous and coniferous trees and large shrubs as depicted for the interior Permit Area. Fences are permitted by the same landscape provision, and, complying with Section 1416, a cedar privacy fence is deployed along Airport Road to the extent that, despite a significant distance between the road and the Permit Area interior, outdoor storage is screened by this fence from an adjoining public right-of-way. Trees at both locations are expected to achieve substantial height as a visual buffer. This approach to buffering, using trees and vegetative materials, is encouraged by CMP 2040, as it can soften the appearance nonresidential development (Policy 2-6F.4) and enhance landscape values while serving as a visual screen (Policy 2-6B.3).

2111.05(3). Overall Impacts of the Proposed Use on the Adjoining Lands.
Located in the interior of the planned and industrially-zoned Owens Industrial Center, the overall impacts of the proposed use are consistent with, or lesser than, other uses in the immediate vicinity.

As noted above in reference to the intent of the General Industrial zone district, the Douglas County Zoning Resolution anticipates that its permitted uses will generate impacts in the form of “more noise, dust, fumes, odors, refuse, smoke, vapor, lights, and vibration and other environmental pollutants" than permitted in areas with other zoning. Impacts from operation of the USR include only some of those expected for industrial processes. Subject to detailed assessment and mitigation as also guided by the Zoning Resolution and other environmental regulations, the noise, dust, incidental air emissions including odors, lights, traffic, and visual impacts of proposed APM and crushing are typical for uses within the GI zoning district.

Mitigation efforts will be utilized to address these impacts in a manner meeting or exceeding standards established by the County and others. It is the Applicant's intent that impacts are mitigated to the greatest practical degree. Many impacts will be fully contained within the subject land.

The following summarizes impact studies and mitigation-related features accompanying this application:

- Noise: A Revised Noise Modeling Report is included with this April 2024 resubmittal. Based on surrounding land uses and noise characteristics of the proposed use, APM and crushing operations as proposed will meet all applicable regulatory criteria. To address concerns with discernable noise not otherwise captured by regulatory criteria, the Applicant considered various noise reduction strategies and elected to focus on mitigating key equipment at the point of noise production. For example, white noise alarms are installed on mobile equipment, other low-noise equipment is selected, compressors are housed in noise mitigated cabinets, and mufflers are placed on pneumatic hatch gates at the APM loadout. Specific plans related to hours of operation are covered in discussion of DCZR § 2111.05(11) (Impacts on the Peace and Quiet of Neighborhood) below.

- Dust: Because the proposed use involves bulk material handling and processing and outdoor storage, close attention is given to controlling fugitive dust on the Permit Area. Extensive mitigation includes reduced on-site traffic speeds, regular sweeping, wetting of piles, red flag and other cut-off criteria for high winds, material transfer controls, and treatment of haul roads and gravel areas. A baghouse and other particulate controls (i.e., use of washed aggregates) are integral to APM production. Dust is governed by both County and state regulations, under which the use will meet all applicable standards.

- Fumes: Adjoining lands will not be detrimentally impacted by air emissions, including dust, fumes, odors, smoke, and vapors. As a category, fumes and smoke are present on the Permit Area inside the APM production equipment. All combustion and mixing associated with APM production take place in a closed loop, with an integral blue smoke control system, discussed in further detail with reference to DCZR § 2111.05(10) (Impacts to Air and Water Quality). Additional mitigation to curtail incidental emissions includes flue gas recirculation, a low-NOx burner and ability to produce warm mix asphalt in lieu of hot mix asphalt as demand grows.

- Odors: Odors may occur in the immediate vicinity of storage tanks if hydrocarbon vapors are present. This is an occasional occurrence, when heated vapors from an asphalt cement (AC) tank are displaced by tank filling (AC, a key input to APM production, must be heated in storage to maintain a liquid state). As mitigation, AC tanks will be equipped with condensers (see details in USR plan drawings) to re-liquify vapors produced by tank heat. Condensers have been shown to greatly reduce the venting of hydrocarbons, including vapors responsible for odors.

- Refuse: The proposed use is not a significant generator of refuse. Co-locating construction material production and crushing ensures that any overloaded trucks that must discharge excess material, any product out of specification, and any other wasted product may immediately be re-used. Regionally, the proposed use will incrementally reduce the impact of construction waste.

- Smoke: Smoke and fumes are discussed above as a category, under the heading of "Fumes." Smoke will not have a substantial or detrimental impact on adjoining lands.

- Vapor: Vapors will not detrimentally impact adjoining lands. As discussed above (see "Odor" heading), occasional hydrocarbon odors could occur in the immediate vicinity of the proposed use due to vapors from tank heating. Condensers are added to tanks to reduce the vast majority of emissions associated with hydrocarbon storage. Water vapor is also a product of APM production, with no detrimental impact on or off-site.

- Lights: Lighting within the Permit Area is a requirement of the Occupational Safety and Health Administration (OSHA) and is not expected to have a significant or detrimental impact on adjoining lands. The proposed use is primarily a daytime operation, with the need for early-day and early-evening lighting in winter months, and with occasional nighttime operations (details on hours of operation are found in discussion of DCZR § 2111.05(11) below). Brannan's lighting plan has been modeled and checked by professional lighting engineers to ensure it exceeds requirements and minimizes light perceived at neighboring properties. The lighting plan will meet both the intent of the County's Comprehensive Master Plan policies regarding Dark Skies and the County's lighting regulations, in conjunction with applicable safety requirements of the OSHA. Specific mitigation measures include plan provisions to turn off lights when no production is occurring.

- Vibration: No significant vibration impact is anticipated.

- Other Impacts - Traffic: An updated Traffic Impact Analysis is included with this April 2024 resubmittal. In general, local and regional roadways are able to absorb trips generated by the proposed use without the need for public improvements, especially with recent capacity and connection improvements. Turn lanes to handle trucks to and from the Permit Area, for example, have been incorporated into recent Airport Road improvements. In addition to driver training, rigorous accounting and control of traffic counts, and the prohibition of truck routes through Louviers, the USR plan will implement improved internal circulation with an inbound and outbound driveway to optimally manage all traffic. To the extent that the proposed use contributes to congestion as regional development expands traffic demands on affected public roads, the Applicant is committed to participating in its fair share of future road improvements, as presented in the Applicant Response letter accompanying this resubmittal.

- Other Impacts – Visual: A visual assessment is included in submittal materials. Extensive vegetative screening, as well as privacy fencing adjacent to public roadways, is incorporated into plans. County policies informing this approach to visual impact are discussed relative to the Comprehensive Master Plan (CMP 2040) and other components of the Narrative below.

2111.05(4). Compliance with the Douglas County Comprehensive Master Plan.
The current Douglas County Comprehensive Master Plan, CMP 2040, follows long-established policy regarding industrial properties near Airport Road and the US 85/Santa Fe corridor. CMP 2040 recognizes that this industrial area blends both urban and rural uses, noting this in the introduction to plans for the Louviers Rural Community. The Owens Industrial Center, including the Permit Area, is central to the designated industrial development node on the Louviers subarea plan (Map 4.5).

The proposed development is supported by several policies and objectives within the Louviers Rural Community Plan:

- The proposed use is distinctly separated from Louviers Village by more than 2,000 feet of open space. Moreover, the Permit Area is topographically separated from the Plum Creek open space, which includes floodplain previously divested from the Owens Industrial Center to achieve community separator and wildlife conservation goals. *(Objective 4-2A. Establish Community Separators around Louviers Village to maintain community identity and sense of place.)*

- Relative to residential areas, significant ridgelines, road viewsheds and views of the mountain backdrop, the proposed use is below the horizon, making it less obtrusive within the overall landscape and presenting no interference with views of ridgelines and mountains. *(Objective 4-2D. Preserve the visual integrity of significant ridgelines, road viewsheds, view of the mountain backdrop, and other important features; Policy 4-2D.1 Locate development away from important ridgelines.)*

- The Owens Industrial Center is one of a very limited number of parcels with undeveloped acreage in unincorporated Douglas County that is both zoned and designated in long-term planning documents for industrial use. The present USR process will hold the new APM use to stringent modern standards; it will reconceive and bring up to current USR standards the crushing use previously approved as an SIP; and it will refresh Property management and streamline enforcement for all uses on the site. Substantial acreage will remain undeveloped to the north of proposed uses, allowing for wildlife migration and acting as a Community Separator. *(Objective 4-2E. Develop and redevelop the US Highway 85 corridor focusing on infrastructure improvements and infill redevelopment; Policy 4-2E.1. Ensure that the redevelopment of existing nonresidential sites within the industrial zoned areas along the US Highway 85 corridor is upgraded to meet current standards;Policy 4-2E.4. Support the siting of industrial and commercial uses in development nodes, as shown in map 4.5, rather than in a continuous strip configuration* *along the US Highway 85 corridor in order to facilitate major wildlife corridors and support the visual integrity of the US Highway 85 viewshed.)*

Many CMP 2040 policies and objectives from Urban Land Use and Nonurban Land Use sections of the document are also informative. According to CMP 2040, "Land use review within the Louviers Rural Community is also subject to the Urban Land Use and Nonurban Land Use sections of this Plan." Several nonconflicting policies from other sections of CMP 2040 support the compliance of this proposed USR with Douglas County planning policy:

- The Permit Area is immediately adjacent to a mainline Class 1 railroad. Industrial activity on the Permit Area is not impacted by frequent train operations. *(Objective 6-6B. Achieve land use compatibility between the railways and adjoining land uses; Policy 6-6B.1. Ensure all new land uses located in the vicinity of rail lines are compatible with railway noise, air quality, visual, fire and access impacts.)*

- Other uses occupy lands between the proposed use and residential areas, including Louviers Village. An equestrian center occupies property immediately north and west of the Property, and the industrial node encompasses areas to the east and south. Substantial agricultural-zoned land remains on the residual Owens Industrial Center to serve as a Community Separator. *(Policy 2-6E.2. Encourage uses such as office, institutional and open space as a transition between residential and major commercial or industrial areas; Policy 2-6B.3. Support the establishment and enhancement of community separators by creating open space buffers, utilizing natural landforms and tree plantings to screen views and provide wildlife habitat.)*

- Multiple design elements of the proposed use promote harmony with the surrounding landscape. Structures will be painted in natural tones. The boundary of the proposed use is a vegetative landscape buffer. Lighting is minimized, directed only where needed and used only when needed. *(Policy 2-6F.4. Use landscaping to complement and soften nonresidential development, and provide buffering, screening, and shade; Policy 3-2B.2. Design structures and site amenities with materials and colors that complement the natural landscape; Policy 3-2C.4. Minimize the impacts of light pollution from commercial and residential uses through lighting standards that support dark-sky principles.)*

2111.05(5). Compliance with Appropriate Agency Regulations and Any Necessary Permits. Brannan acquires and maintains as required all applicable permits administered by local, state, and federal regulatory agencies. Other agencies involved with the project and relevant permit numbers include:

- Colorado Department of Public Health and Environment Air Pollution Control Division - Construction Permit 23DG0565
- Colorado Department of Public Health and Environment Water Quality Control Division - Construction Stormwater Permit - COR3U189
- Colorado Department of Public Health and Environment Water Quality Control Division - Non-Extractive Industries Stormwater Permit - COR901483

- Douglas County Grading Permit 0918-0859-G (GESC Permit DV2018-052, as amended by NOC#2)
- Colorado Department of Labor and Employment Division of Oil and Public Safety - Diesel AST Installation Permit - OFL 8100
- Colorado Division of Water Resources Office of the State Engineer - Well Permit 63898-F
- U.S. Environmental Protection Agency - Spill Prevention, Control and Countermeasures (SPCC) Plan, to be maintained on-site.

2111.05(6). Proof of Water Availability.
As discussed in reference to DCZR 1406 above, the proposed asphalt production facility will be served from an existing non-tributary groundwater well #AD-7609 (State permit #63898-F). Proof of water availability was previously submitted for review and is resubmitted presently with an updated will-serve letter from the Sedalia Water and Sanitation District, as well as copies of the relevant well permits and decree.

2111.05(7). Method of Wastewater Treatment.
Based on feedback in earlier review, the Site Plan is revised to include a dedicated restroom structure in proximity to the APM control room. An onsite wastewater treatment system (OWTS) will be designed and permitted for this restroom facility. To accommodate personnel located in other areas of the Permit Area and/or transient drivers, the operator may supplement sanitary facilities with up to two portable toilet facilities subject to review and approval by Douglas County Health Department. All sanitary facilities will be regularly serviced in accordance with regulations and best practices.

2111.05(8). Type or Method of Fire Protection.
A fire protection method was developed through coordination with South Metro Fire Rescue (SMFR). Following initial discussion, SMFR reviewed and approved fire protection for the APM and crushing site to include the installation of a 120,000-gallon underground water supply tank, with dedicated volume and standby pressure for fire suppression. The tank will feed proposed fire hydrants as shown on the Site Plan.

2111.05(9). Impacts to Existing Vegetation and Wildlife.
Impacts to existing vegetation and wildlife will be minimal. There is existing separation between habitat and GI-zoned land; as noted above, floodplain areas were divested from the Owens Industrial Center and presently form an open space buffer under conservation easement. Developable areas of the Property, including the area proposed for the APM facility, are topographically separated from the floodplain area by a bench of 15 to 20 feet in height.

Since its initial development in conjunction with early uses at the Owens Industrial Center, the area of proposed uses consists of gravel and dirt with minimal existing vegetation. Today, this area is congruent with the area improved under a GESC for the SIP crushing use. The proposed

USR will create a distinct boundary for industrial use, and at that boundary provide vegetation and buffering to guide wildlife toward the agricultural field and crossing opportunities to the north.

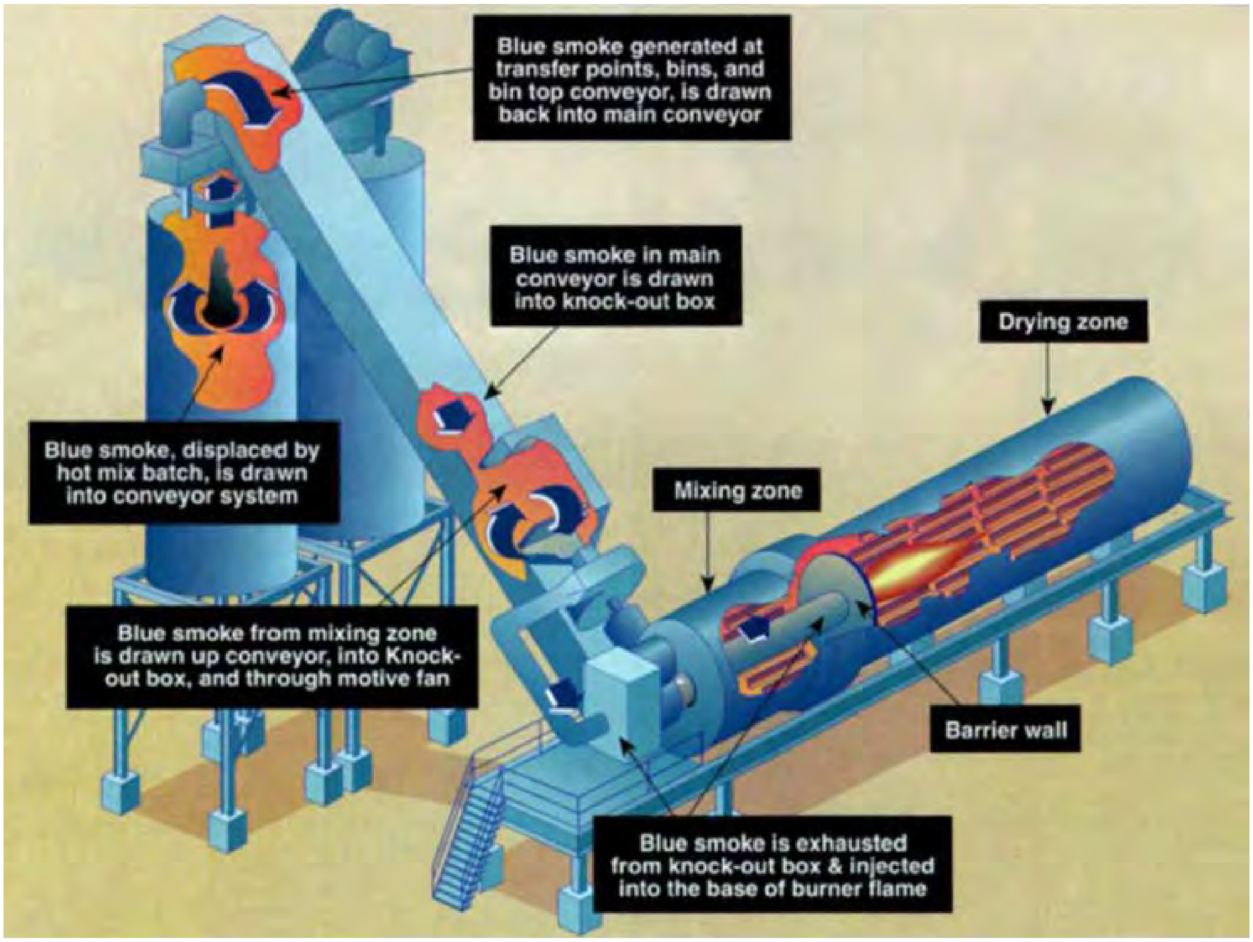
With regard to the Preble's Meadow Jumping Mouse and its habitat, Brannan worked with the Colorado Department of Transportation to confirm that the USR permit area is private, industrially zoned land, and does not involve construction or work within CDOT property or right-of-way. Brannan will follow CDOT's recommendation that Brannan minimize any potential impacts on habitat by utilizing the minimum amount of lighting necessary and using shielding as feasible.

2111.05(10). Impacts on Air and Water Quality.
Both APM and crushing facilities undergo rigorous evaluation for air and water quality impacts. By observing environmental regulation at all levels of government, including air and water quality permit programs administered by the Colorado Department of Public Health and Environment, the proposed use is highly regulated to protect public health and safety. As detailed below, the proposed use complies with all air and water quality regulations, with extensive planning to minimize and mitigate impacts to air and water quality.

Air Quality
APCD Permit No. 23DG0565 has been issued for the proposed use. This permit governs APM production and accessory equipment, associated material silos, and product/material loading and conveyance. Also covered are fugitive emissions associated with on-site truck traffic, aggregate stockpiles, and material handling.

As part of efforts to minimize air quality impacts, the Applicant is proposing air quality mitigation efforts including physical interventions, best practices, and Management Plan limitations described below.

Plant Equipment and Operating Procedure. A filter baghouse installed on the plant reduces 99.9% of particulate emissions, and its inspection and maintenance will be documented in accordance with the air permit. Upgraded filter bags to increase particulate capture and minimize particulate emissions from the plant will also be utilized, in addition to an upgraded low nitrous oxide (NOx) burner. The low NOx burner will be fitted with a non-regulatory required device called a flue gas recirculation (FGR) control, which will further reduce emission byproducts. Furthermore, a top-of-silo blue smoke return system (see illustration below) will collect air off the product silos and return it to the burner. The top-of-silo blue smoke return will reduce both visible emissions and combustion byproducts off the silos. The FGR and top-of-silo blue smoke return are not required by a regulatory body. These additional control measures demonstrate Brannan's commitment to environmental stewardship and desire to operate harmoniously with the local community by minimizing operational impact.



The Blue Smoke Capture System is an evacuation fan powered by an electric motor that pulls gases, vapors, odors, steam and organic hydrocarbons from the drum mixing zone that may result from the recycled asphalt paving and mixing operation. The vapors are returned to the combustion zone under controlled conditions, incinerating any of the organic fumes in the gases. These technologies typically reduce fumes, smoke and odor significantly.

Additionally, opacity measurements will be performed and logged regularly in accordance with air permitting protocols. If dust above permitted opacity limits is observed during plant operation, the plant will be shut down to determine the source and maintenance activities will be completed before the plant is restarted.

Dust. Brannan has produced a comprehensive Dust Control Plan that will be implemented to govern dust at the APM facility. The Plan describes controls for dust generation Property-wide. The following sources are addressed in the Plan: haul roads, trucking, and equipment operations, material stockpiles, and dust created from processes inherent to the APM (as well as crushing).

To ensure compliance with air quality standards, Brannan may implement additional dust control measures, which may include additional watering and sweeping, and use of magnesium chloride or other dust palliative.

Haul Roads, Mobile Equipment and Trucking Operations. The speed limit for all unpaved roads is 5 miles per hour, and the surface of all haul roads will be paved with asphalt to minimize dust. The number of truck trips will be limited and paved roads will be cleaned with a mechanical street sweeper at a minimum of twice per week, including Airport Road from Louviers Boulevard to US 85. Additionally, a water truck will spray gravel roads on dry operational days as needed, which is typically two to three times per day. Equipment operators will also be trained to keep their buckets and conveyors as low to the ground as possible to minimize material drop height and associated emissions.

Crushing and Material Stockpiles. Material stockpiles are limited to no more than 20 feet in height and no more than a total area of 160,000 square feet. Water spray will be applied to stockpiles and crushers and screens during processing to minimize dust. Stockpiles will also be partially enclosed to reduce wind shearing. The majority of aggregate being used in the plant will be pre-washed to minimize fugitive dust during material stockpiling and handling operations.

Water Quality

The proposed use poses no threat to water quality. Standard stormwater quality facilities, including a water quality volume, as implemented on this Permit Area have proven effective at controlling water quality on asphalt production facilities in jurisdictions throughout the State of Colorado.

Water discharges are strictly controlled by CDPHE and EPA, and by the Permit Area's discharge permit, under which Brannan implements pollutant discharge mitigation, such as regular cleaning, street sweeping, chemical storage, training, sampling, and reporting. Discharges from the Permit Area that are sampled are reported to the State to ensure that pollutants are not discharged, and a well designed and engineered drainage facility, including a water quality pond, inlets, and flow limiting devices, has been constructed on the Property to manage any possible water pollution.

Under its water quality permit, Brannan will complete quarterly benchmark and water quality monitoring. Brannan has also developed a stormwater management plan (SWMP) for the proposed use, which will be implemented at the time the facility goes into operation.

Spills are governed by an SPCC (Spill Prevention, Control and Countermeasures) plan – see discussion of other permits with notes on DCZR § 2111.05(6) above. Asphalt cement becomes a solid at ambient temperature. This prevents spills from traveling a significant distance or seeping into the ground.

2111.05(11). Impacts on Peace and Quiet of the Neighborhood.

The proposed use will occupy land adjacent to an active railroad on an existing industrial development, neighbor to an open space buffer and the existing industrial node. While preservation of the agricultural buffer and additional screening is provided to bolster the Community Separator with non-industrial uses, particularly to the north of the proposed use, the baseline level of activity in this vicinity accommodates industrial use of similar character and intensity as the proposed use. Incrementally, as for example shown in the noise study, the proposed use does not change that character or intensity.

On occasion, based on specific justification and with careful management, the APM use will operate a nighttime shift. To be clear, crushing will never occur outside of standard hours of operation. The limited frequency and other conditions for night operations will be governed by the Management Plan to minimize any impact to the peace and quiet of the neighborhood:

- Brannan would advise the County, neighboring property owners and nearby residents 30 days in advance of nighttime operations when a government contract requires off-hour or nighttime paving.
- The APM would operate outside of regular hours only between May 1st to October 31st and only if temperatures are warm enough for paving.
- During extended hours, the APM would be open for a maximum of 20 hours per day in two 10-hour shifts (there would not be three shifts in a day). The first shift would work from 6 a.m. to 4 p.m.; the second shift of different personnel would work from 8 p.m. to 6 a.m. No extended hours would occur on Friday and Saturday nights (in accordance with CDOT policy).
- No outside sales outside of regular hours, only Brannan-contracted paving work.
- Brannan will endeavor to pre-load bins during the prior daytime shift and conduct other preparation to minimize unnecessary activity or idling at night.

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2111.05(12). Provision of Buffering, Including Additional Landscaping.
The Douglas County Zoning Resolution defines a "buffer area" as an area of land established to separate and protect one type of land use from another (i.e., a Community Separator), to screen from objectionable noise, smoke or visual impact (i.e., landscape buffering as described by DCZR § 2708.01.1(2)), or to provide for future public improvements or additional open space (i.e., divestiture of river bottom land for habitat conservation). As described in Narrative sections above, each of these strategies add value to the present case.

The Permit Area is buffered from nearby nonindustrial uses by a combination of distance and topography. The Plum Creek open space and conservation lands abut to the west of the Permit Area and substantially below the bench elevation on which the proposed use occupies existing industrial land. To the north of the proposed asphalt production facility it is a significant distance to any adjacent development, across an A-1 Agricultural One zoned parcel from other land uses to the north.

The perimeter of the APM and crushing use area is screened on its west, north and east sides, all adjoining private land, with trees that will reach substantial stature at maturity. Additional landscaping is proposed along the frontage of Airport Road, including a privacy fence adjacent to the public roadway, and in an area in the northern portion of the Permit Area to provide visual relief to the northeast.

2111.05(13). A Description of the Availability and Adequacy of Public Services and Facilities.
As described in the submittal materials, there are adequate public facilities and services to support the proposed Use by Special Review. See particularly Narrative sections above

addressing the adequacy of on-site water and wastewater facilities, fire protection as coordinated with South Metro Fire Rescue, and streets. In sum, traffic analysis indicates that the adjacent road network has sufficient capacity to support additional traffic from the proposed use, the commitment to serve letter from the Sedalia Water and Sanitation District demonstrates that there is sufficient water available, current plans implement a restroom facility for sanitary needs as prescribed by review, and a dedicated water storage volume and hydrants for fire suppression meets the requirements of South Metro Fire Rescue. The present application is not a subdivision, and accordingly does not generate demand for schools or parks.

2111.05(14). Other Narrative Details Unique to the Specific Type of Use by Special Review. Most asphalt paving in Douglas County relies on production outside the county, at a substantial distance. With growth producing more roadways to build and maintain, and development producing more traffic congestion inside Douglas County and between the county and regional points of APM production, this reliance is increasingly tenuous. Because APM must arrive at a construction site at its proper working temperature, transporting APM through congestion is costly in many ways. Local production is ultimately safer, less taxing on the environment and more cost-efficient for projects. The co-location of the proposed APM and accessory crushing use on an existing materials facility is a logical and wise choice for Douglas County's future.

Use by Special Review allows for site-specific assessment of the various impacts and mitigation measures covered by this Narrative. In this case, impacts are minimized through the relative isolation of the Permit Area and significant efforts to curtail noise, dust, and other effects before they reach the boundaries of the Permit Area or the Property. Mitigation for traffic and other externalities includes the Applicant's ongoing commitments in the USR Management Plan. The Applicant will respond immediately to any unforeseen problems and work continuously to create and seize opportunities for regional solutions.

Community Engagement

Brannan is committed to community engagement through multiple channels, and has endeavored to respond to stakeholder input by making substantial and financially significant changes to the proposed facility over the course of several years.

Brannan understands and appreciates the importance of transparent communication and meaningful engagement with the communities in which we operate. As such, we have been proactive in our outreach efforts to ensure that members of the community are well-informed about our plans and are given the opportunity to express their concerns, ask questions, and provide feedback.

Leading up to this resubmittal of our proposed asphalt paving materials facility, Brannan's resubmittal is the culmination of response to feedback from the following outreach channels:

Website and Informational Materials: We have developed a dedicated website (www.dogcoapm.com) and informational materials outlining the details of the proposed asphalt paving materials facility, its potential impacts, operation logistics, and commitment to environmental stewardships and community responsibility.

Plant Tours: Beginning in October of 2020 our company and plant managers have invited interested parties to take part in touring an existing Brannan asphalt facility in Adams County, Colorado that consists of similar operations, technologies, and safety standards that our proposed asphalt paving materials facility in Sedalia, Colorado would include. Tours can be requested any time through our project website. Tours offer not only the opportunity to inspect and learn about APM equipment, but also the chance to hear from Brannan's workforce, who are intimately familiar with operation of the Property in Sedalia, of APM and crushing equipment, and of the daily, critical importance Brannan places on clean and safe operation of its facilities.

Community Meetings:
Meeting # 1 Based on Covid restrictions, and for the convenience of the community, Brannan has hosted community meetings via Zoom, with a live question and answer session. We hosted a virtual interactive community meeting in October of 2020. A list of residents in the surrounding communities of our proposed facility was provided by Douglas County staff and were invited my invitation sent through US mail. An overview of the proposed facility was presented by Brannan with the opportunity for participants to ask questions through a live question and answer session. Questions regarding air quality, noise, traffic, and water were addressed. Answers to lingering questions were published on our project website.

Meeting # 2 Given the updates and modifications to our application over time, we felt it was necessary to provide the community with an update on the submitted application. On November 17, 2022, 137 residents living within 1-mile of our proposed site were invited by US mail to attend our second virtual community meeting. Of the 137 residents invited, 20 individuals registered and attended. Participants were encouraged to email questions in advance to our meeting so that Brannan team members could address during the live meeting. For those that were unable to attend, a recording of the meeting has been made available to watch on our website.

Upcoming Community Outreach:
Brannan's revised submittals demonstrate that Brannan recognizes the importance of listening to stakeholders, and moreover, is dedicated to addressing concerns in a thoughtful and responsible manner. Moving forward, Brannan remains fully committed to community outreach efforts and is working closely with county staff to ensure the proposed USR aligns with the county standard and community needs. Upcoming community outreach efforts include:

Community Open House: This May 2024, Brannan will host a community open house in the Louviers community. This open house will allow for community members and residents to learn more about the applicant and improvements to the proposed facility through visual presentations that will address exiting concerns and showcase our efforts and technologies to mitigate concerns of air quality, noise, and traffic., etc.

Community Conversations: Brannan is working with the business community, surrounding city officials, and community partners to facilitate presentations and conversations to offer updates on the proposed APM, and collect and respond to feedback. Presentations include the Northwest Douglas County Chamber and Economic Development Cooperation.

In addition to its direct community outreach efforts, Brannan will maintain a complaint and suggestion line for its USR operations, which will be attended and answered during operational hours, and a dedicated email contact point for intake and response to community concerns. Contact information for reaching these services will be displayed on signage at the facility entrance.

PHASE III DRAINAGE REPORT

FOR

SEDALIA BATCH PLANT ACCESS

COUNTY OF DOUGLAS
STATE OF COLORADO

PREPARED FOR:

Brannan
2500 East Brannan Way
Denver, CO 80229

PREPARED BY:

Civil Resources, LLC
8308 Colorado Boulevard
Suite 200
Firestone, CO 80504

PREPARED: OCTOBER 2022

UPDATED: MARCH 2023

CIVIL RESOURCES, LLC
ENGINEERS & PLANNERS

Engineer's Certification

This report and plan for the Phase III drainage design of Sedalia Batch Plant Access was prepared by me (or under my direct supervision) in accordance with the provisions of Douglas County Drainage Design and Technical Criteria for the owners thereof. I understand that Douglas County does not and will not assume liability for drainage facilities designed by others.

Jim Brzostowicz
Registered Professional Engineer
State of Colorado No. 40551

Developer's Certification

Brannan hereby certifies that the drainage facilities for Sedalia Batch Plant Access shall be constructed according to the design presented in this report. I understand that Douglas County does not and will not assume liability for drainage facilities designed and/or certified by my engineer and that Douglas County reviews drainage plans pursuant to Colorado Revised Statutes, Title 30, Article 28; but cannot, on behalf of Sedalia Batch Plant Access, guarantee that final drainage design review will absolve Brannan and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

(Owner/Applicant): ______________________________

By: ______________________________

Date: ____________________________

Table of Contents

I. GENERAL LOCATION AND DESCRIPTION

A. Location

This report discusses drainage design for approximately 5 acres of land located in the Northwest Quarter of Section 4, Township 7 South, Range 70 West of the 6th Principal Meridian, County of Douglas, State of Colorado. A vicinity map is provided in Appendix A. The Site lies at address 5775 Airport Road in Sedalia, Colorado. The Site is bounded by the Daniels Park Drain to the north, Plum Creek to the west, an existing concrete pant to the east, and Airport Road to the south. The surrounding land use is mostly industrial.

B. Description of Property

The 5.15 acre Site currently contains an existing 30-foot asphalt road serving the concrete plant, the northern half of Airport Road, and landscape/open area.

Per Natural Resources Conservation Services (NRCS), the site soils are classified as Hydrologic Soil Groups C (see Appendix A for soils classification table and map). According to FEMA Flood Insurance Rate Map (FIRM) No. 08035C0151F, effective September 30th, 2005, a portion of the Site lies within the 100-year floodplain boundary of The Daniels Park Drain (see FIRMette in Appendix A).

This project proposes the construction of an approximately 700-foot long access road off of Airport Road. The access road will serve the proposed asphalt batch plant to the north of the existing concrete plant.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

This Site lies within the Plum Creek watershed. This watershed was analyzed in a 2016 Major Drainageway Plan as well as a 2019 Flood Hazard Area Delineation, both prepared by Enginuity Engineer Solutions for the Urban Drainage Flood Control District (now Mile High Flood District). Future flow downstream of the Site at Louviers Avenue is estimated to be 39,000 cfs for the 100-year rainfall event. The 2016 MDP states that existing and future land use within this watershed are the same, with a composite impervious value of 1%.

B. Existing Minor Drainage Basins

The existing Site is characterized as one on-site historic drainage basin, H1.

- Basin H1: 5.05 acres, 30.3% impervious, C_{100}=0.61. Historic basin H1 encompasses the entire Site. Runoff in this basin drains southwest to the gutter along Airport Road and enters the drainage system through the existing 10 foot Type R inlet (design point H1) or the existing riprap rundown west of the existing concrete pan (design point H2). This basin also includes the northern half of Airport Road which drains north to the gutter.

C. Proposed Minor Drainage Basins

Under proposed conditions, the site is divided into three sub-drainage basins:

- Basin S1: 1.31 acres, 24.5% impervious, C_{100}=0.59. This basin contains half of the proposed access road, the proposed swale, and the proposed detention pond. Runoff in this basin sheet flows across the proposed road to the roadside swale on the north. From here, flow travels west in the swale to the detention pond at design point S1.

- Basin S2: 3.19 acres, 26.6 % impervious, C_{100}=0.60. This basin contains the other half of the proposed access road, the existing asphalt road, and the landscaped area between the proposed road and Airport Road. Runoff in this basin flows across the existing asphalt road and is captured by an 18-inch culvert at design point S2. Flow in the culvert discharges at the detention pond.
- Basin S3: 0.65 acres, 93.0% impervious, C_{100}=0.86. Basin S3 contains the northern half of Airport Road. Runoff in this basin sheet flows north to the gutter where it is channelized and travels west, terminating at the existing inlet at design point S3A, or continuing west to the existing riprap rundown at design point S3B.

III. DRAINAGE DESIGN CRITERIA

A. Regulations

This report has been prepared in accordance with Douglas County Storm Drainage Design and Technical Criteria Manual as well as the MHFD Urban Storm Drainage Criteria Manual (USDCM) Volumes 1, 2, and 3 (current editions as of this report date).

B. Drainage Studies, Outfall Systems, and Site Constraints

This Site is part of the Plum Creek Major Drainage Plan.

C. Hydrologic Criteria

- The design point rainfall values used were obtained from Table 6-1 of the Douglas County Storm Drainage Design and Technical Criteria Manual. The site lies within Douglas County Rainfall Zone I. No rainfall value is provided for the 25-year storm; thus the 1-hour, 25-year precipitation depth was taken from NOAA Atlas 14 at the Sedalia Station. See Appendix A.
- The drainage system is designed to convey runoff from the 5-year and 100-year storms, per Douglas County's requirements for minor and major drainage systems.
- The Rational Method was utilized in calculating the 2-year, 5-year, 10-year and 100-year runoff flow rates. Percentage imperviousness values and runoff coefficients for the site were determined using Tables 6-3 and 6-4 from Volume 1 of the USDCM.

D. Hydraulic Criteria

- Hydraflow Storm Sewer software was used to model the proposed storm sewer system for the 5- and 100-year peak flow. Because the software only allows one runoff coefficient for each inlet, the 100-year runoff coefficient will be conservatively used for the 5-year event. The starting water surface elevation was assumed to be critical depth.
- Hydraflow Express software was used to model the swale in Basin S1.

E. Water Quality Enhancement

The following best management practices are proposed to reduce the discharge of pollutants from the site:

- Extended detention basin
- Roadside swale
- Disconnected impervious area

The extended detention basin was designed according to the criteria outlined in Chapter 12 of the Mile High Flood District's (MHFD) Urban Storm Drainage and Criteria Manual (USDCM) along with the Detention basin Design Workbook version 4.06.

IV. STORMWATER MANAGEMENT FACILITY DESIGN

A. Stormwater Conveyance Facilities

The proposed system will modify the existing drainage pattern by adding a roadside swale and culvert to convey runoff. The swale is designed to convey flows from Basin S1 to the detention pond. Runoff in this basin will sheet flow from the crown of the proposed road and enter the roadside swale where it channelizes and travels west. The trapezoidal swale has a bottom width of 1 foot, 4:1 side slope down from the shoulder of the road and 3:1 on the opposite side to meet existing grade. During the 100-year storm, the swale receives 4.34 cfs of runoff, resulting in a flow depth of 0.59 feet and top width of 5.13 feet. There is 1.41 feet of freeboard in the swale during the 100-year storm.

A culvert has been designed to convey runoff from drainage Basin S2 under the proposed access road and into the detention pond. Runoff in this basin sheet flows from the crown of the road across the landscaped area and existing asphalt road and collects at a low point (design point S2) just east of the new access point. During the 100-year storm, 11.56 cfs of flow is captured by an 18 inch flared end section and flows north west to the detention pond. The outlet to the pond is armored by Type L riprap for a distance of 5.5 feet downstream of the flared end section. Design of the pond outlet riprap apron is included in the appendix.

The drainage pattern in Basin S3 is unchanged from historic conditions. Runoff in this basin will continue to sheet flow north to the gutter of Airport Road and travels west to the existing inlet or riprap rundown (design points S3A and S3B). During the 100 year storm, tributary flow to design point S3B is 3.45 cfs.

B. Stormwater Storage Facilities

There is one proposed pond designed to detain runoff from Basins S1 and S2 before it is released off-site. The pond is located west of the proposed access road and accepts 16.27 cfs of runoff from Basins S1 and S2 during the 100-year storm. The tributary area to the pond is 4.50 acres with a composite impervious value of 26%. The pond was sized using the MHFD Detention Basin Design Workbook. The water quality capture volume (WQCV) is 0.052 acre-feet with a water surface elevation (WSE) of 5651.01 feet. The excess urban runoff volume (EURV) is 0.053 acre-feet with a WSE of 5651.86 feet. The 100-year storage volume is 0.174 acre-feet and the 100-year WSE is 5653.28 feet. A summary of the detention pond stage storage is provided in Table 1.

Table 1: Summary of Stage-Storage

Stage	Elevation	Δ Elevation	Area	Incremental Est. Volume	Est. Available Volume		Note
(ft)	(ft)	(ft)	(SF)	(CF)	(CF)	(ac-ft)	
0	5648.76	0.00	29	0	0	0.000	BOTTOM OF POND
0.50	5649.26	0.50	1,037	267	267	0.006	-
1.00	5649.76	1.00	1,505	1,271	1,271	0.029	-
1.50	5650.26	0.50	1,900	851	2,122	0.049	-
2.00	5650.76	0.50	2,322	1,056	3,178	0.073	-
2.25	5651.01	0.25					WQCV
2.50	5651.26	0.50	2,774	1,274	4,452	0.102	-
3.00	5651.76	0.50	3,253	1,507	5,959	0.137	-
3.10	5651.86	0.10					EURV
3.50	5652.26	0.50	3,762	1,754	7,712	0.177	-
4.00	5652.76	0.50	4,299	2,015	9,728	0.223	-
4.50	5653.26	0.50	4,870	2,292	12,020	0.276	-
4.52	5653.28	0.02					100-YR
4.55	5653.31	0.03					SPILLWAY
5.00	5653.76	0.50	5,442	2,578	14,598	0.335	
5.50	5654.26	0.50	5,500	2,736	17,333	0.398	
5.55	5654.31	0.05	5,501	275	17,608	0.404	TOP OF BERM

The outlet structure will consist of an orifice plate, circular orifice, and overflow weir. The orifice plate will have three (3) orifices with a diameter of 1/2 inch, spaced 9 inches apart, and one 1-inch orifice. The outlet pipe is 18 inches in diameter with a restrictor plate 7 inches above the pipe invert. The detention basin is designed to drain 97% of the 5-year inflow volume drains in 48 hours, which is within the maximum drain time of 72 hours.

The pond has an 18-foot emergency spillway along the north side. The invert elevation of the spillway is 5653.31 feet, 0.03 feet above the 100-year WSE. The spillway has 4:1 side slopes with a top of berm elevation of 5654.31 feet, providing 1-foot of freeboard above the invert of the spillway. The spillway is armored with Type VL riprap for a length of 10 feet and drains to Daniels Park Drain to the north.

C. Water Quality Enhancement BMPs

The extended detention basin in Basin S1 serves as a best management practice (BMP) by treating the WQCV and reducing runoff from the site. The detention basin is designed to release 99% of the WQCV in 41 hours. This is greater than MHFD's minimum drain time of 40 hours. By extending the drain time, the detention basin will facilitate pollutant removal for more frequently occurring storm events.

The roadside swale also serves as a BMP for Basin S1. The vertical geometry of the swale follows the proposed road; therefore, the maximum longitudinal slope is greater than the allowable slope outlined in section 14.5.5 of the Douglas County Criteria Manual.

The south half of the proposed access road in Basin S2 is unconnected impervious area. Runoff sheet flows from the crown of the road and continues flowing over open area acting as receiving pervious area. This provides filtration and infiltration of runoff in this basin before it is conveyed to the extended detention basin.

D. Floodplain Modification

There is no fill being placed above existing grade in the floodplain; therefore, no floodplain modifications are proposed.

E. Additional Permitting Requirements

A site visit in September 2022 indicated there are no wetlands present on the Site.

F. General

The proposed drainage system reduces runoff from the site for both the minor 5-year and major 100-year storms.

During the minor 5-year storm event, runoff increases by 0.51 cfs; however, during the 100-year storm runoff decreases by 3.86 cfs (Table 2). The detention pond releases the 100-year volume at a rate of 6.40 cfs, which is 75% of the predevelopment peak inflow. This satisfies the MHFD criteria that the 100-year release rate is less than or equal to 90% of the predevelopment peak inflow.

Table 2: Design Release Rates

Point of Discharge	Runoff Existing (CFS)					Runoff Proposed (CFS)					Detention Pond Discharge Proposed (CFS)				Δ in Discharge from Discharge Point Proposed LESS Existing (CFS)			
	Basin	2-Year	5-Year	10-Year	100-Year	Basin	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year
Detention Pond	N/A	0.00	0.00	0.00	0.00	S1	0.56	1.03	1.60	4.71	0.20	1.90	3.10	6.40	0.20	1.90	3.10	6.40
						S2	1.52	2.69	4.07	11.56								
	Total	0.00	0.00	0.00	0.00	Total	2.08	3.71	5.67	16.27	0.20	1.90	3.10	6.40	0.20	1.90	3.10	6.40
Direct Offsite	H1	2.21	3.79	5.50	15.01	S3	1.72	2.40	2.86	4.75	N/A				-	-	-	-
	Total	2.21	3.79	5.50	15.01	Total	1.72	2.40	2.86	4.75	1.72	2.40	2.86	4.75	-0.48	-1.39	-2.64	-10.26
Overall Site Total	**-**	**2.21**	**3.79**	**5.50**	**15.01**	**-**	**3.81**	**6.11**	**8.53**	**21.02**	**-**	**-**	**-**	**-**	**-0.28**	**0.51**	**0.46**	**-3.86**

V. CONCLUSIONS

A. Compliance with Standards

The proposed drainage system complies with the regulations set forth by the Douglas County Storm Drainage Design and Technical Criteria Manual and the MHFD USDCM. This project will decrease discharge from the Site for the 100-year storm by 25% compared to existing conditions. The proposed detention pond provides sufficient storage for the 100-year storm and will discharge flows below 90% of the predevelopment peak flow, incompliance with the USDCM.

B. Variances

There are no variances requested for the proposed drainage system.

C. Drainage Concept

Overall, the proposed drainage system effectively conveys runoff on-site to the proposed detention pond and off-site flows to existing downstream inlets. The proposed swale has sufficient capacity to convey the 100-year storm with over 1-foot of freeboard above the 100-year WSE. The detention pond has sufficient capacity to detain the 100-year storm and will release the 100-year volume at a rate of 75% of the predevelopment peak inflow.

VI. REFERENCES

- *Mile High Flood District Urban Storm Drainage Criteria Manual, Volumes 1, 2, and 3*. Latest Revision – January 2021 updates.
- *Douglas County Storm Drainage Design & Technical Criteria Manual.* Latest Revision – July 8, 2008.
- *Flood Hazard Area Delineation – Plum Creek, East Plum Creek, West Plum Creek. Enginuity Engineering Solutions.* November 2019.

VII. APPENDICES

Appendix A - Hydrologic Computations

- *Project Location Map*
- *Hydrologic Soils Map and Table*
- *FIRMette*
- *Rainfall Data*
- *Developed Conditions*
- *Historic Conditions*
- *Runoff Comparison*

Appendix B - Hydraulic Computations

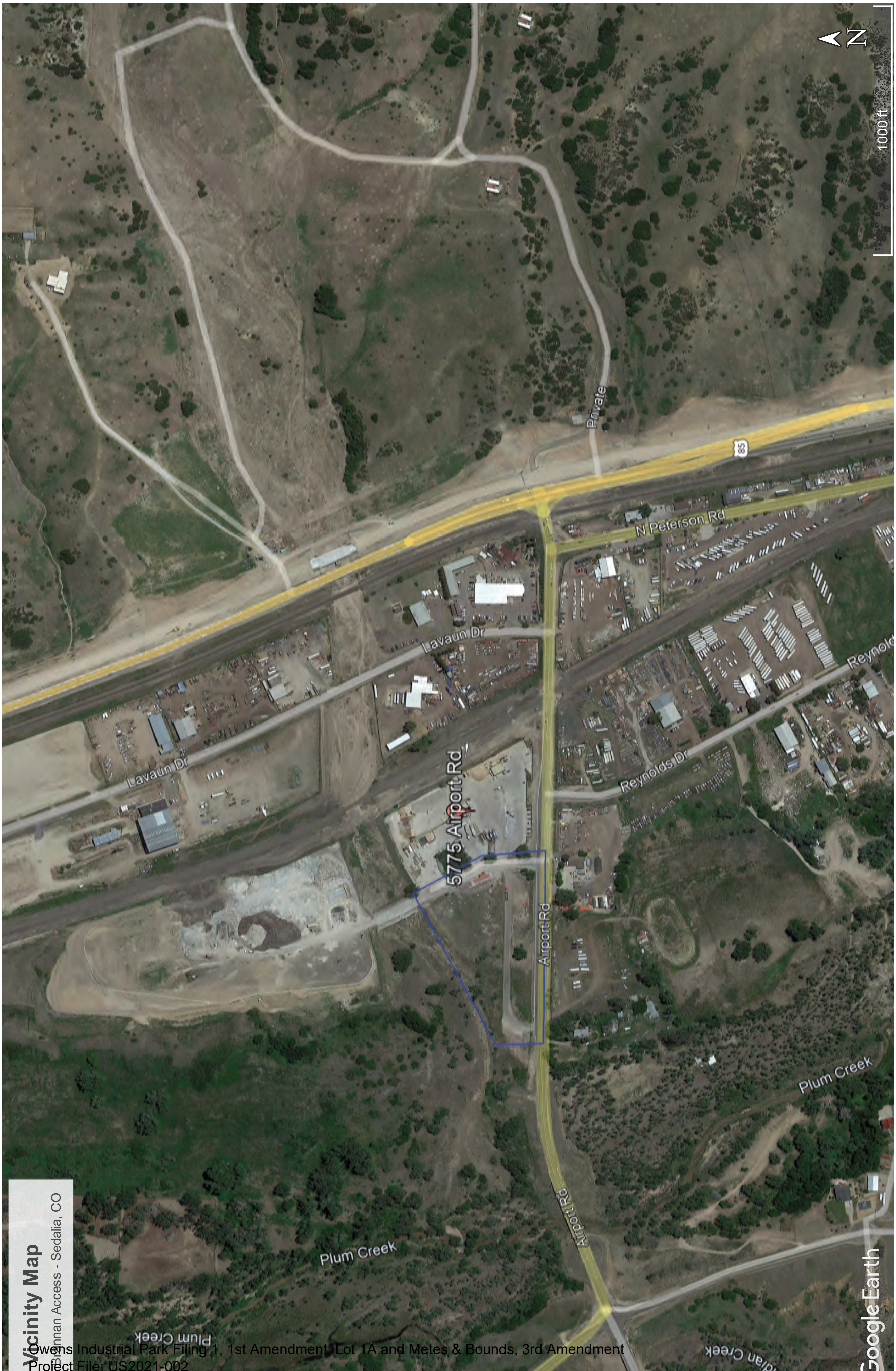
- *Hydraflow Storm Sewer Analysis*
- *Hydraflow Express Analysis*
- *MHFD Detention Basin Design Workbook*
- *Stage-Storage Table*
- *Spillway and Riprap Calculations*
- *Riprap Apron Design Calculations*

Appendix C – Phase III Drawings

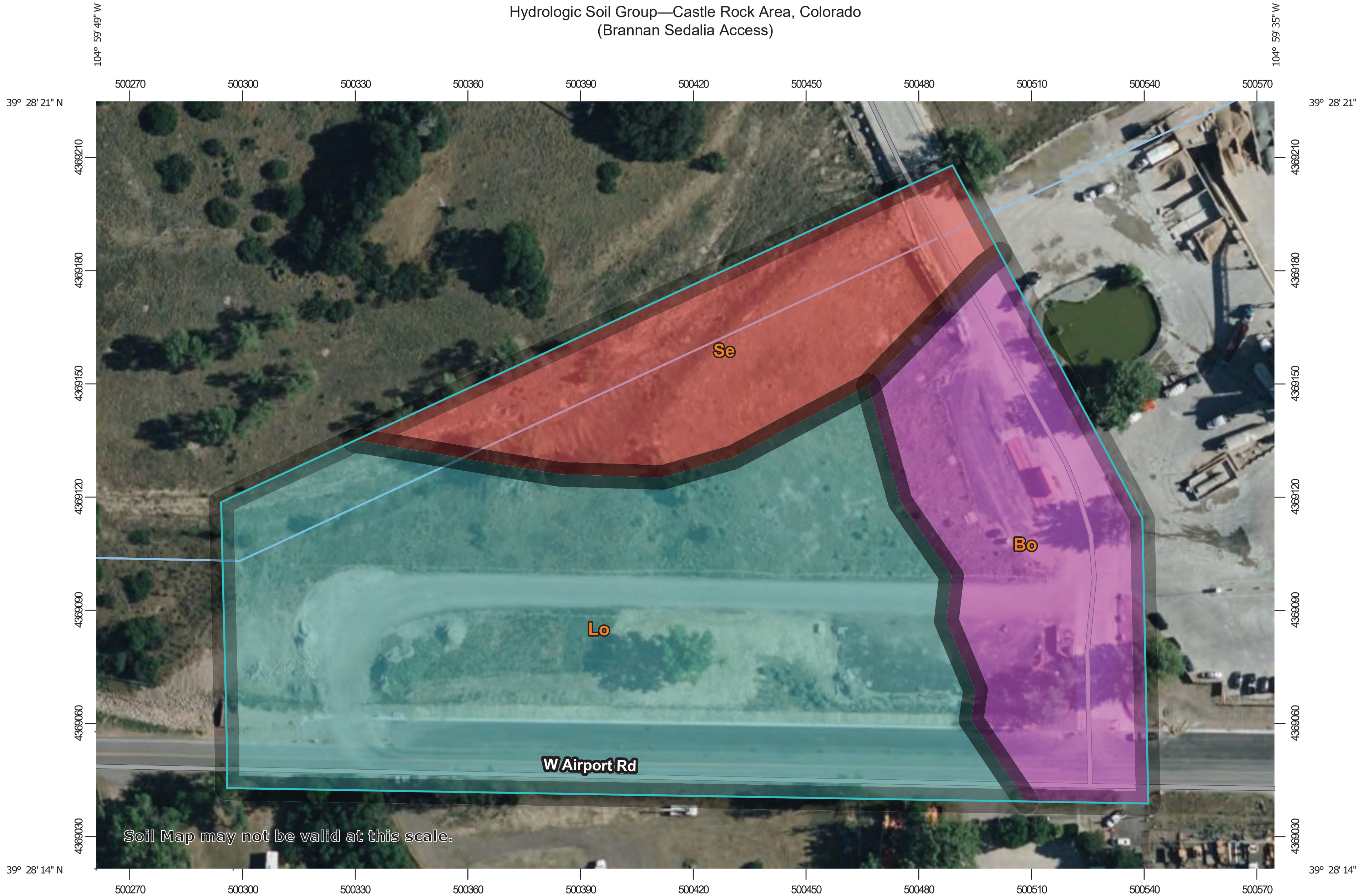
- *Historic Drainage Plan*
- *Proposed Drainage Plan*
- *Details*

APPENDIX A

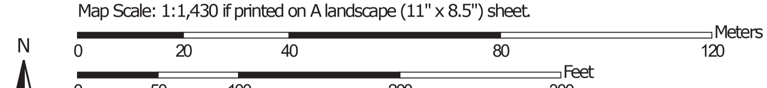
Hydrologic Computation


Vicinity Map
Brannan Access - Sedalia, CO
5775 Airport Rd
Airport Rd
N Peterson Rd
Lavaun Dr
Reynolds Dr
Private
85
Plum Creek
Indian Creek
1000 ft
N
Google Earth

Hydrologic Soil Group—Castle Rock Area, Colorado
(Brannan Sedalia Access)



Map Scale: 1:1,430 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 14, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2020—Jul 2, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bo	Blakeland-Orsa association, 1 to 4 percent slopes	A	1.6	22.1%
Lo	Loamy alluvial land	C	4.3	58.2%
Se	Sandy wet alluvial land	D	1.5	19.7%
Totals for Area of Interest			**7.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

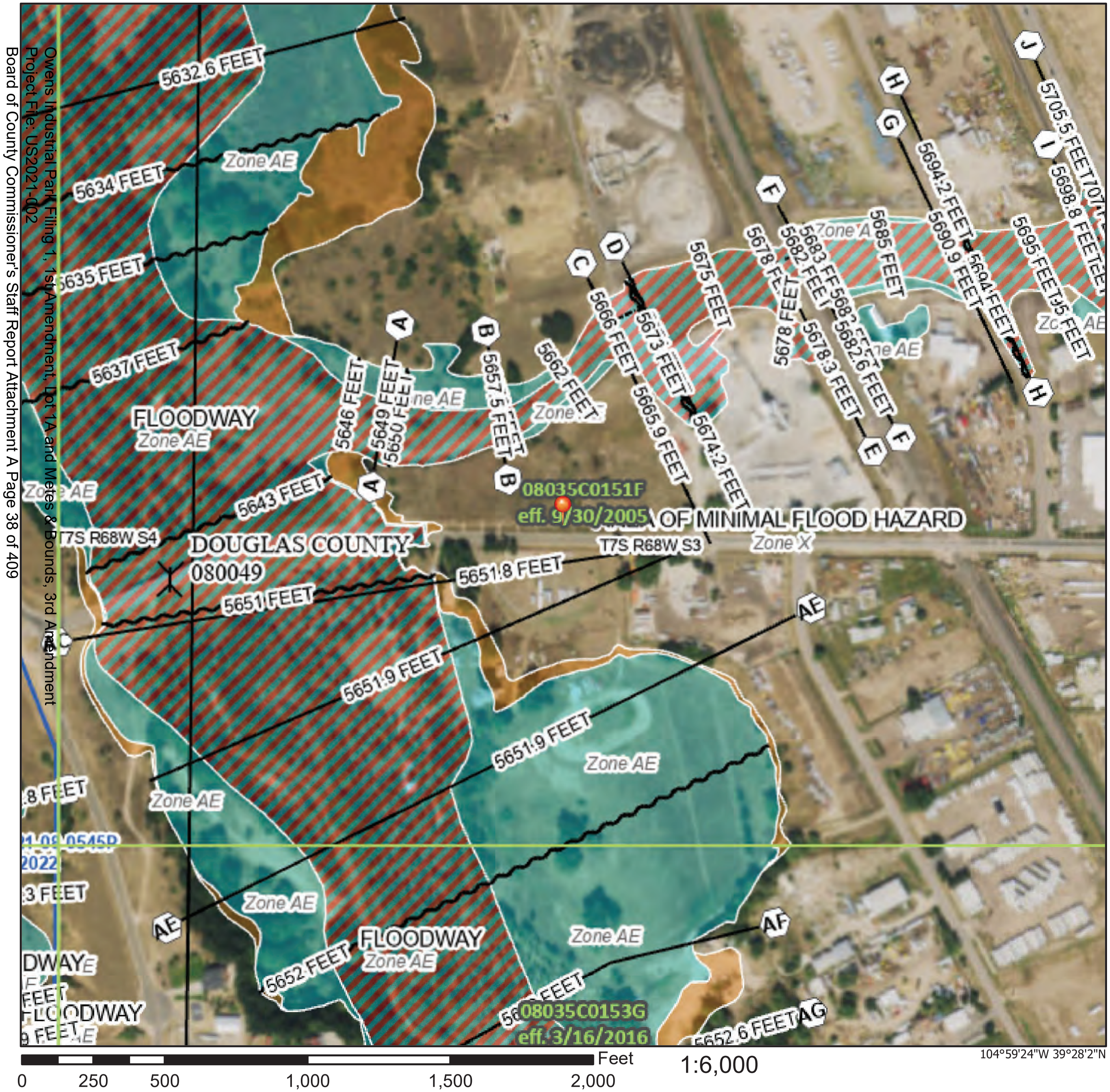
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

National Flood Hazard Layer FIRMette

FEMA

105°0'1"W 39°28'30"N



1:6,000

104°59'24"W 39°28'2"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/13/2022 at 11:51 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Chapter. Table 6-1 indicates the one-hour design point rainfall values for each zone.

Zone 1 includes the area from the Douglas/Elbert County line west to the base of the foothills. **Zone 2** includes the area from the base of the foothills west to the South Platte River drainage basin line. **Zone 3** includes the area from the South Platte River drainage basin line west to the Douglas/Jefferson County line.

TABLE 6-1
1-HOUR POINT RAINFALL VALUES FOR DOUGLAS COUNTY (INCHES)

	2- YR	5-YR	10-YR	50-YR	100-YR
ZONE 1	1.06	1.43	1.66	2.26	2.60
ZONE 2	0.98	1.32	1.53	2.07	2.34
ZONE 3	0.72	1.05	1.26	1.78	2.05

If the watershed(s) for a specific project site lies within multiple rainfall zones, runoff calculations shall be based upon the rainfall data from the zone with the greatest precipitation depth. If the watershed is divided into smaller sub-watersheds, the rainfall depth that shall be used is from the zone where the majority of the sub-watershed area is located.

6.1.2 Intensity-Duration Curves. Rainfall intensity based on storm duration for a variety of storm return periods and for the three rainfall zones are shown in Figures 6-2, 6-3, and 6-4, respectively. These curves were developed using distribution factors provided in the NOAA Atlas and also provided in Table RA-4 of the *UDFCD Manual*.

6.1.3 Six-hour Rainfall. In order to use the Colorado Urban Hydrograph Procedure (CUHP), 2-, 3- or 6-hour rainfall distributions are required, depending on watershed area. Table RA-1 in the *UDFCD Manual* summarizes storm durations, area adjustments, and incremental rainfall depths to be used in CUHP based on watershed area. The UD-Raincurve Spreadsheet included in the *UDFCD Manual* shall be used to generate the rainfall distribution curves necessary for a CUHP model. In order to generate these distribution curves, the 1-hour and 6-hour rainfall depths for the design return periods are necessary. Since not all of Douglas County is located within UDFCD boundaries, the rainfall depth-duration-frequency curves provided in the *UDFCD Manual* do not provide rainfall values for the entire County. Therefore these values are provided in these *Criteria*. The 1-hour point values can be found in Table 6-1 of this chapter. The 6-hour point values are as follows:

Table 1

Brannan Access - Sedalia, CO

DEVELOPED DRAINAGE

WEIGHTED PERCENT IMPERVIOUSNESS AND RUNOFF COEFFICIENT "C"

Land Use	Imperviousness (%)
Roof	90
Pavement	100
Gravel	40
Landscape/Open	2
Historic	2

NRCS Hydrologic Soil Group	C

Sub-Basin I.D.	Area												Weighted	[1]Runoff Coefficient "C"			
	TOTAL		Roof		Pavement		Gravel		LC/Open		Historic		Imperviousness	2-Year	5-Year	10-Year	100-Year
	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(%)	-	-	-	-
S1	57,011	1.31	0	0.00	12,334	0.28	1,914	0.04	42,763	0.98	0	0.00	24.5	0.17	0.23	0.31	0.59
S2	138,949	3.19	0	0.00	24,819	0.57	25,985	0.60	88,145	2.02	0	0.00	26.6	0.19	0.25	0.33	0.60
Total to Pond	**195,960**	**4.50**	**0**	**0.00**	**37,153**	**0.85**	**27,899**	**0.64**	**130,907**	**3.01**	**0**	**0.00**	**26.0**	**0.18**	**0.24**	**0.32**	**0.59**
S3	28,443	0.65	0	0.00	26,405	0.61	0	0.00	2,038	0.05	0	0.00	93.0	0.77	0.79	0.81	0.86
Total	**224,403**	**5.15**	**0**	**0.00**	**63,558**	**1.46**	**27,899**	**0.64**	**132,945**	**3.05**	**0**	**0.00**	**34.5**	**0.25**	**0.31**	**0.38**	**0.63**
SWALE	47,396	1.09	0	0.00	11,864	0.27	2,159	0.05	33,374	0.77	0	0.00	28.3	0.20	0.26	0.34	0.60
		4.50															

[1]Runoff Coefficient "C" Values are from Table 6-5 in the USDCM.

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CIVIL RESOURCES

Table 2

Brannan Access - Sedalia, CO

DEVELOPED DRAINAGE

DEVELOPED T_c

Type of Land Surface	NRCS Conveyance Factor, K
Heavy meadow	2.5
Tillage/Field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

NRCS Hydrologic Soil Group	C

Sub-Basin I.D.	Total Area	Overland Sheet Flow		Shallow Concentrated Flow			-	-	Eqn 6-3	Eqn 6-4	Eqn 6-2	Eqn 6-5	Final
		Length	Slope	Length	Slope	K	Imp	C_5	Ti^1	Tt^2	Tc^3	Tc^4	Tc
	(ac)	(ft)	(%)	(ft)	(%)	-	(%)	-	(min)	(min)	(min)	(min)	(min)
S1	1.31	146	6.0%	549	3.4%	15	24.5	0.23	10.5	3.3	13.8	25.8	13.8
S2	3.19	150	4.3%	532	3.2%	20	26.6	0.25	11.6	2.5	14.1	25.4	14.1
S3	0.65	46	4.7%	742	3.1%	20	93.0	0.79	2.3	3.5	5.8	13.4	5.8
SWALE	1.09	28	0.8%	688	3.1%	21	28.3	0.26	8.5	3.1	11.6	26.2	11.6

[1] $Ti = 0.395*(1.1-C_5)*L^{0.5}/S^{0.33}$ (Eq. 6-3)

[2] $Tt = L/(60*K*(So^{0.50}))$ (Eq. 6-4)

[3] $T_c = T_i + T_t$ (Eq. 6-2)

[4] $Tt = (26-17i)+(Lt/(60*(14i + 9)*(So^{0.5})))$ (Eq. 6-5)

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CIVIL RESOURCES

Table 3

Brannan Access - Sedalia, CO

DEVELOPED DRAINAGE

DEVELOPED PEAK FLOWS

	2-year	5-year	10-year	100-year
[1] P_1	1.06	1.43	1.66	2.60

NRCS Hydrologic Soil Group	C

Sub-Basin I.D.	Total Area	Final T_c	Weighted Imper.	[2]Runoff Coefficient "C"				[3]Rainfall Intensity "I"				[4]Runoff			
				2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year
	(ac)	(min)	(%)	-	-	-	-	(in/hour)	(in/hour)	(in/hour)	(in/hour)	(cfs)	(cfs)	(cfs)	(cfs)
S1	1.31	13.8	24.5	0.17	0.23	0.31	0.59	2.50	3.38	3.92	6.14	0.56	1.03	1.60	4.71
S2	3.19	14.1	26.6	0.19	0.25	0.33	0.60	2.48	3.34	3.88	6.08	1.52	2.69	4.07	11.56
S3	0.65	5.8	93.0	0.77	0.79	0.81	0.86	3.45	4.65	5.40	8.46	1.72	2.40	2.86	4.75
Total	**5.15**	**-**	**34.48**	**0.25**	**0.31**	**0.38**	**0.63**	**-**	**-**	**-**	**-**	**3.81**	**6.11**	**8.53**	**21.02**
SWALE	1.09	11.6	28.3	0.20	0.26	0.34	0.60	2.70	3.64	4.23	6.62	0.60	1.05	1.55	4.34

[1] P_1 for the 2-year, 5-year, 10-year and 100-year storms were taken from Douglas County Storm Drainage Design and Technical Criteria Manual.

[2] Table 6-5 (USDCM) along with the weighted imperviousness for each basin was used to find the composite "C" runoff coefficient.

[3] I Taken from Final Report OR $I = (28.5 \cdot P_1)/(10+T_c)^{0.786}$ (Eq. 5-3)

[4] Q = CIA

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CIVIL RESOURCES

Table 4

Brannan Access - Sedalia, CO

EXISTING DRAINAGE

WEIGHTED PERCENT IMPERVIOUSNESS AND RUNOFF COEFFICIENT "C"

Land Use	Imperviousness (%)
Roof	90
Pavement	100
Gravel	40
Landscape/Open	2
Historic	2

NRCS Hydrologic Soil Group	C

Sub-Basin I.D.	Area												Weighted	Runoff Coefficient "C"[1]			
	TOTAL		Roof		Pavement		Gravel		LC/Open		Historic		Imperviousness	2-Year	5-Year	10-Year	100-Year
	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(sf)	(ac)	(%)	-	-	-	-
H1	219,998	5.05	0	0.00	53,364	1.23	26,240	0.60	140,394	3.22	0	0.00	30.3	0.22	0.28	0.35	0.61
Total	**219,998**	**5.05**	**0**	**0.00**	**53,364**	**1.23**	**26,240**	**0.60**	**140,394**	**3.22**	**0**	**0.00**	**30.3**	**0.22**	**0.28**	**0.35**	**0.61**

[1]Runoff Coefficient "C" Values are from Table 6-5 in the USDCM.

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CIVIL RESOURCES

Table 5

Brannan Access - Sedalia, CO

EXISTING DRAINAGE

EXISTING T_c

Type of Land Surface	NRCS Conveyance Factor, K
Heavy meadow	2.5
Tillage/Field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

NRCS Hydrologic Soil Group	C

Sub-Basin I.D.	Total Area	Overland Sheet Flow		Shallow Concentrated Flow			-	-	Eqn 6-3	Eqn 6-4	Eqn 6-2	Eqn 6-5	Final
		Length	Slope	Length	Slope	K	Imp	C_5	Ti^1	Tt^2	Tc^3	Tc^4	Tc
	(ac)	(ft)	(%)	(ft)	(%)	-	(%)	-	(min)	(min)	(min)	(min)	(min)
H1	5.05	150	4.9%	728	2.4%	7	30.3	0.28	10.7	11.2	21.9	26.8	21.9

[1] $Ti = 0.395*(1.1-C_5)*L^{0.5}/S^{0.33}$ (Eq. 6-3)

[2] $Tt = L/(60*K*(So^{0.50}))$ (Eq. 6-4)

[3] $T_c = T_i + T_t$ (Eq. 6-2)

[4] $Tt = (26-17i)+(Lt/(60*(14i + 9)*(So^{0.5})))$ (Eq. 6-5)

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CIVIL RESOURCES

Table 6

Brannan Access - Sedalia, CO

EXISTING DRAINAGE

EXISTING PEAK FLOWS

	2-year	5-year	10-year	100-year
[1]P_1	1.06	1.43	1.66	2.60

NRCS Hydrologic Soil Group	C

Sub-Basin I.D.	Total Area	Final T_c	Weighted Imper.	[2]Runoff Coefficient "C"				[3]Rainfall Intensity "I"				[4]Runoff			
				2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year
	(ac)	(min)	(%)	-	-	-	-	(in/hour)	(in/hour)	(in/hour)	(in/hour)	(cfs)	(cfs)	(cfs)	(cfs)
H1	5.05	21.9	30.3	0.22	0.28	0.35	0.61	1.99	2.68	3.11	4.87	2.21	3.79	5.50	15.01
Total	**5.05**	**-**	**30.3**	**0.22**	**0.28**	**0.35**	**0.61**	**-**	**-**	**-**	**-**	**2.21**	**3.79**	**5.50**	**15.01**

[1]P_1 for the 2-year, 5-year, 10-year and 100-year storms were taken from Table 6-1 in the Douglas County Storm Drainage Design and Technical Criterial Manual

[2]Table 6-5 (USDCM) along with the weighted imperviousness for each basin was used to find the composite "C" runoff coefficient.

[3]I Taken from Final Report OR $I = (28.5 * P_1)/(10+T_c)^{0.786}$ (Eq. 5-3)

[4]Q = CIA

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CIVIL RESOURCES

Table 7

Brannan Access - Sedalia, CO

SITE

RUNOFF COMPARISON

Point of Discharge	Runoff Existing (CFS)					Runoff Proposed (CFS)					Detention Pond Discharge Proposed (CFS)				Δ in Discharge from Discharge Point Proposed LESS Existing (CFS)			
	Basin	2-Year	5-Year	10-Year	100-Year	Basin	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year
Detention Pond	N/A	0.00	0.00	0.00	0.00	S1	0.56	1.03	1.60	4.71	0.20	1.90	3.10	6.40	0.20	1.90	3.10	6.40
						S2	1.52	2.69	4.07	11.56								
	Total	0.00	0.00	0.00	0.00	Total	2.08	3.71	5.67	16.27	0.20	1.90	3.10	6.40	0.20	1.90	3.10	6.40
Direct Offsite	H1	2.21	3.79	5.50	15.01	S3	1.72	2.40	2.86	4.75	N/A				-	-	-	-
	Total	2.21	3.79	5.50	15.01	Total	1.72	2.40	2.86	4.75	1.72	2.40	2.86	4.75	-0.48	-1.39	-2.64	-10.26
Overall Site Total	**-**	**2.21**	**3.79**	**5.50**	**15.01**	**-**	**3.81**	**6.11**	**8.53**	**21.02**	**-**	**-**	**-**	**-**	**-0.28**	**0.51**	**0.46**	**-3.86**

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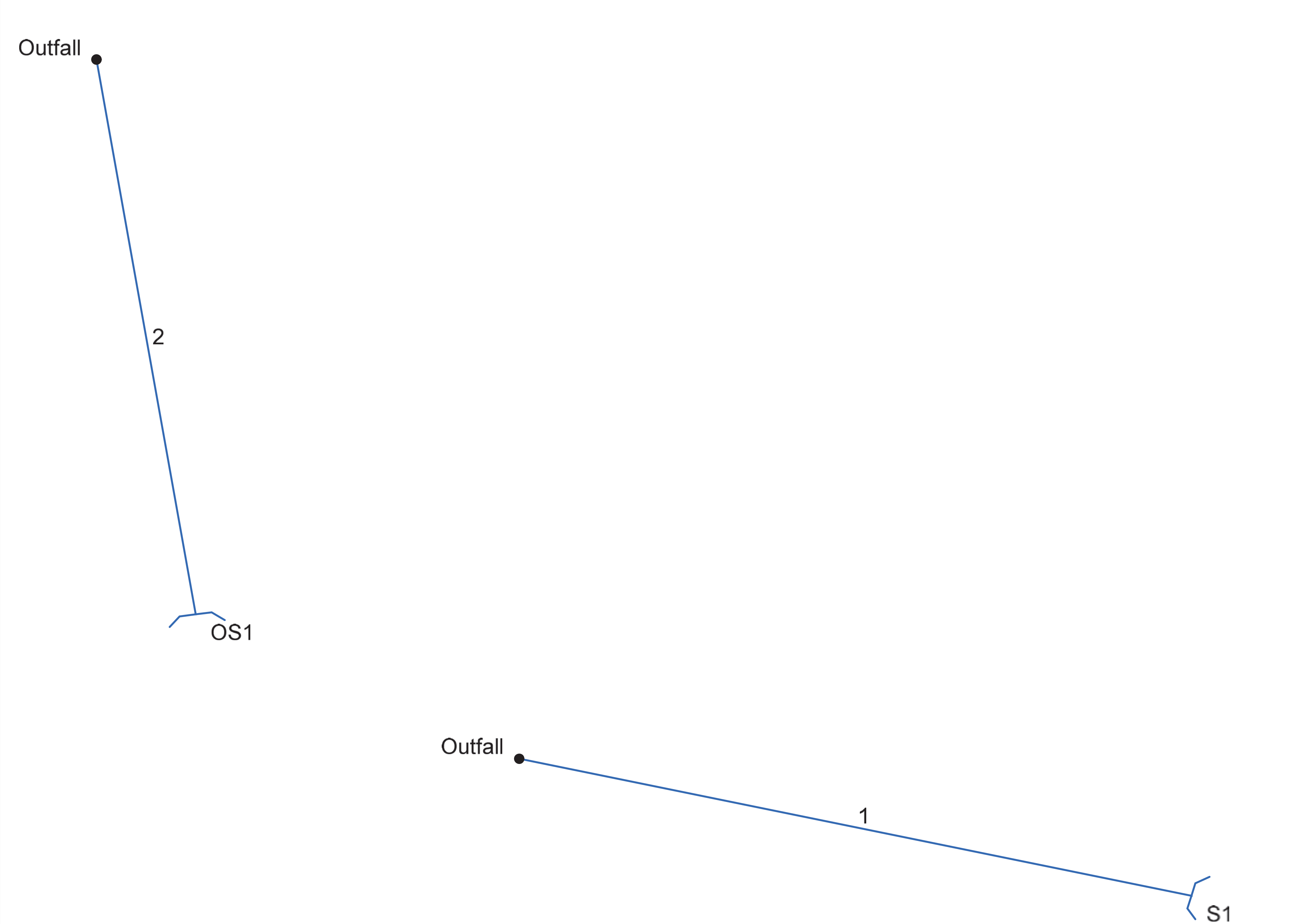
APPENDIX B

Hydraulic Computations

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: New.stm	Number of lines: 2	Date: 10/5/2022

Storm Sewers v2022.00

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (25)	11.36	18	Cir	86.488	5574.00	5575.50	1.734	5575.29	5576.79	n/a	5576.79 j	End	OpenHeadwall
2	Pipe - (26)	5.70	18	Cir	86.624	5572.00	5572.95	1.097	5572.95	5573.87	n/a	5573.87 j	End	OpenHeadwall

Project File: New.stm | Number of lines: 2 | Run Date: 10/5/2022

NOTES: Return period = 100 Yrs. ; j - Line contains hyd. jump.

Storm Sewers v2022.00

Inlet Report

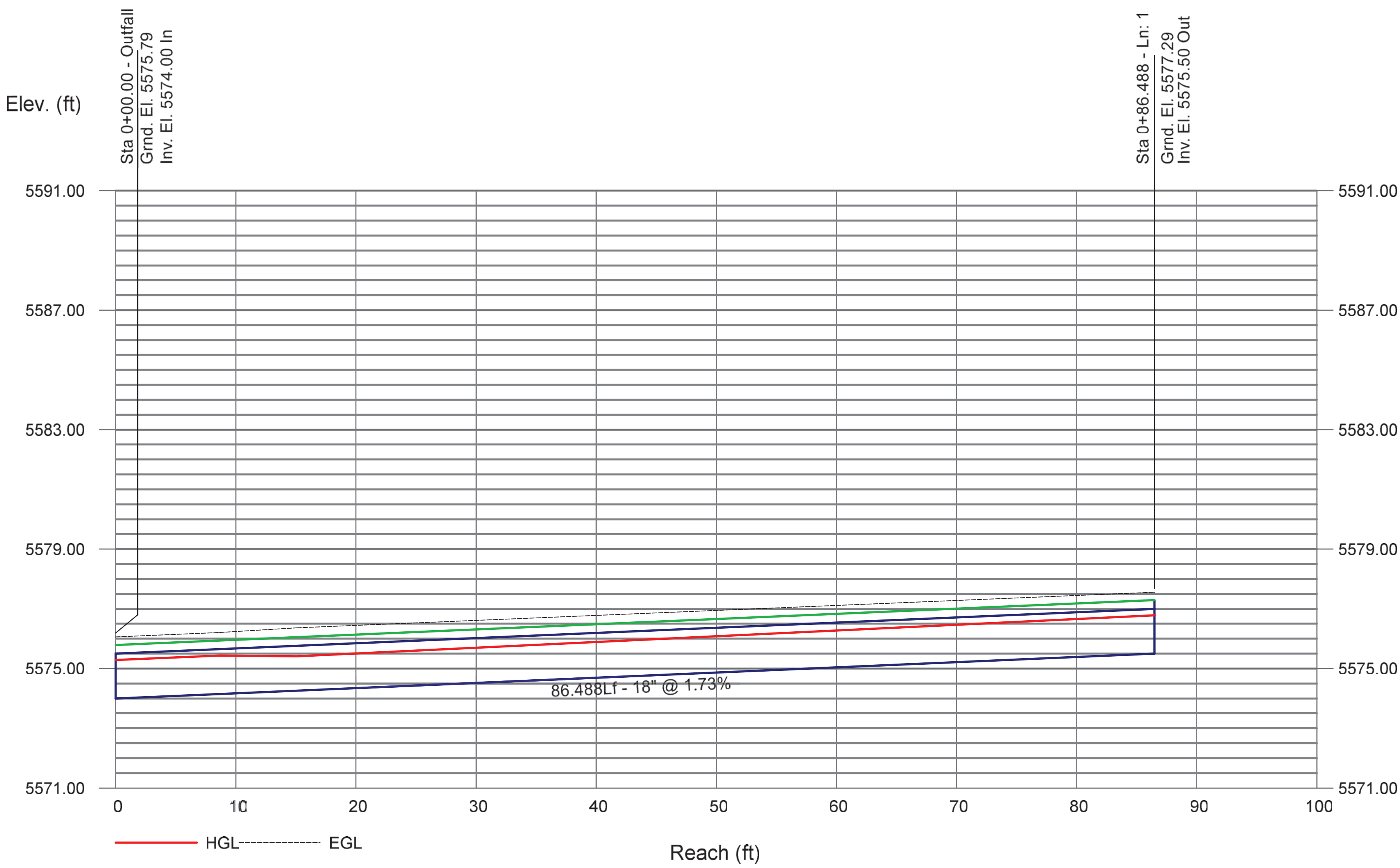
Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	S1	11.36	0.00	11.36	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	OS1	5.70*	0.00	5.70	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off

Project File: New.stm | Number of lines: 2 | Run Date: 10/5/2022

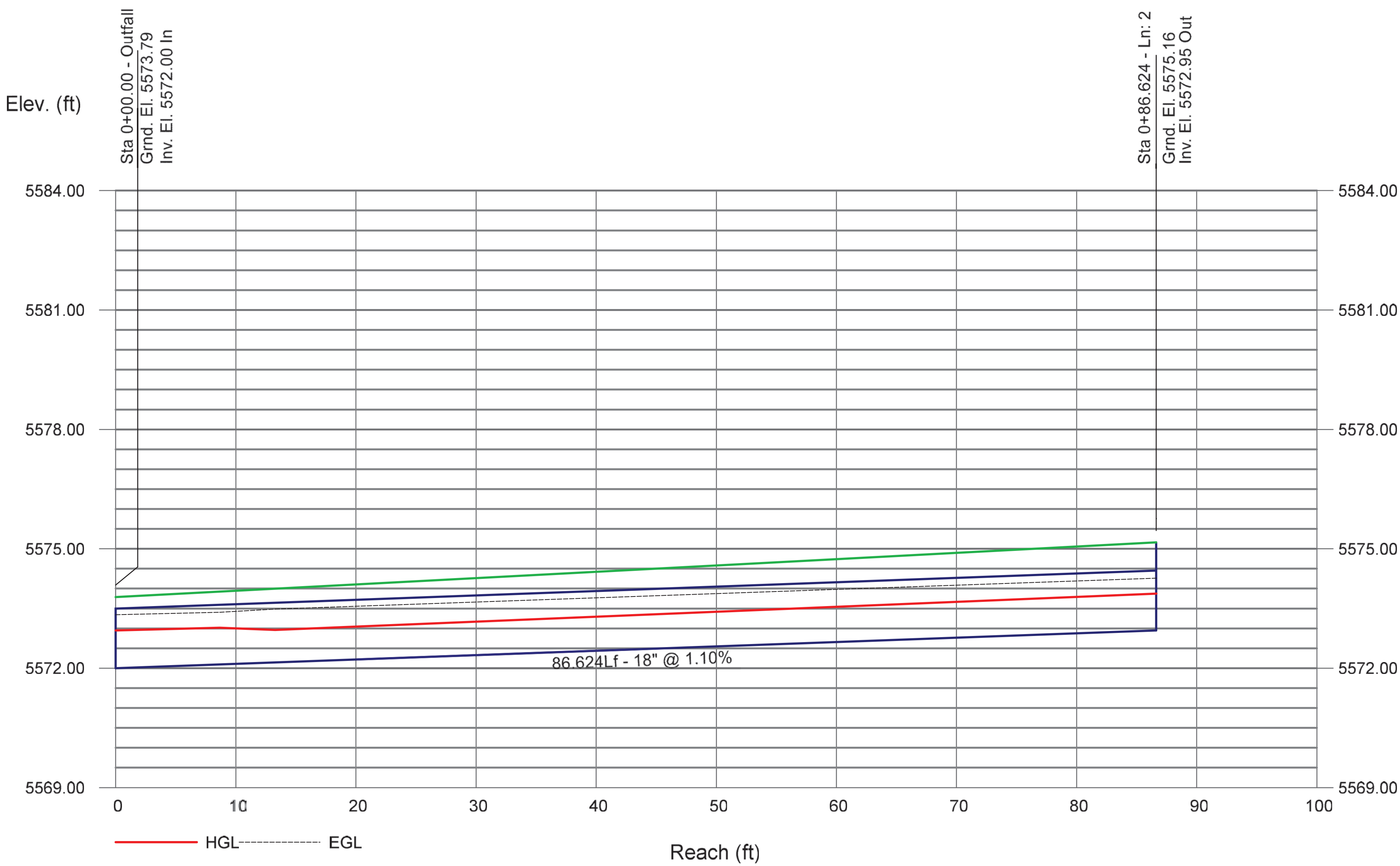
NOTES: Inlet N-Values = 0.016; Intensity = 61.51 / (Inlet time + 5.80) ^ 0.78; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewers v2022.00

Storm Sewer Profile



Storm Sewer Profile



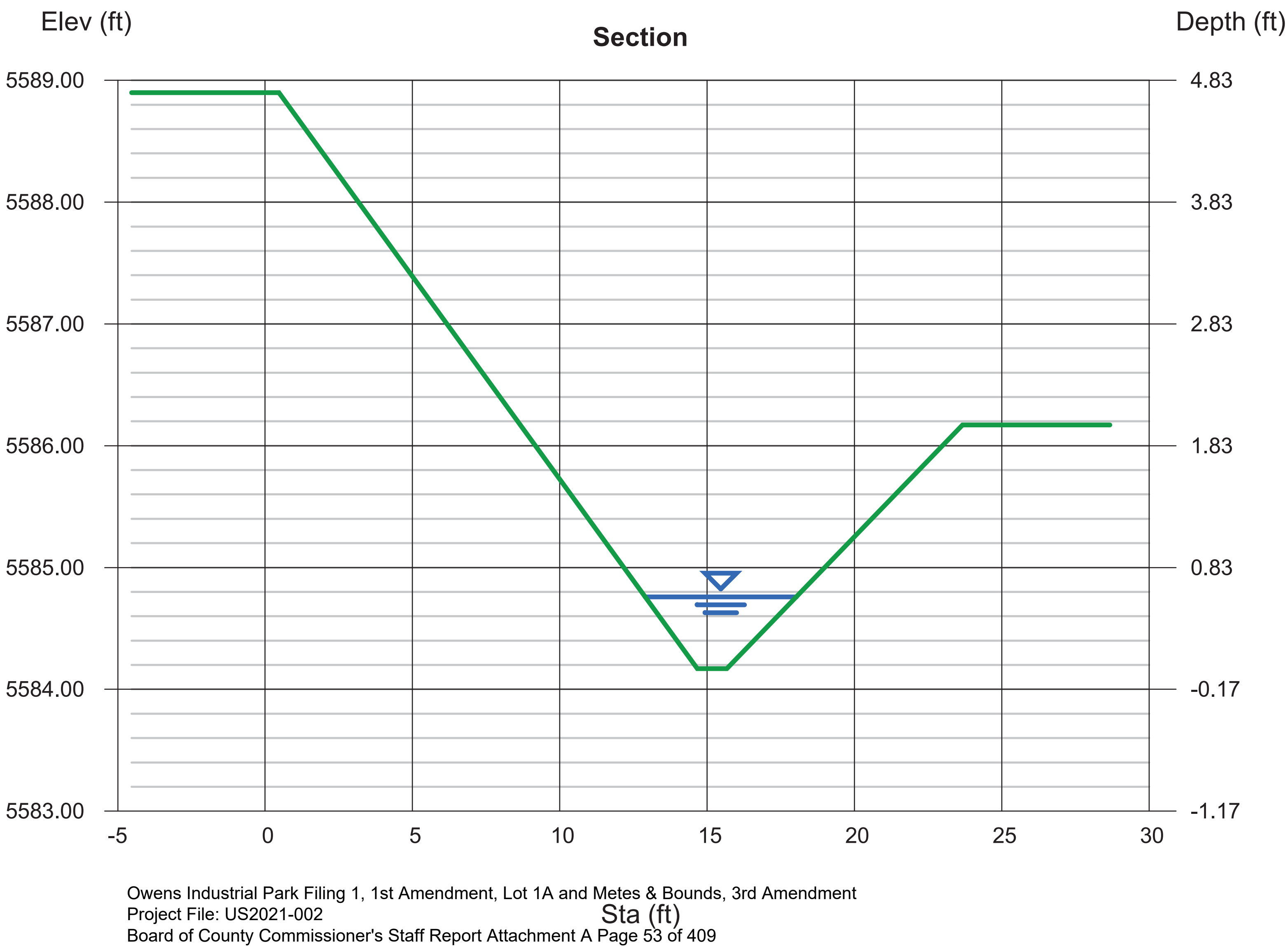
Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Nov 3 2022

North Swale

User-defined		**Highlighted**	
Invert Elev (ft)	= 5584.17	Depth (ft)	= 0.59
Slope (%)	= 1.00	Q (cfs)	= 4.340
N-Value	= 0.030	Area (sqft)	= 1.81
		Velocity (ft/s)	= 2.40
Calculations		Wetted Perim (ft)	= 5.30
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.51
Known Q (cfs)	= 4.34	Top Width (ft)	= 5.13
		EGL (ft)	= 0.68

(Sta, El, n)-(Sta, El, n)...
(0.47, 5588.90)-(14.67, 5584.17, 0.030)-(15.67, 5584.17, 0.030)-(23.67, 5586.17, 0.030)

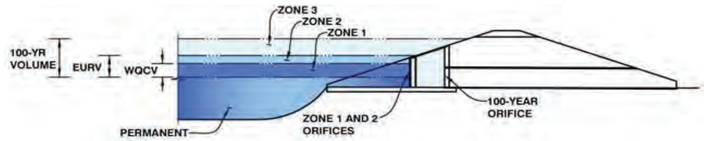


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Sedalia Batch Plant Access**

Basin ID: **Pond**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	4.50	acres
Watershed Length =	700	ft
Watershed Length to Centroid =	150	ft
Watershed Slope =	0.026	ft/ft
Watershed Imperviousness =	26.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.052	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.105	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	0.109	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	0.219	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	0.298	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.74 in.) =	0.346	acre-feet	1.74	inches
50-yr Runoff Volume (P1 = 2.26 in.) =	0.535	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	0.682	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.885	acre-feet		inches
Approximate 2-yr Detention Volume =	0.080	acre-feet		
Approximate 5-yr Detention Volume =	0.148	acre-feet		
Approximate 10-yr Detention Volume =	0.173	acre-feet		
Approximate 25-yr Detention Volume =	0.180	acre-feet		
Approximate 50-yr Detention Volume =	0.218	acre-feet		
Approximate 100-yr Detention Volume =	0.279	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.052	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.053	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.174	acre-feet
Total Detention Basin Volume =	0.279	acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
5649.26	--	0.50	--	--	--	64	0.001	16	0.000
	--	1.00	--	--	--	664	0.015	198	0.005
	--	1.50	--	--	--	1,687	0.039	786	0.018
	--	2.00	--	--	--	2,101	0.048	1,733	0.040
	--	2.50	--	--	--	2,543	0.058	2,894	0.066
	--	3.00	--	--	--	3,017	0.069	4,284	0.098
	--	3.50	--	--	--	3,529	0.081	5,920	0.136
	--	4.00	--	--	--	4,084	0.094	7,823	0.180
	--	4.50	--	--	--	4,693	0.108	10,017	0.230
	--	5.00	--	--	--	5,301	0.122	12,516	0.287
5654.29	--	5.50	--	--	--	5,942	0.136	15,327	0.352
TOP OF BERM	--	5.55	--	--	--	6,000	0.138	15,625	0.359
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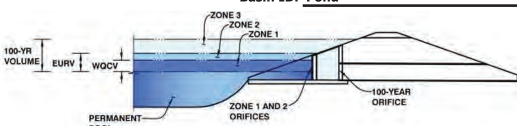
DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Sedalia Batch Plant Access**
Basin ID: **Pond**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.24	0.052	Orifice Plate
Zone 2 (EURV)	3.10	0.053	Circular Orifice
Zone 3 (100-year)	4.94	0.174	Weir&Pipe (Restrict)
Total (all zones)		0.279	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	2.24	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	9.00	inches
Orifice Plate: Orifice Area per Row =	0.20	sq. inches (diameter = 1/2 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.389E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.80	1.60					
Orifice Area (sq. inches)	0.20	0.20	0.20					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	2.00	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	3.11	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	1.00	N/A	inches

Calculated Parameters for Vertical Orifice

	Zone 2 Circular	Not Selected	
Vertical Orifice Area =	0.01	N/A	ft^2
Vertical Orifice Centroid =	0.04	N/A	feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.10	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	3.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.10	N/A	feet
Overflow Weir Slope Length =	3.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	13.14	N/A	
Overflow Grate Open Area w/o Debris =	8.35	N/A	ft^2
Overflow Grate Open Area w/ Debris =	4.18	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	7.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.64	N/A	ft^2
Outlet Orifice Centroid =	0.34	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.35	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.55	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	10.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.50	feet
Stage at Top of Freeboard =	6.05	feet
Basin Area at Top of Freeboard =	0.14	acres
Basin Volume at Top of Freeboard =	0.36	acre-ft

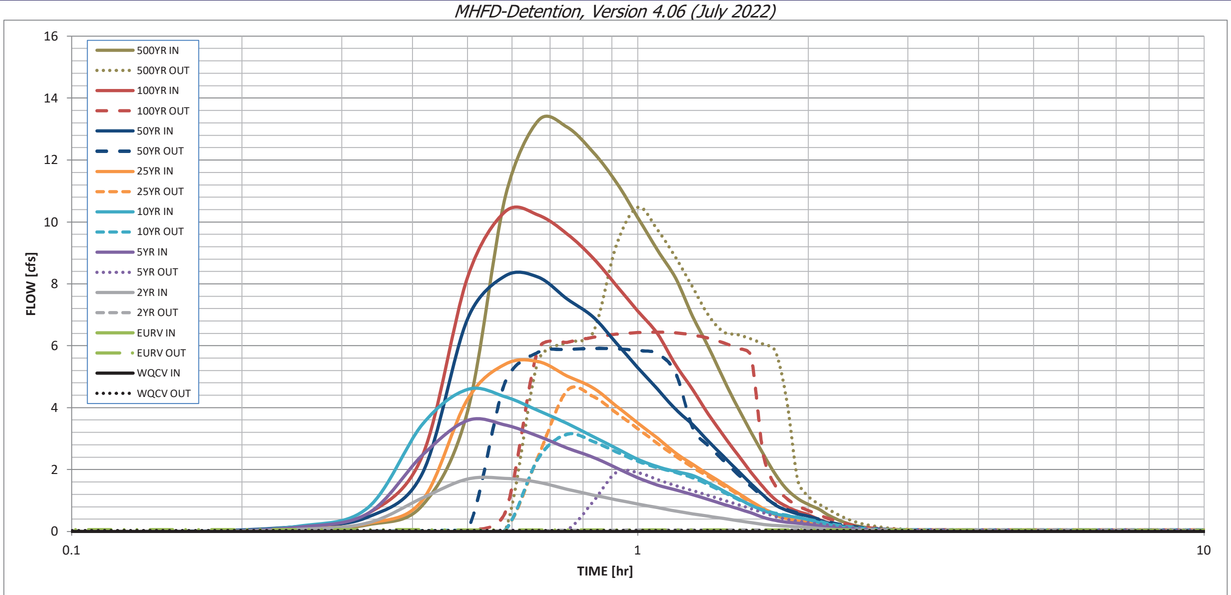
Routed Hydrograph Results

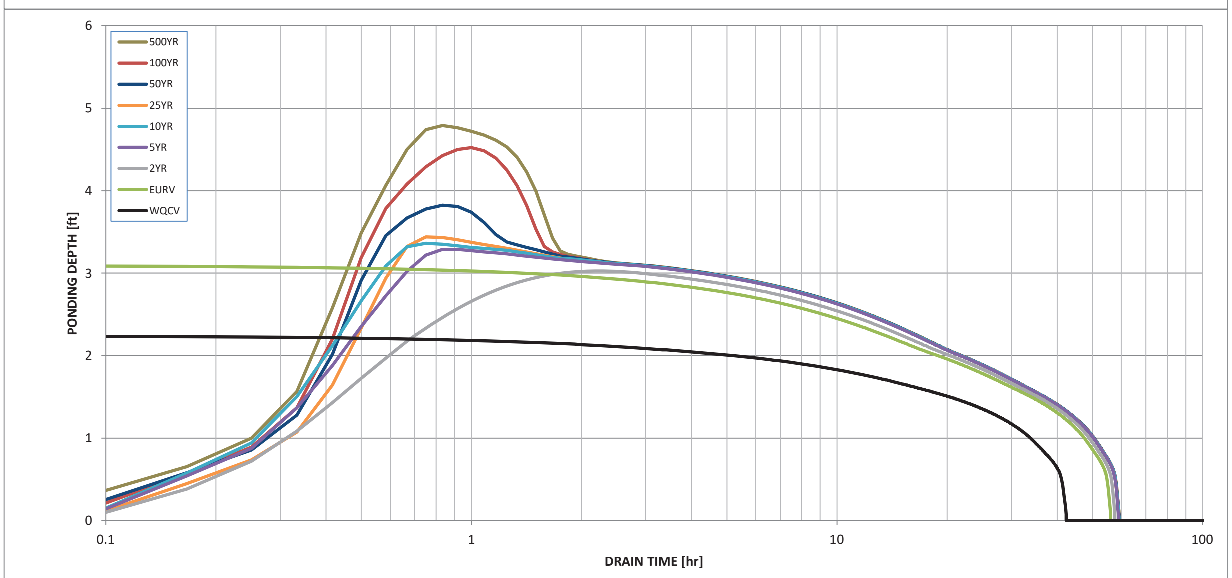
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

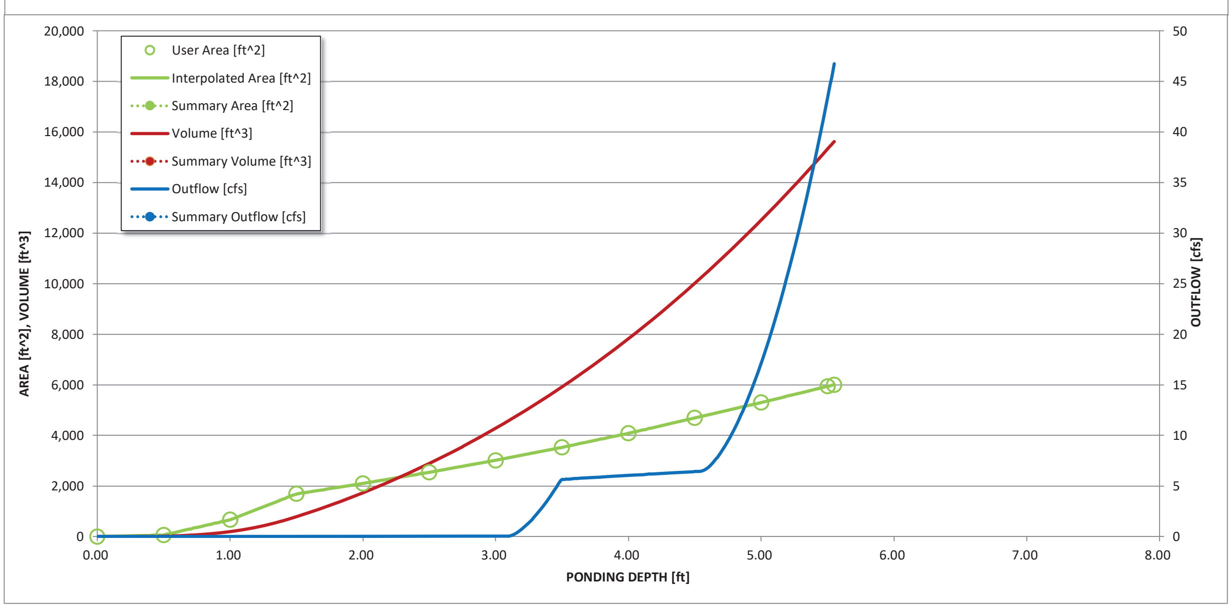
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.06	1.43	1.66	1.74	2.26	2.60	3.14
CUHP Runoff Volume (acre-ft) =	0.052	0.105	0.109	0.219	0.298	0.346	0.535	0.682	0.885
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.109	0.219	0.298	0.346	0.535	0.682	0.885
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.6	2.2	3.1	4.2	6.7	8.6	11.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.14	0.50	0.70	0.92	1.49	1.91	2.50
Peak Inflow Q (cfs) =	N/A	N/A	1.7	3.6	4.6	5.5	8.3	10.3	13.3
Peak Outflow Q (cfs) =	0.0	0.1	0.1	1.9	3.1	4.6	5.9	6.4	10.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.9	1.0	1.1	0.9	0.8	0.9
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.2	0.4	0.5	0.7	0.8	0.8
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	49	51	48	46	44	39	35	30
Time to Drain 99% of Inflow Volume (hours) =	**41**	53	55	54	53	52	50	48	46
Maximum Ponding Depth (ft) =	2.25	3.10	3.03	3.29	3.37	3.44	3.83	4.52	4.79
Area at Maximum Ponding Depth (acres) =	0.05	0.07	0.07	0.08	0.08	0.08	0.09	0.11	0.12
Maximum Volume Stored (acre-ft) =	0.052	0.105	0.100	0.119	0.125	0.131	0.163	0.232	0.262

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)







Brannan Batch Plant - Sedalia, CO

Detention Pond

STAGE - STORAGE TABLE

Stage	Elevation	∆ Elevation	Area	Incremental Est. Volume	Est. Available Volume		Note
(ft)	(ft)	(ft)	(SF)	(CF)	(CF)	(ac-ft)	
0	5648.76	0.00	29	0	0	0.000	BOTTOM OF POND
0.50	5649.26	0.50	1,037	267	267	0.006	-
1.00	5649.76	1.00	1,505	1,271	1,271	0.029	-
1.50	5650.26	0.50	1,900	851	2,122	0.049	-
2.00	5650.76	0.50	2,322	1,056	3,178	0.073	-
2.25	5651.01	0.25					WQCV
2.50	5651.26	0.50	2,774	1,274	4,452	0.102	-
3.00	5651.76	0.50	3,253	1,507	5,959	0.137	-
3.10	5651.86	0.10					EURV
3.50	5652.26	0.50	3,762	1,754	7,712	0.177	-
4.00	5652.76	0.50	4,299	2,015	9,728	0.223	-
4.50	5653.26	0.50	4,870	2,292	12,020	0.276	-
4.52	5653.28	0.02					100-YR
4.55	5653.31	0.03					SPILLWAY
5.00	5653.76	0.50	5,442	2,578	14,598	0.335	
5.50	5654.26	0.50	5,500	2,736	17,333	0.398	
5.55	5654.31	0.05	5,501	275	17,608	0.404	TOP OF BERM

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CIVIL RESOURCES

Pond

SPILLWAY & RIPRAP DESIGN

Parameter	Description	Value
[1]C_{BCW}	broad-crested weir coefficient	3.00
Z (ft)	side slopes (horiz:vert)	4.00
L (ft)	broad-crested weir length	10.00
H (ft)	head above weir crest	0.22
S (%)	longitudinal slope	2.70
[2]Q_H (cfs)	horizontal discharge	0.90
[3]Q_S (cfs)	sloping discharge	0.22
Q (cfs)	total discharge	1.12
q (cfs/ft)	unit discharge	0.11
[4]d_{50} (in)	riprap mean particle size	9.00

[1]C_{BCW} ranges 2.6-3.0; 3.0 is typical (USDCM 5.14.2)

[2]$Q=C_{BCW}LH^{1.5}$ (Eq. 12.8 USDCM)

[3]$Q=2(2/5)C_{BCW}ZH^{2.5}$ (Eq. 12.9 USDCM)

[4]d_{50} (Fig. 8-4 USDCM)

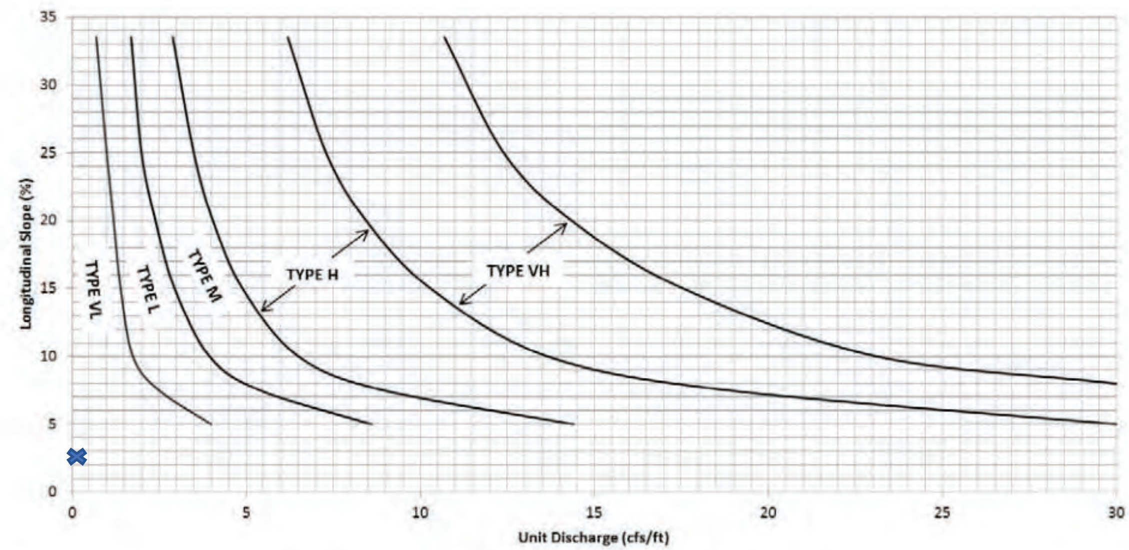


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

RIPRAP SIZE - CIRCULAR OUTLET

SEDALIA

Pipe ID	Storm Sewer Diameter		Discharge	Velocity at Pipe Outlet	Depth of Flow at Pipe Outlet	Median (design) Rock Size		Riprap Type	Median Rock Size (selected from standard)		Riprap Thickness	Expansion Factor				Allowable Discharge	Calculated Riprap Length
	D_c		Q	v	Yt	D_{50}		UDFCD Figure 9-38	D_{50}		T	Q/D_c^1.5	Q/D_c^2.5	Yt/D	Expansion Factor	Per soil type	L_R
	(in)	(ft)	cfs	(ft/s)	(ft)	(ft)	(in)		(ft)	(in)	(ft)		Froude		Figure 9-35	ft/s	(ft)
	-		(1)	(1)	(1)	(2)		(3)			(4)		(5)		(6)	(7)	(8)
Outfall to Daniels Park Drain	18	1.5	6.40	3.62	0.60	0.24	2.9	L	0.75	9.0	1.5	3.5	2.3	0.40	5.40	7.00	0.13

Pipe ID	Flared End Width	Minimum Length	Maximum Length	Design Length	Downstream End Width	
	W	3D	10D	L_p	Θ	T
	(ft)	(ft)	(ft)	(ft)	(Rads)	(ft)
		(9)	(9)	(10)	(11)	(12)
Outfall to Daniels Park Drain	3.0	4.5	15.0	**5.5**	0.09	**4.0**

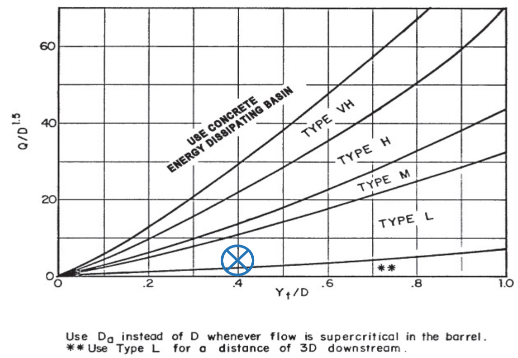
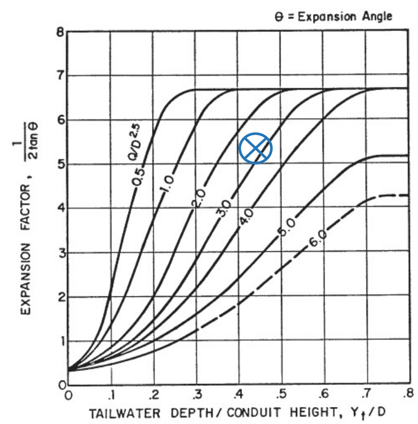


Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for Q/D2.5 ≤ 6.0)



(1) Output from Hydraflow Storm Sewer

(2) D50=0.023Q/Yr^1.2Dc^0.3 UDFCD Equation 9.16 Chapeter 3.2.3

(3) Choose next largest standard gradation

(4) T = 2*D_{50}, UDFCD Volume 2: Hydraulic Structures, Sec. 3.2.2, Eqn. 9.15

(5) Froude parameter is Q/D_c^2.5, UDFCD 3.2.1

(6) Read from from UDFCD Volume 2 Figure 9.35

(7) 5 fps for erodible soils, 7 fps for cohesive soils from UDFCD 3.2.1

(8) L=(1/2tanΘ)(A/y-W) UDFCD Equation 9-11, for unreasonable results (red text) L_p shall be between $3D_c$ and $10D_c$. When the Froude parameter is greater than 6, increase Lp by 25% for each whole number above 6.

(9) 3D and 10D, per section 3.2.1

(10) Where Frouede Parameter is less than 6, length shall be between minimum and maximum

(11) Θ=arctan(1/2*expansion factor) Equatiuon 9-13

(12) T=2(LtanΘ)+w Equation 9-14

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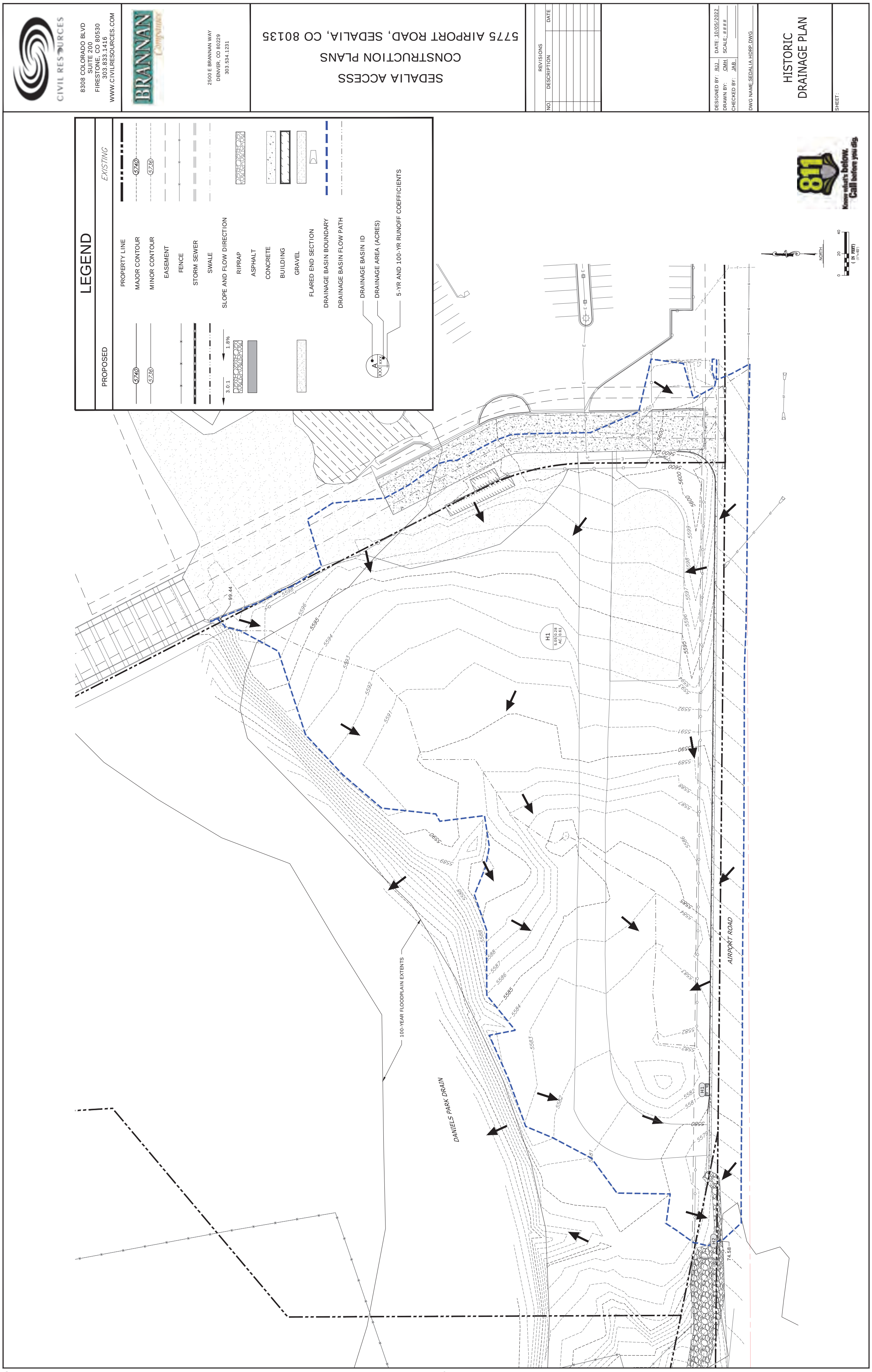
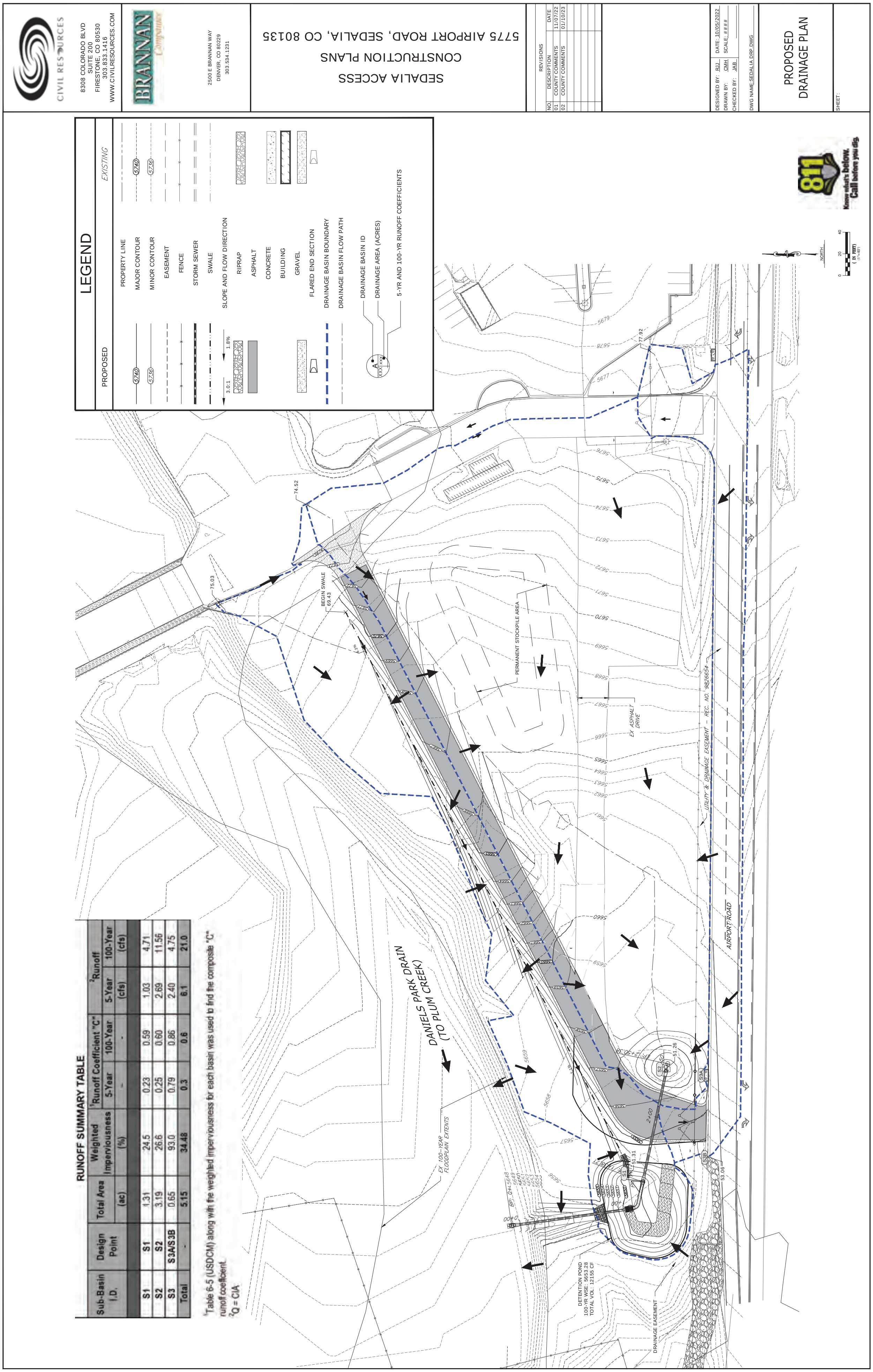
APPENDIX C

Phase III Drawings



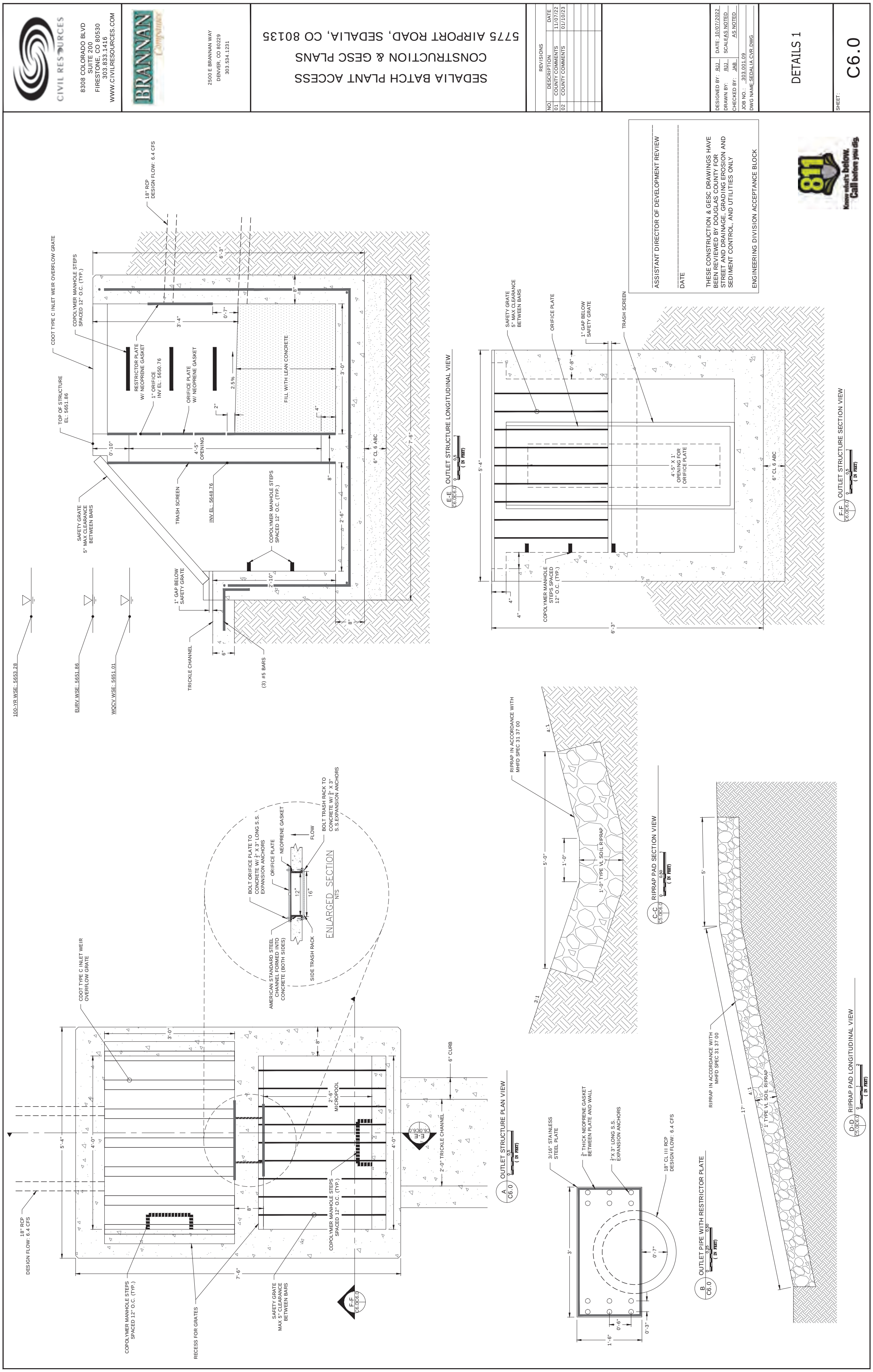
Owens Industrial Park Filing 1, 1st Amendment, Lot 1A and Metes & Bounds, 3rd Amendment
Project File: US2021-002

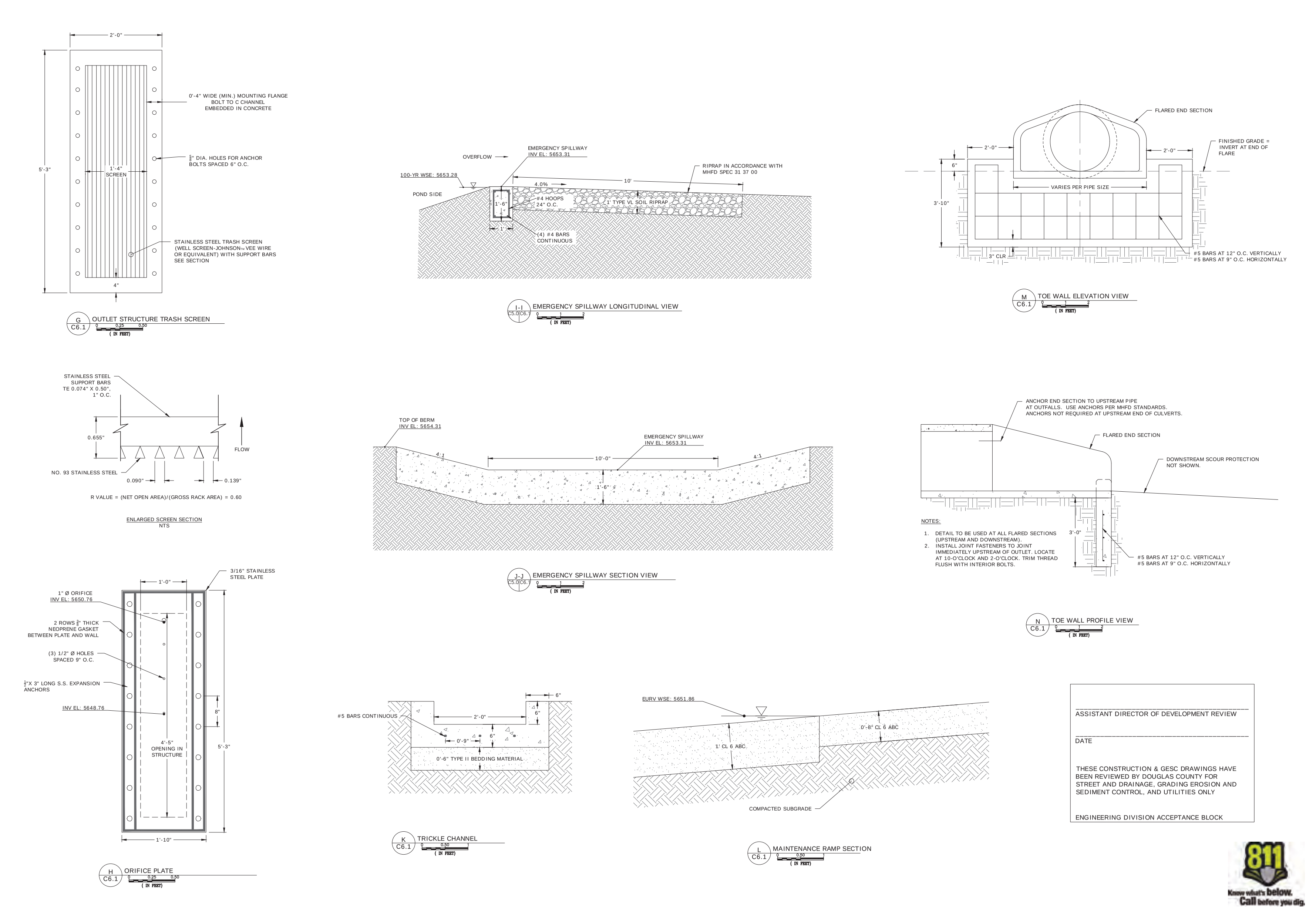


RUNOFF SUMMARY TABLE

Sub-Basin I.D.	Design Point	Total Area	Weighted Imperviousness	[1]Runoff Coefficient "C"		[2]Runoff	
				5-Year	100-Year	5-Year	100-Year
		(ac)	(%)	-	-	(cfs)	(cfs)
S1	S1	1.31	24.5	0.23	0.59	1.03	4.71
S2	S2	3.19	26.6	0.25	0.60	2.69	11.56
S3	S3A/S3B	0.65	93.0	0.79	0.86	2.40	4.75
Total	-	5.15	34.48	0.3	0.6	6.1	21.0

[1]Table 6-5 (USDCM) along with the weighed imperviousness for each basin was used to find the composite "C" runoff coefficient.
[2]Q = CIA


CIVIL RESOURCES
8308 COLORADO BLVD
SUITE 200
FIRESTONE, CO 80530
303.833.1416
WWW.CIVILRESOURCES.COM
BRANNAN
2500 E BRANNAN WAY
DENVER, CO 80229
303.534.1231
SEDALIA BATCH PLANT ACCESS
CONSTRUCTION & GESC PLANS
5775 AIRPORT ROAD, SEDALIA, CO 80135
REVISIONS
NO DESCRIPTION DATE
01 COUNTY COMMENTS 11/07/22
02 COUNTY COMMENTS 01/10/23
DESIGNED BY: RJJ DATE: 10/07/2022
DRAWN BY: RJJ SCALE: AS NOTED
CHECKED BY: JAB AS NOTED
JOB NO.: 303.001.09
DWG NAME: SEDALIA CVR.DWG
DETAILS 1
SHEET
C6.0
ASSISTANT DIRECTOR OF DEVELOPMENT REVIEW
DATE
THESE CONSTRUCTION & GESC DRAWINGS HAVE BEEN REVIEWED BY DOUGLAS COUNTY FOR STREET AND DRAINAGE, GRADING EROSION AND SEDIMENT CONTROL, AND UTILITIES ONLY
ENGINEERING DIVISION ACCEPTANCE BLOCK
811 Know what's below. Call before you dig.
OUTLET STRUCTURE LONGITUDINAL VIEW
OUTLET STRUCTURE SECTION VIEW
OUTLET STRUCTURE PLAN VIEW
OUTLET PIPE WITH RESTRICTOR PLATE
RIPRAP PAD SECTION VIEW
RIPRAP PAD LONGITUDINAL VIEW
ENLARGED SECTION
NTS
100-YR WSE: 5653.28
EURV WSE: 5651.86
WQCV WSE: 5651.01
TOP OF STRUCTURE EL: 5651.86
CDOT TYPE C INLET WEIR OVERFLOW GRATE
COPOLYMER MANHOLE STEPS SPACED 12" O.C. (TYP.)
RESTRICTOR PLATE W/ NEOPRENE GASKET
1" ORIFICE INV EL: 5650.76
ORIFICE PLATE W/ NEOPRENE GASKET
FILL WITH LEAN CONCRETE
18" RCP DESIGN FLOW: 6.4 CFS
SAFETY GRATE 5" MAX CLEARANCE BETWEEN BARS
TRASH SCREEN
INV EL: 5648.76
4'-5" OPENING
1" GAP BELOW SAFETY GRATE
TRICKLE CHANNEL
(3) #5 BARS
6" CL 6 ABC
4'-5" X 1' OPENING FOR ORIFICE PLATE
COPOLYMER MANHOLE STEPS SPACED 12" O.C. (TYP.)
RIPRAP IN ACCORDANCE WITH MHFD SPEC 31 37 00
1'-0" TYPE VL SOIL RIPRAP
1' TYPE VL SOIL RIPRAP
BOLT ORIFICE PLATE TO CONCRETE W/ 1/2" X 3" LONG S.S. EXPANSION ANCHORS
ORIFICE PLATE
NEOPRENE GASKET
FLOW
BOLT TRASH RACK TO CONCRETE W/ 1/2" X 3" S.S. EXPANSION ANCHORS
AMERICAN STANDARD STEEL CHANNEL FORMED INTO CONCRETE (BOTH SIDES)
SIDE TRASH RACK
2'-6" MICROPOOL
6" CURB
2'-0" TRICKLE CHANNEL
RECESS FOR GRATES
SAFETY GRATE MAX 5" CLEARANCE BETWEEN BARS
3/16" STAINLESS STEEL PLATE
1/8" THICK NEOPRENE GASKET BETWEEN PLATE AND WALL
1/2"X3" LONG S.S. EXPANSION ANCHORS
18" CL III RCP DESIGN FLOW: 6.4 CFS



CIVIL RESOURCES
8308 COLORADO BLVD
SUITE 200
FIRESTONE, CO 80530
303.833.1416
WWW.CIVILRESOURCES.COM

BRANNAN Companies
2500 E BRANNAN WAY
DENVER, CO 80229
303.534.1231

SEDALIA BATCH PLANT ACCESS
CONSTRUCTION & GESC PLANS
5775 AIRPORT ROAD, SEDALIA, CO 80135

REVISIONS

NO.	DESCRIPTION	DATE
01	COUNTY COMMENTS	11/07/22
02	COUNTY COMMENTS	01/10/23

DESIGNED BY: RJJ DATE: 10/07/2022
DRAWN BY: RJJ SCALE: AS NOTED
CHECKED BY: JAB AS NOTED
JOB NO.: 303.001.09
DWG NAME: SEDALIA CVR.DWG

DETAILS 2

SHEET: C6.1

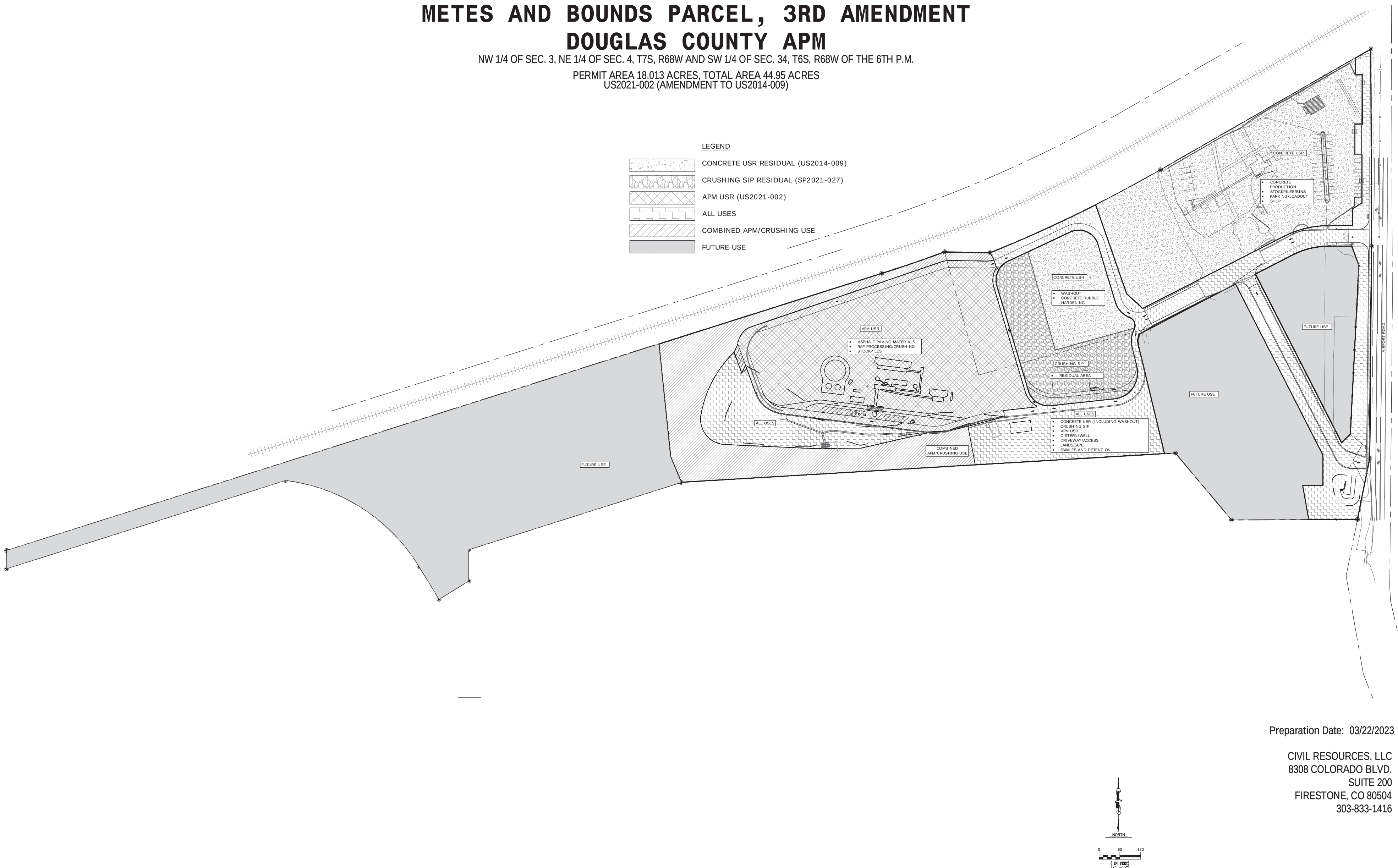
OWENS INDUSTRIAL PARK FILING 1, 1ST AMENDMENT, LOT 1A AND METES AND BOUNDS PARCEL, 3RD AMENDMENT
DOUGLAS COUNTY APM

NW 1/4 OF SEC. 3, NE 1/4 OF SEC. 4, T7S, R68W AND SW 1/4 OF SEC. 34, T6S, R68W OF THE 6TH P.M.

PERMIT AREA 18.013 ACRES, TOTAL AREA 44.95 ACRES
US2021-002 (AMENDMENT TO US2014-009)

LEGEND

- CONCRETE USR RESIDUAL (US2014-009)
- CRUSHING SIP RESIDUAL (SP2021-027)
- APM USR (US2021-002)
- ALL USES
- COMBINED APM/CRUSHING USE
- FUTURE USE



Preparation Date: 03/22/2023

CIVIL RESOURCES, LLC
8308 COLORADO BLVD.
SUITE 200
FIRESTONE, CO 80504
303-833-1416

EXHIBIT A

Brannan DougCO APM

Traffic Impact Study

Brannan Sand and Gravel

Douglas County, Colorado

June 17, 2024

Prepared By:

Sustainable Traffic Solutions, Inc.
http://www.sustainabletrafficsolutions.com/

Joseph L. Henderson, PE, PTOE
303.589.6875
joe@sustainabletrafficsolutions.com

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Brannan DougCO APM

Traffic Impact Study

1.0 Introduction

Brannan Sand and Gravel is proposing to construct an asphalt paving materials (APM) batch plant (the "APM Facility") on the north side of Airport Road adjacent to an existing concrete batch plant, also operated by Brannan by and through its subsidiary, Ready Mixed Concrete Company. A currently-approved crushing operation (for the recycling of concrete and asphalt paving products) will be reduced in size because future crushing will be limited to the accessory use of batch plants on the site. The location of the site is shown in Figure 1. Access to the site will be through the existing access and a new access to the west (see Figure 2). Inbound trucks will use the existing access and outbound trucks will use the new access. Passenger vehicles will use the existing access for inbound and outbound traffic. These vehicles will enter and exit the site during off-peak hours when truck traffic is minimal.

This study has been prepared in conformance with the Douglas County requirements for traffic studies[1]. It addresses comments on previous versions of the study[2, 3, 4].

2.0 Project Description

2.1 Study Area

The study area includes the following intersections.

- US 85 / Airport Road
- Airport Road / Peterson Road
- Airport Road / site accesses (existing and new access)

The intersections on Airport Road at Louviers Boulevard, Lavaun Drive, and Reynolds Drive were not analyzed because traffic from the APM Facility will not turn on or off of these streets unless asphalt is being delivered to a project on one of these streets or a connecting street. Peterson Road was included in the analysis due to its proximity to US 85.

The existing laneage and traffic control are contained in Figure 3. While an eastbound right turn lane isn't marked at US 85, the approach is wide enough for two lanes and observations show that two motorists can use the approach at the same

[1] Roadway Design and Construction Standards – Appendix B. Douglas County. Updated February 2018.

[2] Brannan DougCO APM Traffic Impact Study. Sanderson Stewart. February 2021.

[3] Brannan DougCO APM Traffic Impact Study. Sustainable Traffic Solutions, Inc. March 24, 2023.

[4] Brannan DougCO APM Traffic Impact Study. Sustainable Traffic Solutions, Inc. February 9, 2024.

time. An eastbound to southbound right turn acceleration lane exists at the intersection to facilitate the eastbound right turn movement. US 85 is classified as an expressway by Douglas County and an R-A roadway by CDOT, and Airport Road is classified as a minor arterial. The Douglas County classifications in Figure 1 are based on Figure 9 of the 2040 Douglas County Transportation Master Plan[5]. The CDOT classification is based on the straight-line diagram that was obtained from OTIS[6] (see Appendix A).

2.2 Study Assumptions

The following assumptions were utilized for this study.

Short-Term Horizon. The APM Facility is assumed to be operational in Year 2024, so the Year 2024 is the short-term horizon for this study.

Long-Term Horizon. The long-term horizon is Year 2040 to coincide with the 2040 Douglas County Transportation Master Plan.

Adjacent Development Impacting the Study Area Intersections. Information for the Range development is included in this traffic study. This residential development is planned on the east side of US 85 east of the Airport Road intersection and is documented in the traffic impact study for the project[7] (Range TIS). It will have two accesses to US 85 including a full movement access to Airport Road. The development is expected to be completed in Year 2028, therefore, the traffic from this development is included in the Year 2040 background traffic volume scenario.

Growth in Background Traffic. Annual growth rates were developed for the roadways in the study area utilizing data provided by Katherine Haire with Douglas County. The following growth rates were used to estimate future volumes.

- US 85 north of Airport Road – 3.2%
- US 85 south of Airport Road – 4.5%
- Airport Road west of US 85 – 7.5%

The projections provided by Katherine Haire are contained in Appendix B.

Intersection Capacity Improvements. The following improvements are planned at the study area intersections.

- **Eastbound Right Turn Lane at US 85 and Peterson Road.** Douglas County is planning to construct eastbound right turn lanes on Airport Road at Peterson Road and US 85. The project has been delayed due to right-of-way issues, so these right turn lanes have not been included in the analysis. Considering that a diamond interchange is assumed to be constructed at US

5 2040 Douglas County Transportation Master Plan. David Evans and Associates, Inc. September 2019.

6 Online Transportation Information System. Colorado Department of Transportation. January 3, 2023.

7 Range – 2nd Revised Traffic Impact Analysis. Felsburg Holt & Ullevig. August 18, 2021.

85 / Airport Road by the Year 2040, these right turn lanes are not assumed in any scenario.

- **Diamond Interchange at US 85 / Airport Road.** Based on CDOT's long-range plans, as reflected in the Range TIS, a diamond interchange is assumed to be constructed by the Year 2040.

Saturation Flow Rate. The saturation flow rate was assumed to be 1,900 passenger cars / hour / lane.

Peak Hour Factor (PHF). The PHF for the existing and short-term traffic volume scenarios was based on the traffic counts collected for the project. For the long-term analysis, 0.92 was assumed unless the existing PHF is higher. When the existing PHF is higher than 0.92, the existing PHF was used.

Modal Split. A modal split was not assumed.

Truck Percentage. The peak hour truck percentage recorded in the counts was used in the analysis. The classification data were collected by Miovision when the traffic count data for the study were processed. The following FHWA vehicle classifications apply to the Miovision categories; Lights - 1 through 3, Mediums - 4 through 7, Articulated Trucks - 8 through 13. The truck percentage was calculated for all of the movements for each of the traffic volume scenarios, and was used to provide the most accurate analysis possible. Those calculations are contained in Appendix C.

Signal Timing. The signal timing for US 85 / Airport Road was obtained from CDOT and used in the analysis.

3.0 Year 2023 Traffic Volumes

Traffic count data were collected for the project on average weekdays in May and June of 2023 by All Traffic Data. The data are contained in Appendix C, and the Year 2023 peak hour volumes are summarized in Figures 4 and 5. Year 2023 daily volumes and future daily volumes are summarized in Table 1.

The concrete batch plant was in operation when the traffic count data were collected, so the traffic volumes associated with the concrete batch plant are included in the traffic counts. Counts from June 9th were used for the site access. On June 9th, 67 loads of concrete were batched. The average number of daily loads batched in June was 65, so June 9th was an average day for the plant.

3.1 Level of Service Analysis

To evaluate the performance of the intersections within the study area, the level of service (LOS) was calculated using PTV VISTRO software. This software package utilizes criteria described in the Highway Capacity Manual[8]. LOS is a measure used to describe operational conditions at an intersection. LOS categories ranging from A

[8] Highway Capacity Manual, 7th Edition. National Academy of Sciences, Engineering, and Medicine. 2022.

to F are assigned based on the predicted delay in seconds per vehicle for the intersection as a whole, as well as for individual turning movements. LOS A indicates very good operations, and LOS F indicates poor, congested operations. For signalized intersections and/or roadway segments in zoning applications, LOS "D" will be the design objective in urban areas and LOS "C" will be the design objective in nonurban areas. Douglas County doesn't appear to have level of service criteria for unsignalized intersections.

The results of the Year 2023 analysis are summarized in the following table. The analysis shows that all of the intersections are operating at LOS B which is acceptable operation as defined by Douglas County.

Year 2023 Traffic Conditions

Intersection	Control	Peak Hour	
		Morning	Evening
1 - US 85 / Airport Road	Signalized	B	B
2 - Airport Road / Peterson Road	Side-Street Stop-Control	B	B
3 - Airport Road / East Access	Side-Street Stop-Control	B	B

The detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix D.

4.0 Site Generated Traffic Volumes

4.1 Trip Generation

In order to estimate the traffic impacts associated with the development of the APM Facility, the trip generation was estimated based on the following input provided by Brannan Sand and Gravel. It was necessary to rely on input from Brannan Sand and Gravel for the trip generation because the proposed use is not documented in the Institute of Transportation Engineers Trip Generation manual[9]. The trip generation estimate is contained in Table 3.

APM Facility. The daily trip budget for the APM Facility, not including accessory crushing, is 618 trips. The daily trips are assumed to be divided between:

- asphalt delivery – 344 trips (includes 10 trips by plant operators in passenger vehicles)
- aggregate delivery – 260 trips
- asphalt oil delivery – 12 trips
- lime delivery – 2 trips

This trip budget assumes that on-site accessory crushing produces required recycled asphalt paving (RAP) as feedstock for the APM Facility. In the absence of accessory

9 Trip Generation, 11th Edition. Institute of Transportation Engineers. September 2021.

crushing, trip generation across the site must be adjusted upward to account for off-site shipment of excess concrete and, also in the absence of accessory crushing, additional traffic for the import of RAP.

Delivery of aggregate, asphalt oil, and lime will not occur during the morning peak hour.

Accessory Crushing Operation. As permitted, the daily trip budget for the current crushing operation is 800 trips per day. The trips associated with the crushing operation are from materials being hauled in from construction projects to be crushed at the Brannan facility, and final products (i.e., road base from recycled concrete) being trucked from the Brannan facility to construction projects. This import and export operation will be confined to only needs generated by Brannan concrete and APM production (*i.e.*, so-called “comeback” / unused concrete typically used in crushed form to produce road base for paving projects, and RAP as a required component of many common asphalt paving mixes). The number of trips assumed in the study for the comeback / unused concrete operation is 204 per day (includes four trips by plant operators in passenger vehicles) effectively reducing crushing-related trips by nearly 600 per day relative to the current entitlement.

4.2 Trip Distribution and Assignment

The trip distribution for the development is contained in the following figures. It is based on areas that the APM and crushing operation will serve.

- Asphalt Delivery – Figure 6
- Aggregate, Asphalt Oil, and Lime Delivery – Figure 7
- Crushing Operation – Figure 8

The morning and evening peak hour trip assignments are contained in Figures 9 through 12. They include:

- Inclusive asphalt operation – Figures 9 and 10
- Crushing operation – Figures 11 and 12

As noted in Section 3.0, the concrete batch plant was in operation when the traffic count data were collected, so the traffic volumes associated with the concrete batch plant are included in the traffic counts.

5.0 Year 2024 Traffic Conditions

The Year 2024 traffic operations were estimated by analyzing the background and total traffic volume scenarios. Background traffic volumes were determined by inflating the traffic volumes on US 85 and Airport Road by the growth rates that were discussed in Section 2.2. The background traffic volume scenarios are contained in Figures 13 and 14. Total traffic volumes were estimated by adding the trip assignment for the APM and crushing uses to the background traffic volumes. The total traffic volume scenarios are contained in Figures 15 and 16.

The results of the analysis are summarized in the following table. It shows that all of the intersections are expected to operate at LOS B and LOS C which is acceptable operation as defined by Douglas County. The laneage and traffic control assumed in the analysis are contained in Figure 17.

Year 2024 Traffic Conditions

Intersection	Control	Background		Total	
		Morning	Evening	Morning	Evening
1 - US 85 / Airport Road	Signalized	B	C	B	C
2 - Airport Road / Peterson Road	Side-Street Stop-Control	B	B	C	B
3 - Airport Road / East Access	Side-Street Stop-Control	B	B	B	B
4 - Airport Road / West Access	Side-Street Stop-Control	---		B	B

The detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix D.

6.0 Year 2040 Traffic Conditions

The Year 2040 traffic operations were estimated by analyzing the background and total traffic volume scenarios. The traffic volume scenarios were developed in the same manner as discussed in Section 5.0. The background traffic volume scenarios are contained in Figures 18 and 19, and the total traffic volume scenarios are contained in Figures 20 and 21.

The results of the analysis are summarized in the following table.

- **US 85 / Airport Road Diamond Interchange.** The ramp intersections are expected to operate at LOS A and LOS B which is acceptable operation as defined by Douglas County.
- **Airport Road / Peterson Road.** This intersection is expected to operate at LOS E during both peak hours in the total traffic volume scenarios. Level of service for intersections with side-street stop-control is determined by the movement with the highest delay value. Therefore, the delay for the northbound left turning movement will determine the level of service for the intersection. The analysis assumed one through lane in each direction (as it exists today). Considering the proximity of this intersection to US 85, decisions about the configuration of the intersection will be made during the design of the interchange.
- **Airport Road / East Access.** This intersection is expected to operate at LOS D in the background scenarios and LOS C in the total traffic volume scenarios which is acceptable operation as defined by Douglas County. The level of service will improve because all of the outbound truck traffic (concrete, asphalt, and crushing) will move to the west access.

- **Airport Road / West Access.** This intersection is expected to operate at LOS D during both peak hours which is acceptable operation as defined by Douglas County.

The laneage and traffic control assumed in the analysis are contained in Figure 22.

Year 2040 Traffic Conditions

Intersection	Control	Background		Total	
		Morning	Evening	Morning	Evening
2 - Airport Road / Peterson Road	Side-Street Stop-Control	E	D	E	E
3 - Airport Road / East Access	Side-Street Stop-Control	D	D	C	C
4 - Airport Road / West Access	Side-Street Stop-Control	---		D	D
8 - US 85 SB Ramps	Signalized	A	A	A	A
9 - US 85 NB Ramps	Signalized	B	B	C	B

The detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix D.

7.0 Auxiliary Lane Review

The need for auxiliary lanes at the site accesses was reviewed based on criteria contained in Section 4.13 of the Douglas County Roadway Design and Construction Standards[10]. The Douglas County criteria refer to the State Highway Access Code[11] to determine when auxiliary lanes are required. Based on email correspondence with Chris Martin at Douglas County, the auxiliary lane criteria for the R-B roadway are appropriate for Airport Road. Table 4 summarizes the need for auxiliary lanes and it shows that a westbound right turn deceleration lane is currently required at the east access. An eastbound left turn deceleration lane will be required at the east access following completion of the asphalt plant. Table 4 notes that there are three existing auxiliary lanes at the east access including the eastbound left turn deceleration lane, westbound right turn deceleration lane, and southbound to westbound right turn acceleration lane.

10 Roadway Design and Construction Standards. Douglas County. Amended 2013.

11 State Highway Access Code. The Transportation Commission of Colorado. Amended March 2002.

8.0 Conclusions

STS has drawn the following conclusions based on the analysis performed for this project.

Intersection Operation. PTV VISTRO software was used to analyze the intersection operation for the traffic volume scenarios. The results of the analysis showed:

- All of the study area intersections are currently operating at LOS B and they are expected to operate at LOS B and LOS C following the completion of the APM Facility and the initiation of the accessory crushing operation.
- Both of the site accesses are expected to operate at LOS C or LOS D in the Year 2040.
- Airport Road / Peterson Road is expected to operate at LOS E during both peak hours in the Year 2040 total traffic volume scenarios. The analysis assumed the existing intersection configuration. Considering the proximity of this intersection to US 85, decisions about the configuration of the intersection will be made during the design of the interchange.

Auxiliary Lanes. The need for auxiliary lanes at the site accesses was determined based on the State Highway Access Code requirements for an R-B roadway. The analysis showed that the eastbound left turn deceleration lane and the westbound right turn deceleration lane at the east access are the only auxiliary lane required at either access. Both of these lanes are existing.

Tables

Table 1. Existing and Future Daily Volumes for Key Links in the Study Area

Link	Year 2023 [1]	Year 2024 Background	Brannan Crushing Operation	Brannan Asphalt Plant	Year 2024 Total	Year 2040 Background	Year 2040 Total
US 85 north of Airport Road	18,148	18,720	80	450	19,250	30,400	30,850
US 85 south of Airport Road	19,500	20,370	100	100	20,570	40,810	40,910
Airport Road between US 85 and Brannan Plant	3,380	3,630	180	540	4,350	11,040	11,580
Airport Road west of the Brannan Plant	3,390	3,640	20	70	3,730	11,540	11,610

1. The volumes highlighted in yellow represent data collected in the field. Other daily volumes were estimated assuming that the evening peak hour represents 10% of the daily traffic.

This table is formatted to be printed on 11" x 17" paper.

Table 2. Intersection Operational Summary

Signalized Intersections [1]	Year 2023				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 - US 85 / Airport Road	**15.1**	**B**	**19.7**	**B**	**15.6**	**B**	**20.7**	**C**	**17.2**	**B**	**21.1**	**C**								
NB Approach	14.4	B	16.7	B	15.0	B	17.6	B	16.7	B	18.1	B								
SB Approach	14.4	B	21.7	C	14.8	B	22.7	C	16.2	B	23.1	C	---				---			
EB Approach	25.5	C	24.4	C	25.6	C	25.6	C	25.4	C	25.9	C								
WB Approach	21.4	C	0.0	A	21.3	C	0.0	A	20.8	C	0.0	A								
8 - US 85 SB Ramps													**5.5**	**A**	**6.2**	**A**	**5.9**	**A**	**6.3**	**A**
SB Approach														A	23.4	C	29.2	C	23.4	C
EB Approach	---				---				---					A	3.8	A	3.0	A	3.8	A
WB Approach														A	3.7	A	4.5	A	3.8	A
9 - US 85 NB Ramps													**18.0**	**B**	**10.1**	**B**	**20.8**	**C**	**10.2**	**B**
NB Approach														A	24.9	C	40.2	D	25.1	C
EB Approach	---				---				---					A	4.8	A	9.3	A	4.9	A
WB Approach														A	3.0	A	4.8	A	3.0	A

Stop-Controlled Intersections [2]	Year 2023				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
2 - Airport Road / Peterson Road	**12.4**	**B**	**12.3**	**B**	**12.7**	**B**	**12.9**	**B**	**17.2**	**C**	**12.6**	**B**	**37.3**	E	**35.0**	D	**40.1**	E	**36.3**	E
	NBLT		**NBLT**		**NBLT**		**NBLT**		**NBLT**		**NBLT**		**NBLT**		**NBLT**		**NBLT**		**NBLT**	
NB Approach	11.4	B	11.3	B	11.6	B	11.7	B	12.1	B	11.5	B	29.1	D	27.9	D	31.2	D	29.5	D
EB Approach	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
WB Approach	0.6	A	1.1	A	0.5	A	0.9	A	0.5	A	0.9	A	0.2	A	0.4	A	0.2	A	0.4	A
3 - Airport Road / East Access	**12.1**	**B**	**12.0**	**B**	**12.3**	**B**	**12.3**	**B**	**10.9**	**B**	**10.6**	**B**	**26.6**	D	**28.3**	D	**20.4**	**C**	**20.6**	**C**
	SBLT		**SBLT**		**SBLT**		**SBLT**		**SBLT**		**SBLT**		**SBLT**		**SBLT**		**SBLT**		**SBLT**	
NB Approach	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
SB Approach	12.1	B	11.9	B	12.3	B	12.1	B	10.9	B	10.6	B	26.7	D	27.1	D	20.4	C	20.6	C
EB Approach	0.1	A	0.1	A	0.1	A	0.1	A	0.3	A	0.1	A	0.1	A	0.0	A	0.1	A	0.0	A
WB Approach	0.4	A	0.0	A	0.4	A	0.0	A	0.3	A	0.0	A	0.2	A	0.0	A	0.1	A	0.0	A
4 - Airport Road / West Access									**12.3**	**B**	**12.3**	**B**					**25.3**	D	**26.1**	D
									SBLT		**SBLT**						**SBLT**		**SBLT**	
SB Approach	---		---		---		---		12.1	B	12.1	B	---		---		24.2	C	25.3	D
EB Approach									0.0	A	0.0	A					0.0	A	0.0	A
WB Approach									0.0	A	0.0	A					0.0	A	0.0	A

Notes

1. The level of service for signalized intersections is based on the delay for the entire intersection.

2. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value.

Table 3. Trip Generation Estimate

Asphalt Plant

Land Use	Average Daily Trips			Morning Peak Hour Trips [2]			Evening Peak Hour Trips [3]		
	Total	In	Out	Total	In	Out	Total	In	Out
Asphalt Plant Operators	10	5	5	0	0	0	0	0	0
Asphalt Delivery [1]	334	167	167	30	15	15	7	4	3
Aggregate Delivery [1]	260	130	130	0	0	0	5	3	2
Asphalt Oil Delivery [1]	12	6	6	0	0	0	0	0	0
Lime Delivery [1]	2	1	1	0	0	0	0	0	0
Total	618	309	309	30	15	15	12	7	5

Crushing Operation

Land Use	Average Daily Trips			Morning Peak Hour Trips [2]			Evening Peak Hour Trips [3]		
	Total	In	Out	Total	In	Out	Total	In	Out
Crushing Plant Operators	4	2	2	0	0	0	0	0	0
Crushing Operation [4]	200	100	100	18	9	9	4	3	1
Total	204	102	102	18	9	9	4	3	1

Notes.

1. Refer to Section 4.1 for a detail discussion of the trip generation.

2. The morning peak hour was assumed to be 9% of the daily traffic with 50% entering and 50% exiting. Aggregate and asphalt oil will not be delivered during the morning peak hour.

3. The evening peak hour was assumed to be 2% of the daily traffic with 50% entering and 50% exiting.

4. The daily trip generation budget for the crushing operation is 200 trips, six days per week.

Table 4. Need for Auxiliary Lanes at the Site Accesses

Intersection	Movement	VPH Threshold	Existing Traffic (PCE)		Existing Traffic Reassigned[2] (PCE)		Crushing Operation[3] (PCE)		Asphalt Production[3] (PCE)		2024 Total (PCE)	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
East Access	EBLT Decel[4]	>10	4	2	0	0	3	0	8	3	15	5
	WBRT Decel[4]	>25	30	17	0	0	21	8	32	24	83	49
	SB to WB RT Accel[4]	>50	0	2	0	-2	0	0	0	0	0	0
	SB to EB LT Accel	Note 1	23	23	-22	-22	0	0	0	0	1	1
West Access	SB to WB RT Accel	>50	0	0	0	2	2	0	8	0	10	2
	SB to EB LT Accel	Note 1	0	0	22	22	21	3	32	21	75	46

Notes Threshold Met or Exceeded **XX**

1. It is not possible to construct a left turn acceleration at either access due to the presence of conflicting left turn deceleration lanes. Additionally, a left turn acceleration lane is generally not required where the posted speed limit is less than 45 MPH. The speed limit on Airport Road is 35 MPH.

2. Traffic was reassigned to show all of the existing outbound trucks exiting from the west access.

3. The mix of vehicles was assumed to be 33% greater than 20' long and less than 40' long, and 67% longer than 40'.

4. This auxiliary lane is existing.

Existing Peak Hour Counts Converted to Passenger Car Equivalents

Movement	Morning Peak Hour Traffic[1,2]				Evening Peak Hour Traffic[1,2]			
	Lights	Mediums	Articulated Trucks	PCE	Lights	Mediums	Articulated Trucks	PCE
EBLT Decel	0	2	0	4	0	1	0	2
WBRT Decel	1	10	3	30	1	5	2	17
SB to WB RT Accel	0	0	0	0	0	1	0	2
SB to EB LT Accel	1	2	6	23	1	8	2	23

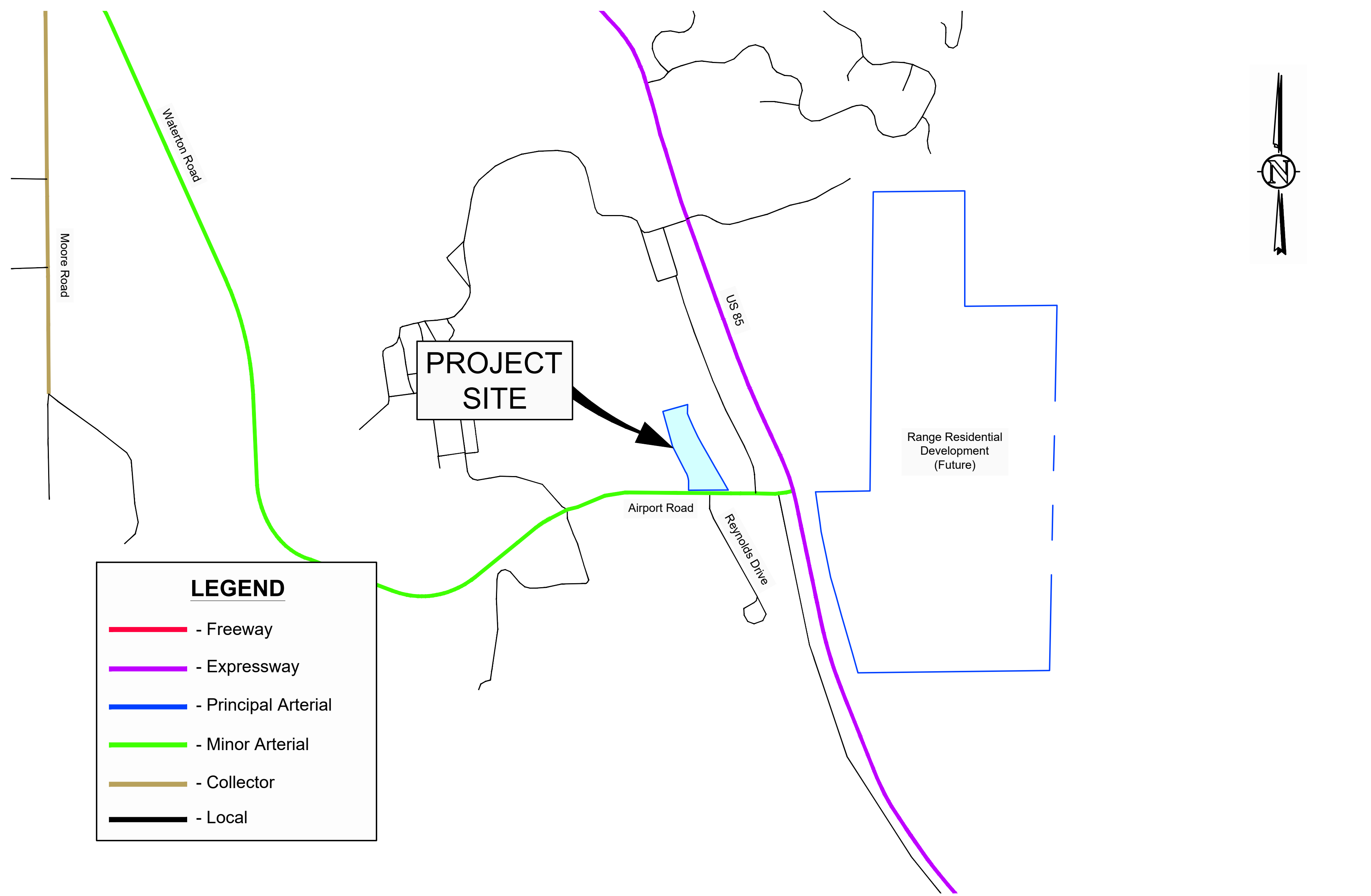
Notes

1. The classification data were collected by Miovision when the traffic count data for the study were processed. The following FHWA vehicle classifications apply to the Miovision categories; Lights - 1 through 3, Mediums - 4 through 7, Articulated Trucks - 8 through 13.

2. The peak hour counts were converted to passenger car equivalents based on Section 2.3(4)(e) of the State Highway Access Code.

3. The data were collected on June 9, 2023.

Figures



STS

Brannan DougCO AMP TIS
VICINITY MAP

Scale	1" = 2,000'	Date	June 17, 2024	Drawn by	JLH	Job #	Brannan Sand & Gravel	Figure	1

Brannan DougCO AMP TIS
SITE PLAN

Scale	NTS	Date	June 17, 2024	Drawn by	JLH	Job #	Brannan Sand & Gravel	Figure	2

Figure 3 – Laneage and Traffic Control – Existing

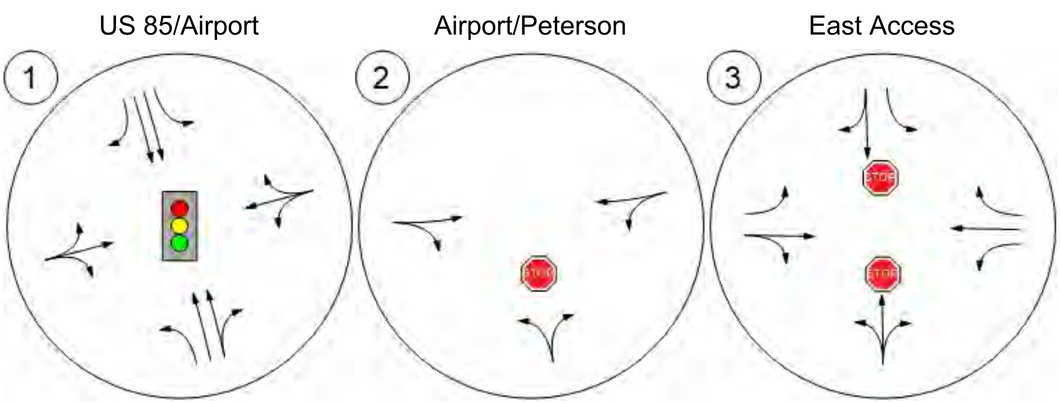


Figure 4 – Year 2023 Traffic Volumes – Morning Peak Hour

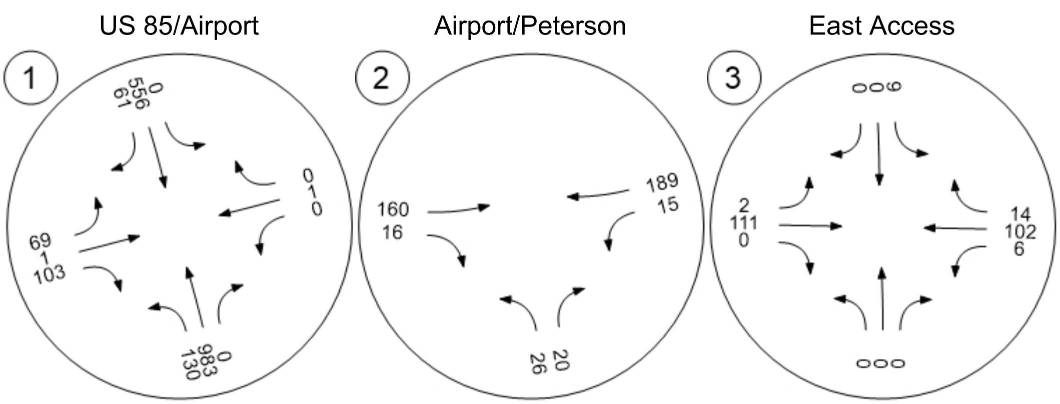
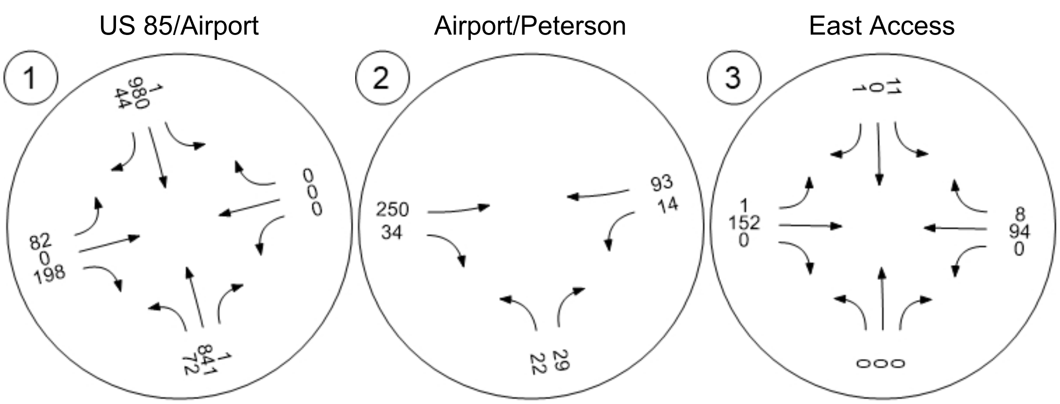
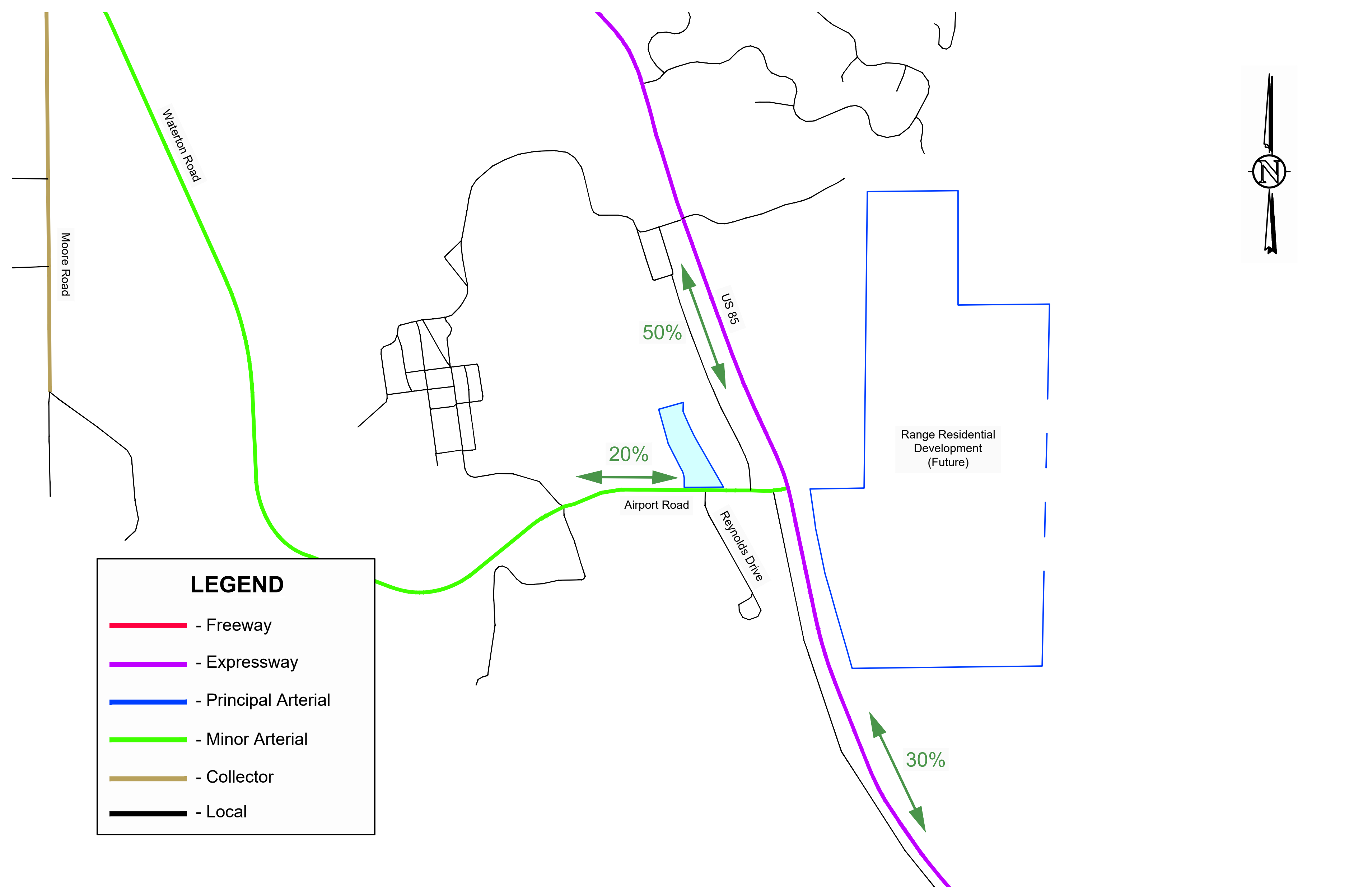


Figure 5 – Year 2023 Traffic Volumes – Evening Peak Hour

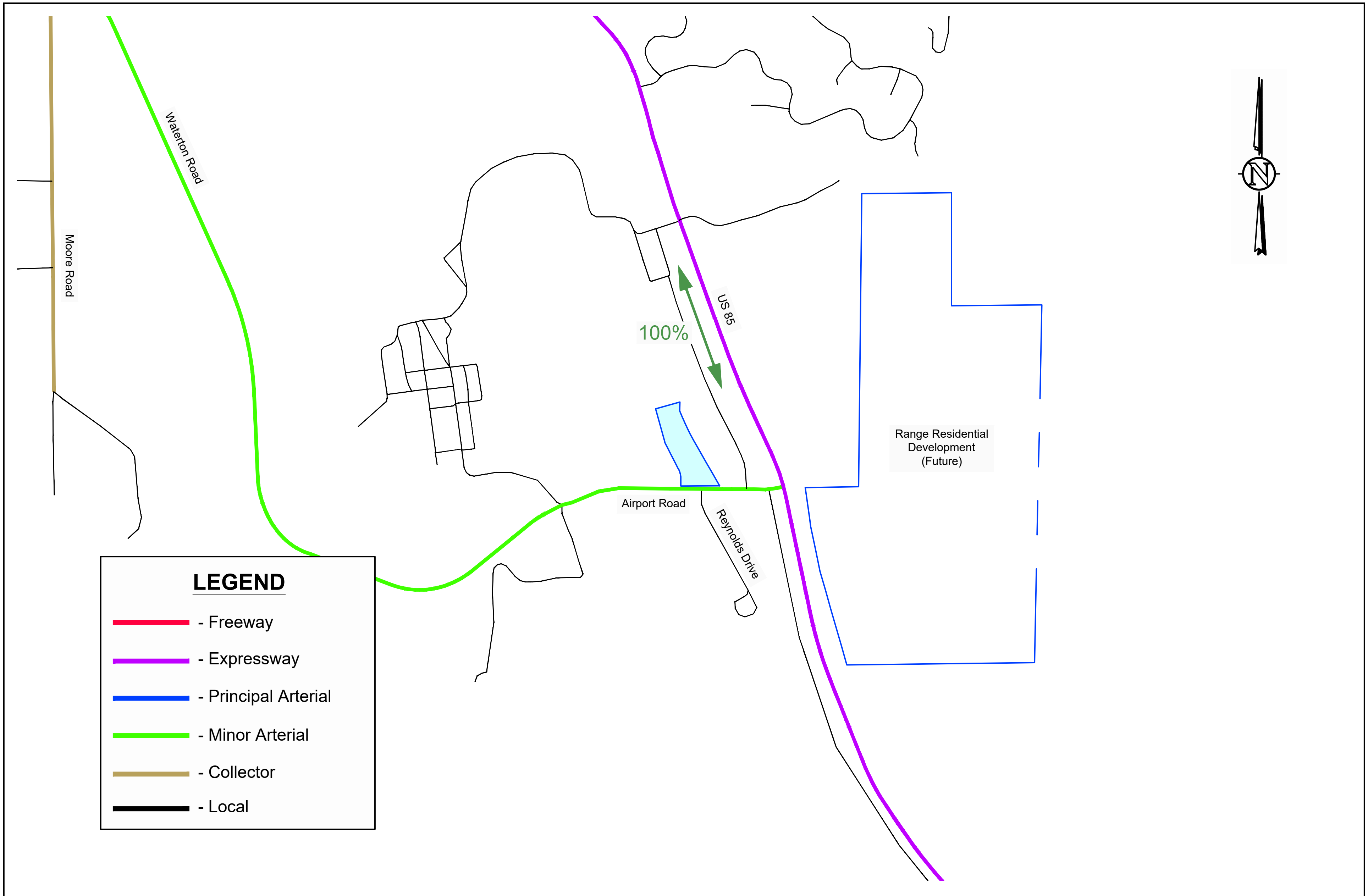




Brannan DougCO AMP TIS

TRIP DISTRIBUTION - ASPHALT DELIVERY

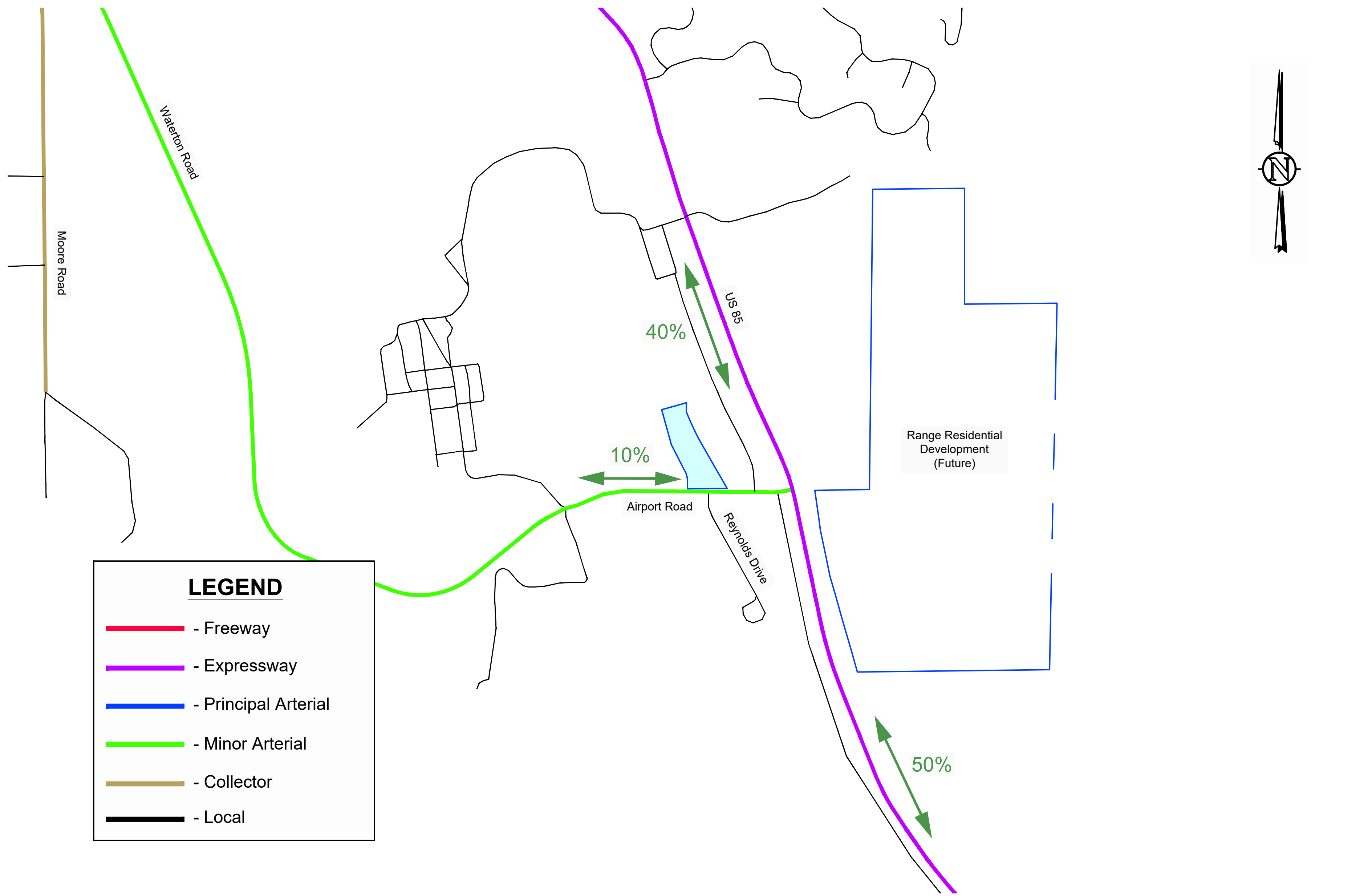
Scale	1" = 2,000'	Date	June 17, 2024	Drawn by	JLH	Job #	Brannan Sand & Gravel	Figure	6



Brannan DougCO AMP TIS

TRIP DISTRIBUTION - AGGREGATE, ASPHALT OIL, AND LIME DELIVERY

Scale	1" = 2,000'	Date	June 17, 2024	Drawn by	JLH	Job #	Brannan Sand & Gravel	Figure	7



Brannan DougCO AMP TIS

TRIP DISTRIBUTION - CRUSHING OPERATION

Scale	1" = 2,000'	Date	June 17, 2024	Drawn by	JLH	Job #	Brannan Sand & Gravel	Figure	8

Figure 9 – Inclusive Asphalt Trip Assignment – Morning Peak Hour

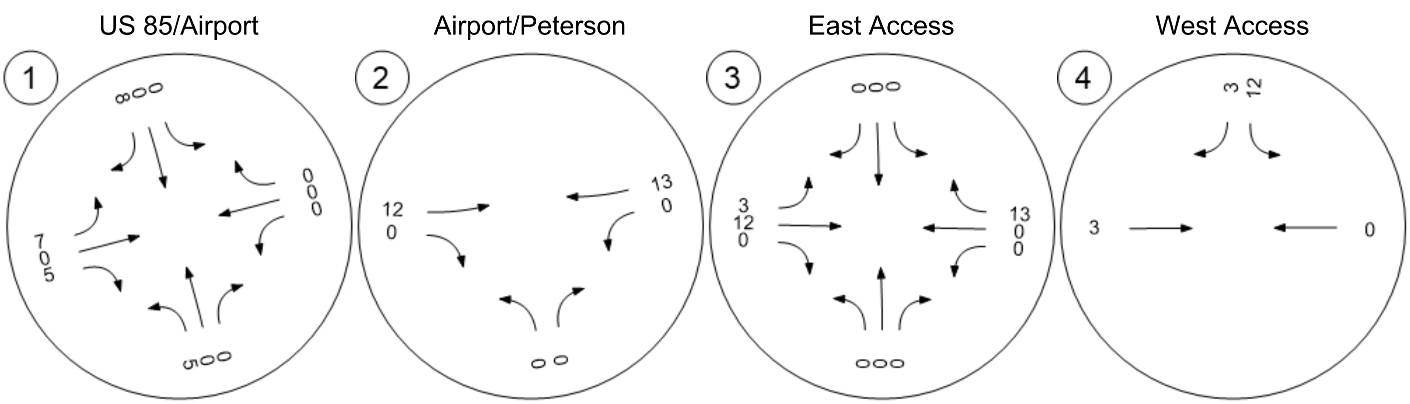


Figure 10 – Inclusive Asphalt Trip Assignment – Evening Peak Hour

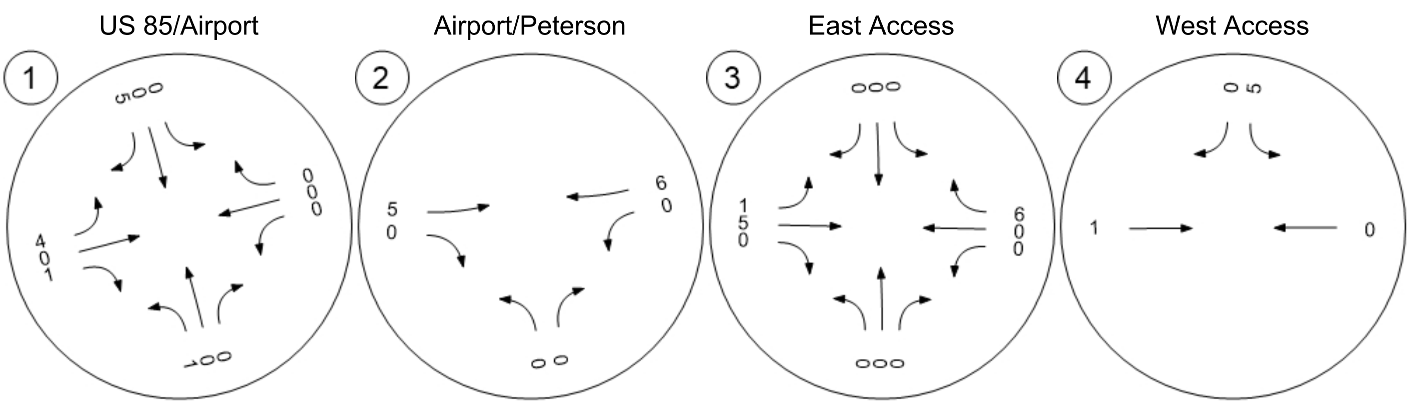


Figure 11 – Crushing Operation Trip Assignment – Morning Peak Hour

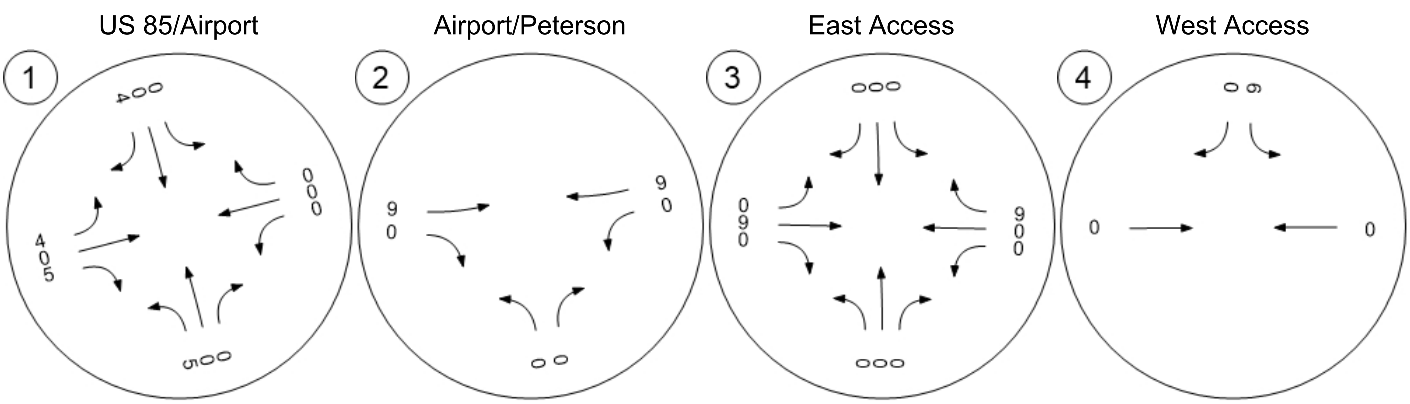


Figure 12 – Crushing Operation Trip Assignment – Evening Peak Hour

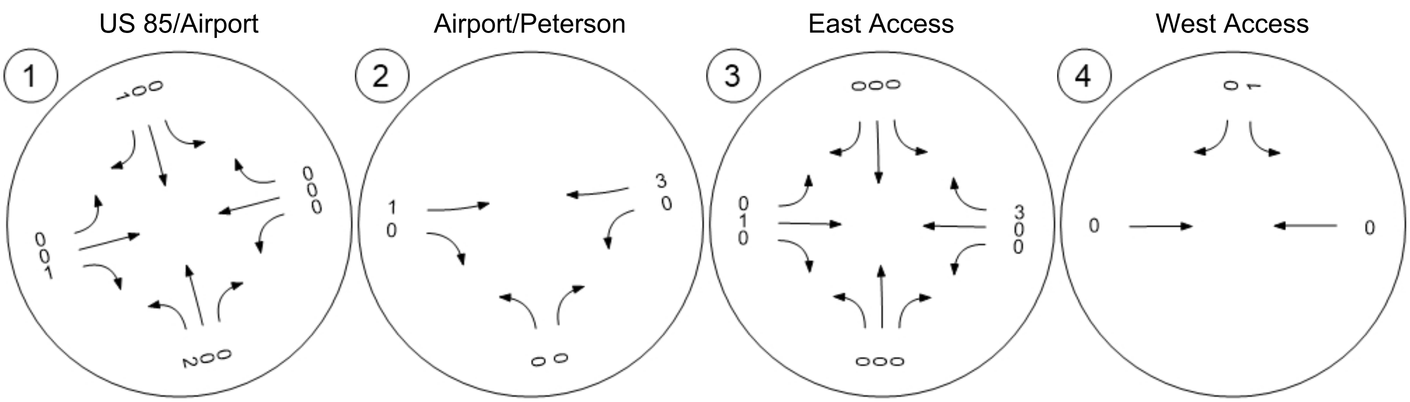


Figure 13 – Year 2024 Background Traffic Volumes – Morning Peak Hour

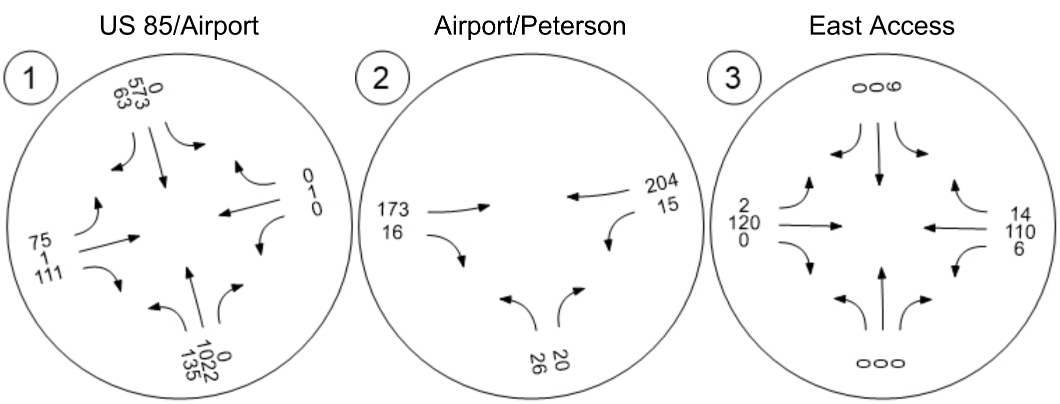


Figure 14 â€“ Year 2024 Background Traffic Volumes â€“ Evening Peak Hour

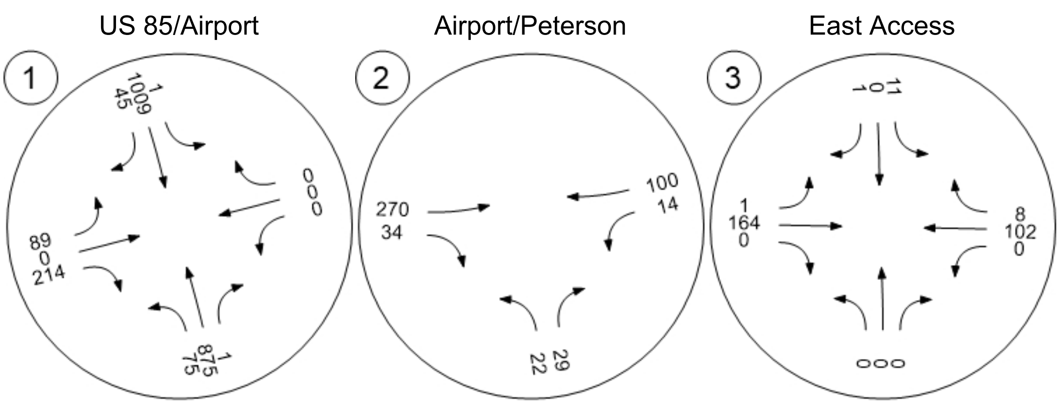


Figure 15 – Year 2024 Total Traffic Volumes – Morning Peak Hour

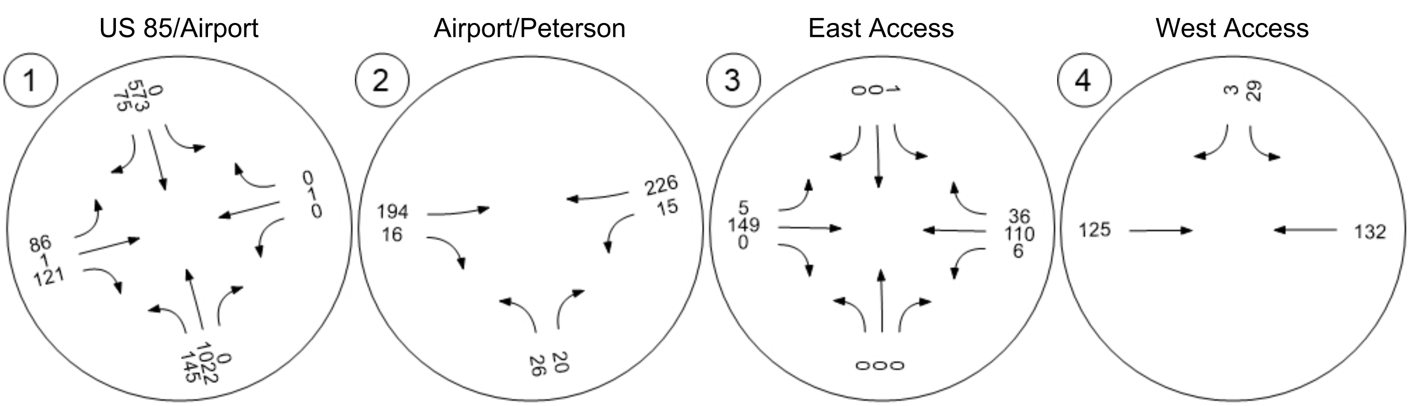


Figure 16 – Year 2024 Total Traffic Volumes – Evening Peak Hour

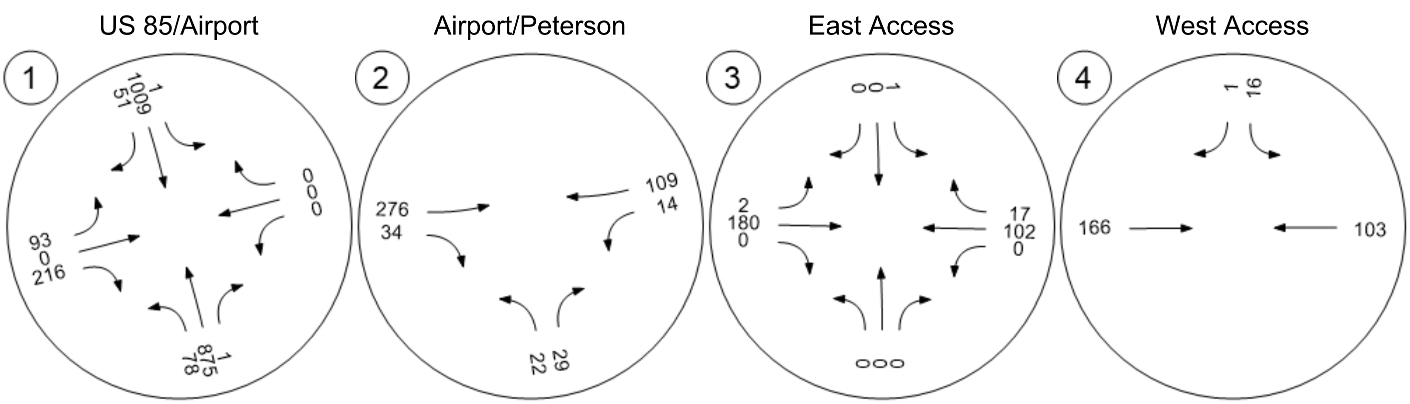


Figure 17 – Laneage and Traffic Control – Year 2024

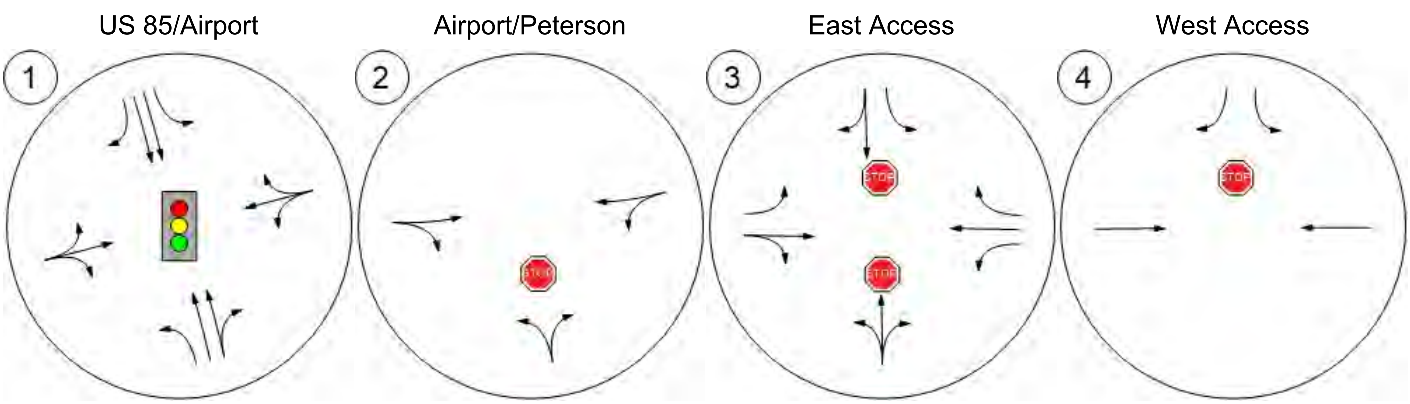


Figure 18 – Year 2040 Background Traffic Volumes – Morning Peak Hour

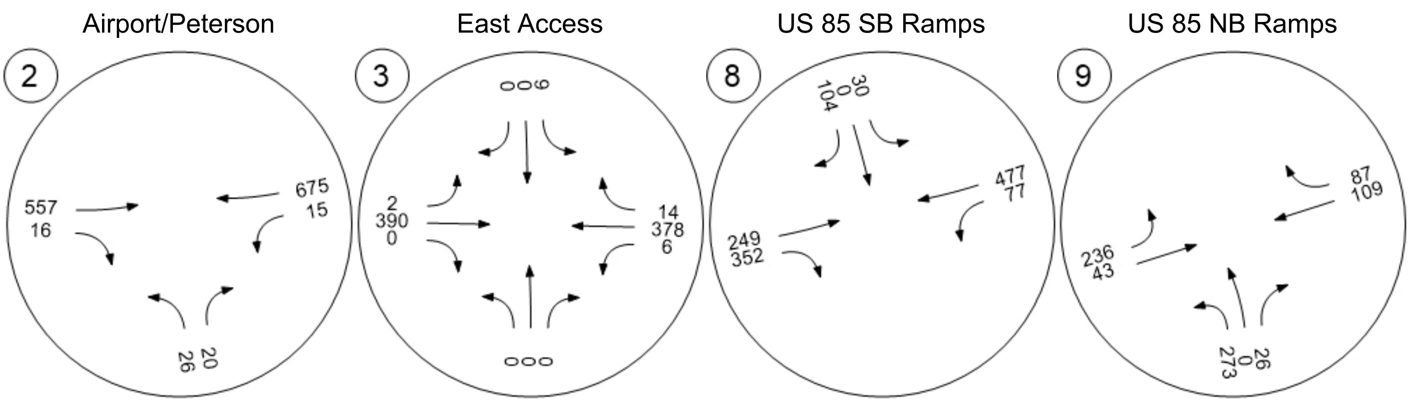


Figure 19 – Year 2040 Background Traffic Volumes – Evening Peak Hour

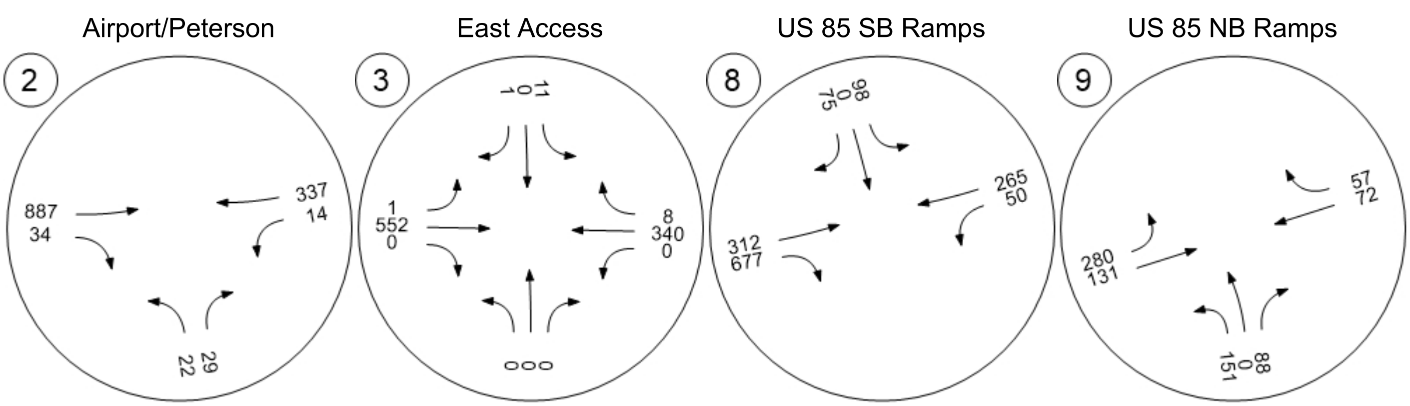


Figure 20 – Year 2040 Total Traffic Volumes – Morning Peak Hour

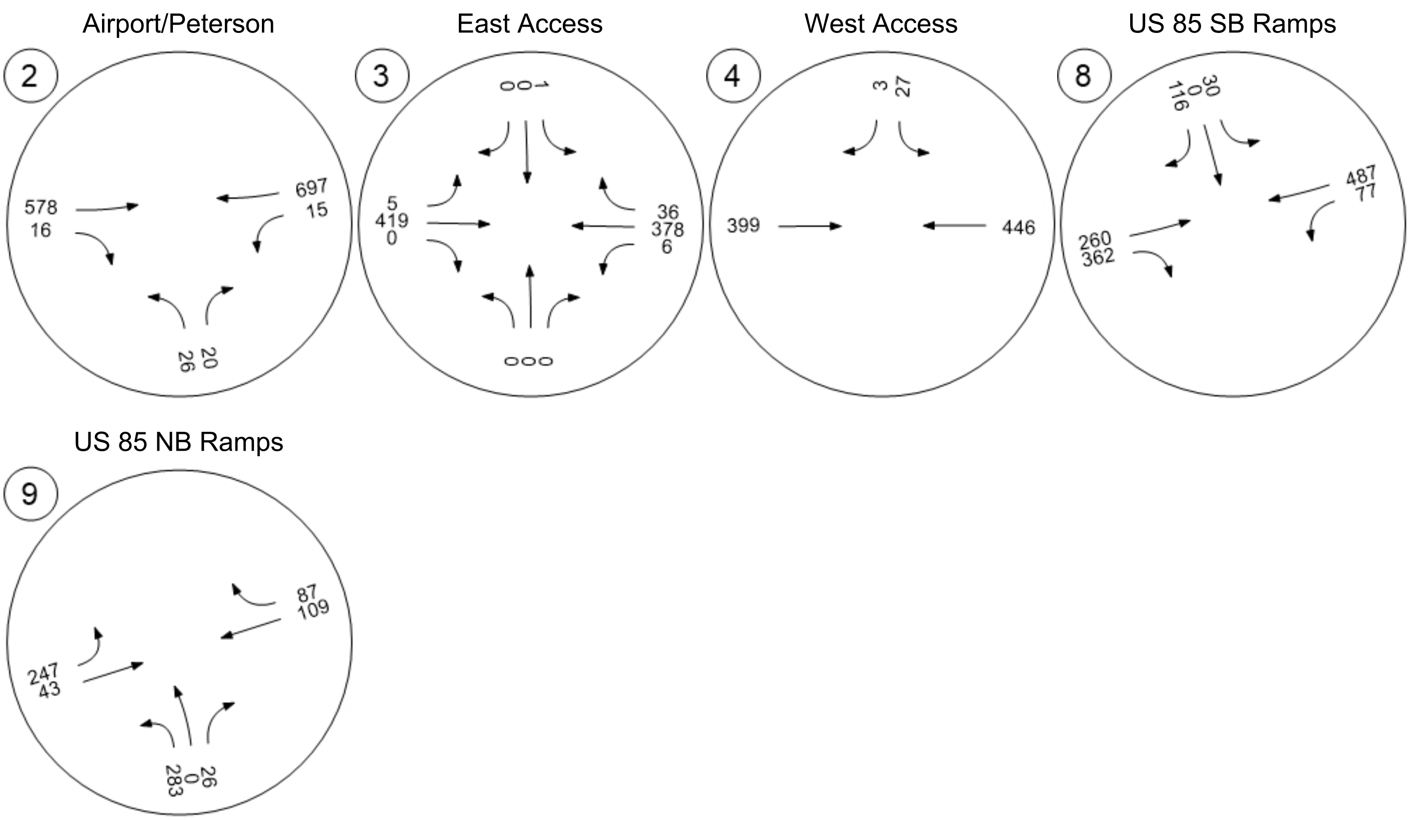


Figure 21 – Year 2040 Total Traffic Volumes – Evening Peak Hour

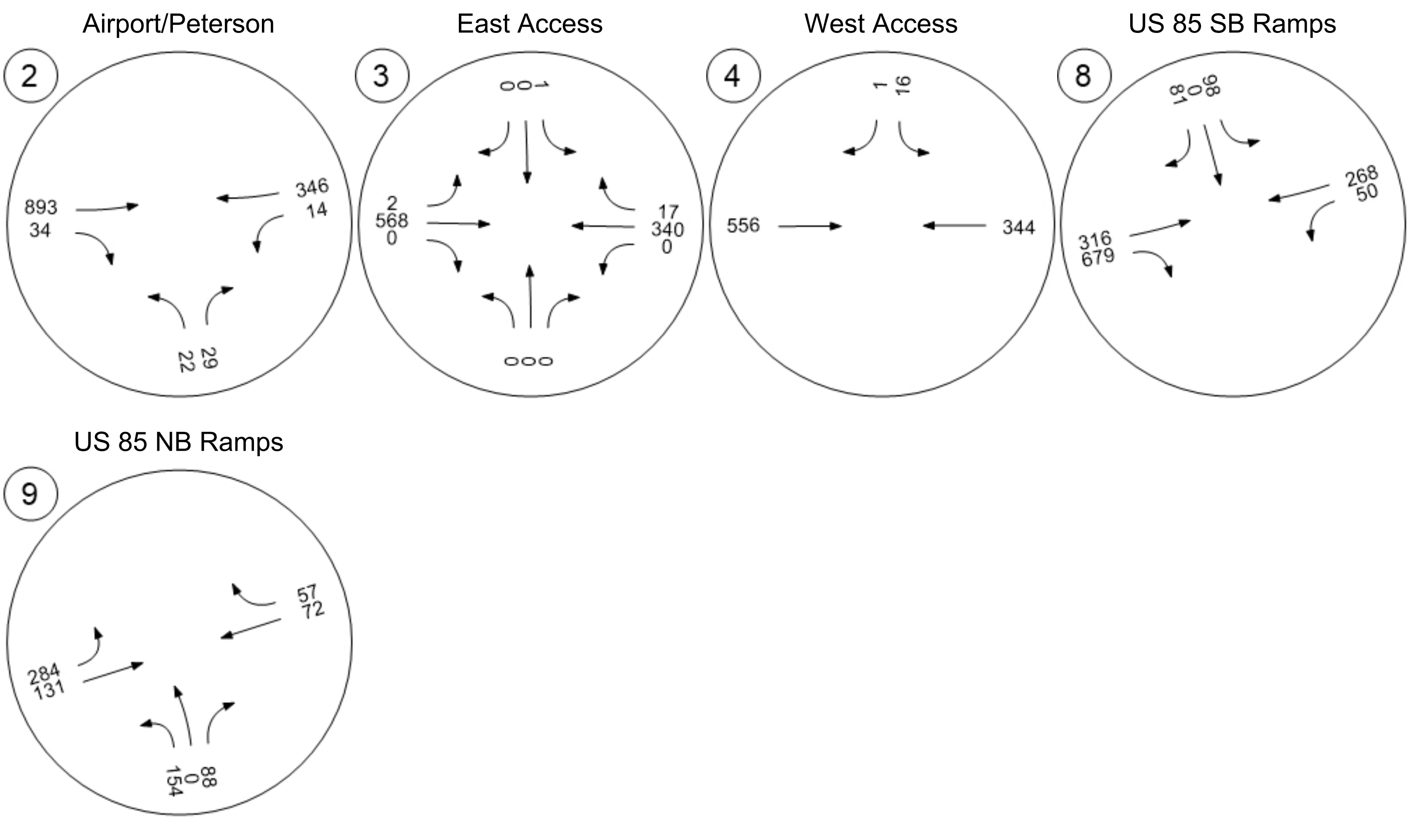
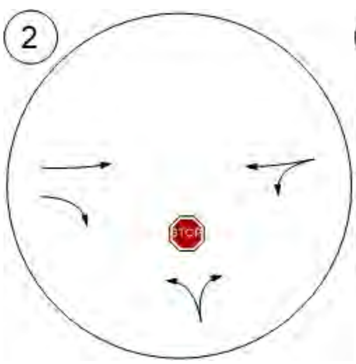
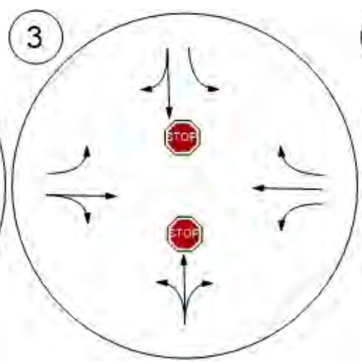


Figure 22 – Laneage and Traffic Control – Year 2040

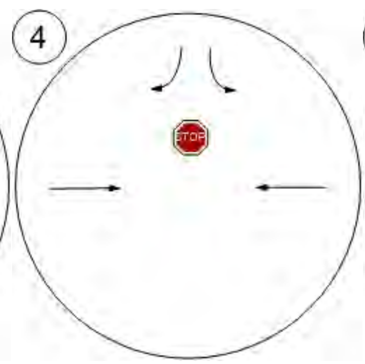
Airport/Peterson



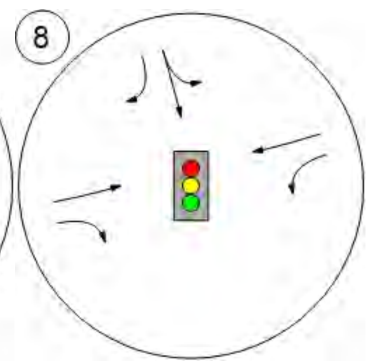
East Access



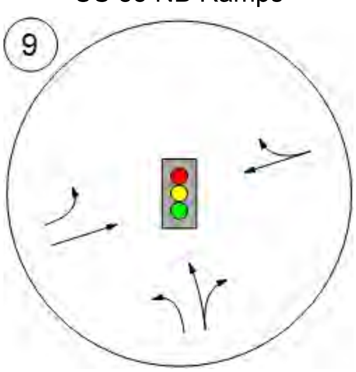
West Access



US 85 SB Ramps



US 85 NB Ramps



Appendix A

CDOT Straight Line Diagram

Route 085B From 193 to 194

Legend

Route

Milepoint

Structures

Major Structure

Minor Structure

Created:

Date: 1/3/2023

Time: 7:36:01 PM

0 0.08 0.16 0.24 0.32

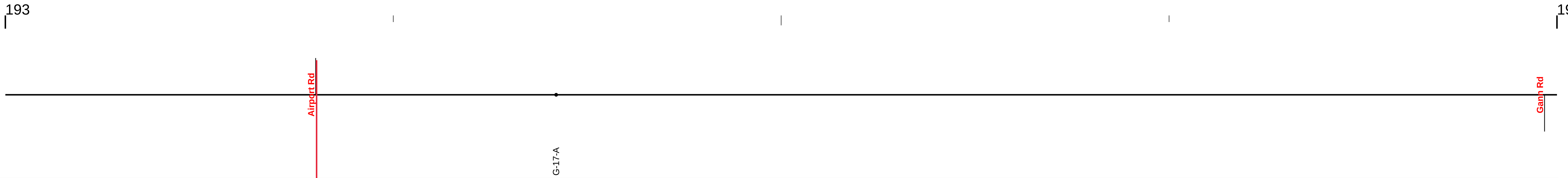
Miles

N
W E
S

The information contained in this map is based on the most currently available data and has been checked for accuracy. CDOT does not guarantee the accuracy of any information presented, is not liable in any respect for any errors or omissions, and is not responsible for determining "fitness for use".

Route 085B
From 193 To 194

- Ramps
- Overpass
- Underpass
- Structures



CLASSIFICATION

Access Control	R-A: Regional Highway

SAFETY

Primary Speed Limit	55

TRAFFIC

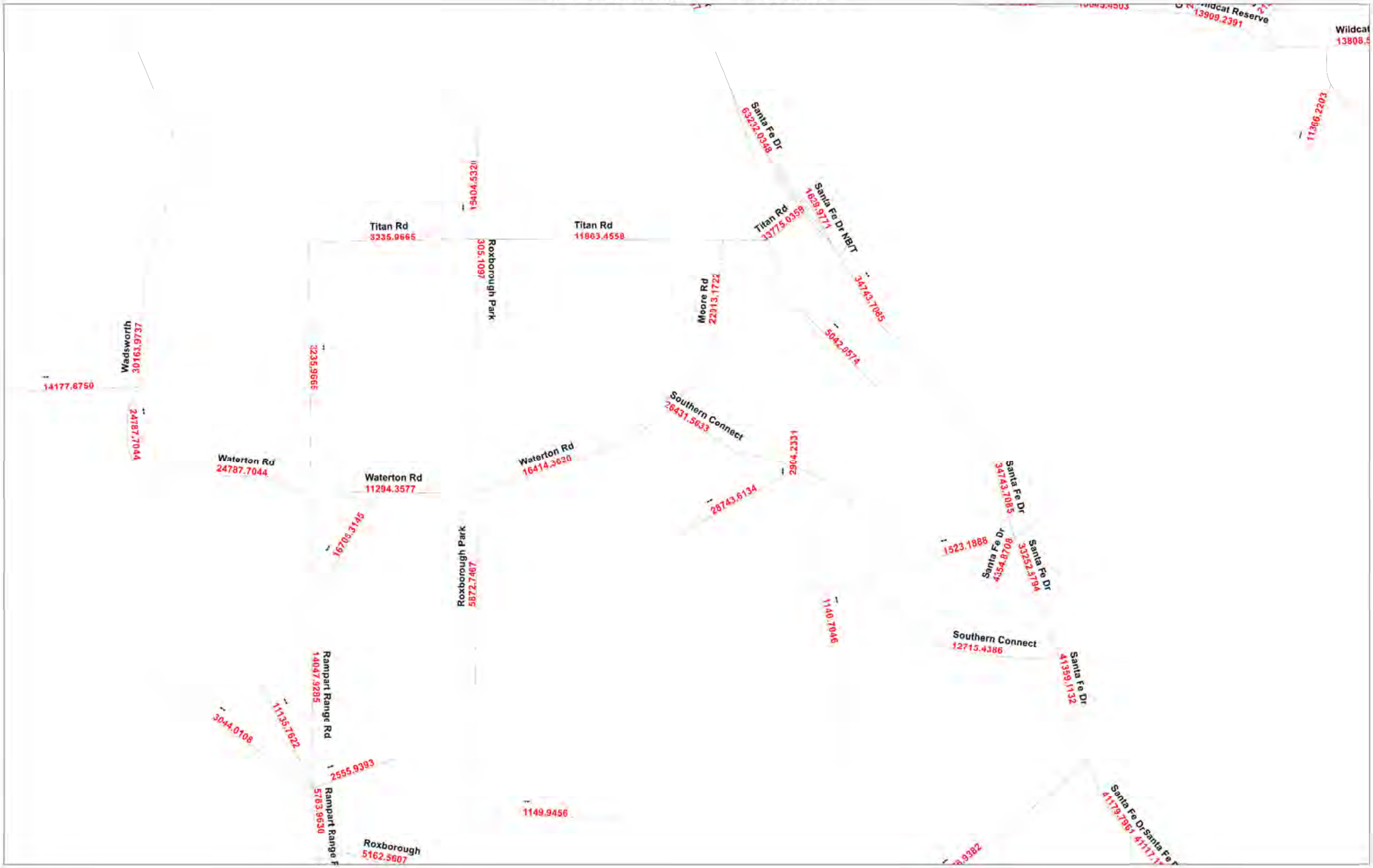
Design Hour Truck Percentage	0.10
Year 20 Factor	1.25

It may appear that information is missing from the straight line diagram. If so, reduce the number of miles/page and re-submit the request.

Appendix B

Year 2040 Traffic Volume Projections

Volumes - 2040



Owens Industrial Park Filing 1, 1st Amendment, Lot 1A and Metes & Bounds, 3rd Amendment
Project File: US2021-002

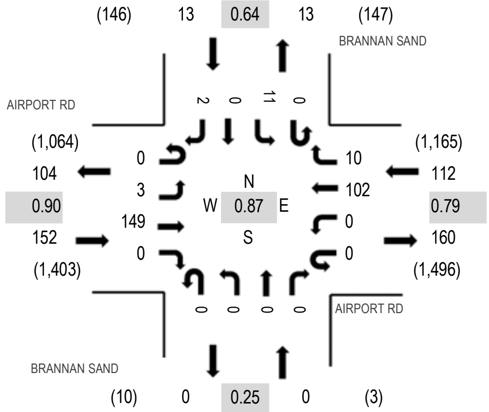
Appendix C

Traffic Count Data

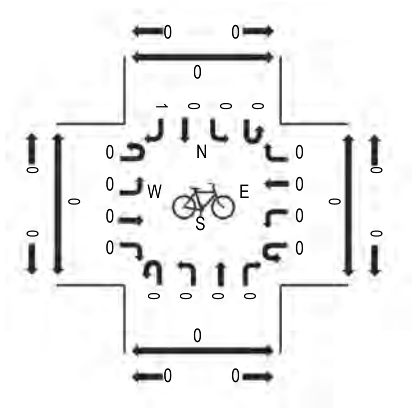
(303) 216-2439
www.alltrafficdata.net

Location: 1 BRANNAN SAND & AIRPORT RD AM
Date: Friday, June 9, 2023
Peak Hour: 12:45 PM - 01:45 PM
Peak 15-Minutes: 01:30 PM - 01:45 PM

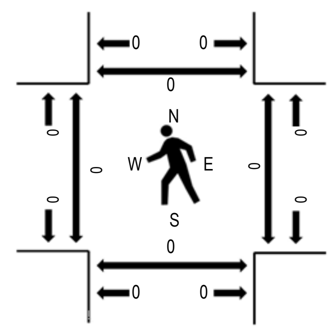
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

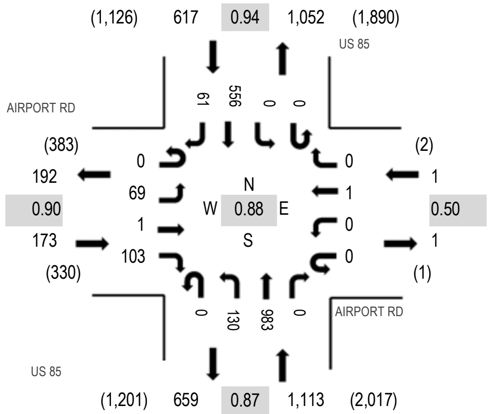
Interval Start Time	AIRPORT RD Eastbound U-Turn	Left	Thru	Right	AIRPORT RD Westbound U-Turn	Left	Thru	Right	BRANNAN SAND Northbound U-Turn	Left	Thru	Right	BRANNAN SAND Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrian Crossings West	East	South	North
6:00 AM	0	1	12	0	0	0	18	5	0	0	0	0	0	0	0	0	36	165	0	0	0	0
6:15 AM	0	0	9	0	0	0	20	5	0	0	0	0	0	1	0	0	35	167	0	0	0	0
6:30 AM	0	0	17	1	0	0	20	4	0	0	0	0	0	1	0	0	43	190	0	0	0	0
6:45 AM	0	0	14	0	0	0	31	3	0	0	0	0	0	3	0	0	51	189	0	0	0	0
7:00 AM	0	0	13	0	0	0	16	2	0	0	0	0	0	7	0	0	38	203	0	0	0	0
7:15 AM	0	0	21	0	0	0	27	5	0	0	0	0	0	5	0	0	58	226	0	0	0	0
7:30 AM	0	0	29	0	0	0	10	1	0	0	0	0	0	1	0	1	42	230	0	0	0	0
7:45 AM	0	0	27	0	0	0	30	4	0	0	0	0	0	2	0	2	65	240	0	0	0	0
8:00 AM	0	0	32	0	0	0	25	1	0	0	0	0	0	1	0	2	61	246	0	0	0	0
8:15 AM	0	0	33	0	0	0	23	3	0	0	0	0	0	3	0	0	62	244	0	0	0	0
8:30 AM	0	0	17	0	0	3	28	3	0	0	0	0	0	1	0	0	52	224	0	0	0	0
8:45 AM	0	2	29	0	0	0	36	4	0	0	0	0	0	0	0	0	71	217	0	0	0	0
9:00 AM	0	0	32	0	0	3	15	4	0	0	0	0	0	5	0	0	59	187	0	0	0	0
9:15 AM	3	0	27	0	0	0	8	0	0	0	0	0	0	4	0	0	42	168	0	0	0	0
9:30 AM	0	2	26	0	0	0	14	1	0	0	0	0	0	1	0	1	45	175	0	0	0	0
9:45 AM	0	1	21	0	0	0	11	3	0	0	0	0	0	1	0	4	41	185	0	0	0	0
10:00 AM	0	1	27	0	0	0	9	0	0	0	0	0	0	2	0	1	40	198	0	0	0	0
10:15 AM	0	2	19	0	0	0	17	7	0	0	0	0	0	4	0	0	49	211	0	0	0	0
10:30 AM	0	0	32	0	0	0	18	1	0	0	0	0	0	3	0	1	55	203	0	0	0	0
10:45 AM	0	1	26	0	0	0	21	2	0	0	0	0	0	4	0	0	54	217	0	0	0	0
11:00 AM	0	0	25	0	0	0	24	1	0	0	0	0	0	3	0	0	53	220	0	0	0	0
11:15 AM	0	1	18	0	0	0	19	2	0	0	0	0	0	0	0	1	41	238	0	0	0	0
11:30 AM	0	1	41	0	0	0	17	6	0	0	0	0	0	3	0	1	69	272	0	0	0	0
11:45 AM	0	0	30	0	0	0	23	0	0	0	0	0	0	4	0	0	57	256	0	0	0	0
12:00 PM	0	0	35	0	0	0	23	6	0	0	3	0	0	4	0	0	71	274	0	0	0	0
12:15 PM	0	2	36	0	0	0	27	5	0	0	0	0	0	5	0	0	75	261	0	0	0	0
12:30 PM	0	1	27	0	0	0	21	0	0	0	0	0	0	3	0	1	53	250	0	0	0	0
12:45 PM	0	0	43	0	0	0	27	2	0	0	0	0	0	3	0	0	75	277	0	0	0	0
1:00 PM	0	0	25	0	0	0	25	5	0	0	0	0	0	2	0	1	58	259	0	0	0	0
1:15 PM	0	1	33	0	0	0	25	2	0	0	0	0	0	3	0	0	64	262	0	0	0	0
1:30 PM	0	2	48	0	0	0	25	1	0	0	0	0	0	3	0	1	80	258	0	0	0	0
1:45 PM	0	0	34	0	0	0	16	3	0	0	0	0	0	3	0	1	57	237	0	0	0	0
2:00 PM	0	4	30	0	0	0	20	1	0	0	0	0	0	6	0	0	61	244	0	0	0	0
2:15 PM	0	0	36	0	0	0	21	0	0	0	0	0	0	2	0	1	60	254	0	0	0	0

2:30 PM	0	1	30	0	0	0	25	3	0	0	0	0	0	0	0	0	59	261	0	0	0	0
2:45 PM	0	1	39	0	0	0	19	2	0	0	0	0	0	3	0	0	64	261	0	0	0	0
3:00 PM	0	1	40	0	0	3	24	0	0	0	0	0	0	3	0	0	71	268	0	0	0	0
3:15 PM	0	0	43	0	0	0	22	1	0	0	0	0	0	1	0	0	67	248	0	0	0	0
3:30 PM	0	0	26	0	0	0	29	2	0	0	0	0	0	2	0	0	59	251	0	0	0	0
3:45 PM	0	0	33	0	0	0	31	5	0	0	0	0	0	2	0	0	71	266	0	0	0	0
4:00 PM	0	1	22	0	0	0	23	2	0	0	0	0	0	2	0	1	51	253	0	0	0	0
4:15 PM	0	1	33	0	0	0	29	4	0	0	0	0	0	3	0	0	70	267	0	0	0	0
4:30 PM	0	0	40	0	0	0	26	1	0	0	0	0	0	6	0	1	74	243	0	0	0	0
4:45 PM	0	0	41	0	0	0	14	2	0	0	0	0	0	1	0	0	58	214	0	0	0	0
5:00 PM	0	0	38	0	0	0	25	1	0	0	0	0	0	1	0	0	65	200	0	0	0	0
5:15 PM	0	0	25	0	0	0	17	0	0	0	0	0	0	4	0	0	46		0	0	0	0
5:30 PM	0	1	22	0	0	0	20	1	0	0	0	0	0	1	0	0	45		0	0	0	0
5:45 PM	0	0	15	0	0	0	26	0	0	0	0	0	0	3	0	0	44		0	0	0	0
Count Total	3	28	1,371	1	0	9	1,040	116	0	0	3	0	0	125	0	21	2,717		0	0	0	0
Peak Hour	0	3	149	0	0	0	102	10	0	0	0	0	0	11	0	2	277		0	0	0	0

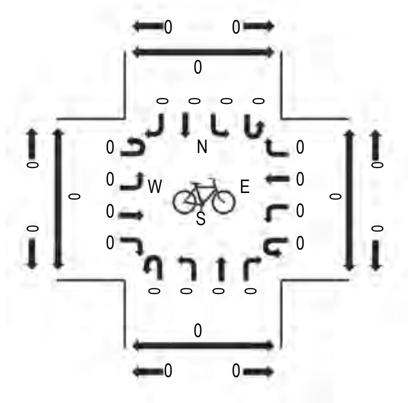
(303) 216-2439
www.alltrafficdata.net

Location: 1 US 85 & AIRPORT RD AM
Date: Thursday, May 18, 2023
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

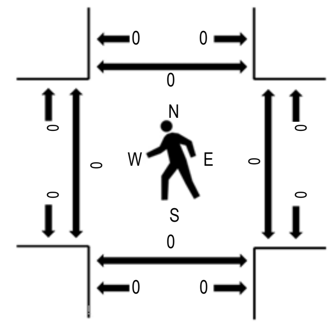
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

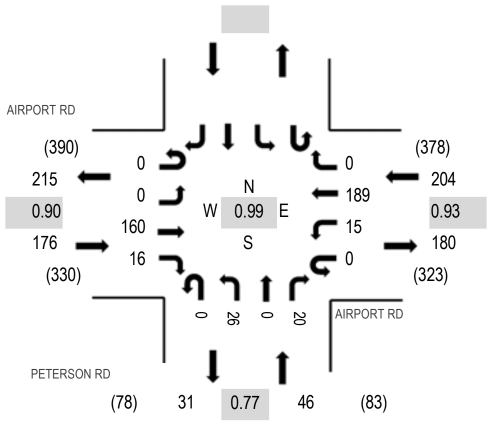
Traffic Counts - Motorized Vehicles

Interval Start Time	AIRPORT RD Eastbound U-Turn	Left	Thru	Right	AIRPORT RD Westbound U-Turn	Left	Thru	Right	US 85 Northbound U-Turn	Left	Thru	Right	US 85 Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrian Crossings West	East	South	North
7:00 AM	0	11	0	27	0	0	0	0	0	39	207	0	0	0	90	19	393	1,834	0	0	0	0
7:15 AM	0	24	0	19	0	0	0	1	0	36	229	0	0	0	101	14	424	1,894	0	0	0	0
7:30 AM	0	15	0	32	0	0	0	0	0	39	247	0	0	0	134	11	478	1,904	0	0	0	0
7:45 AM	0	18	1	30	0	0	0	0	0	34	289	0	0	0	149	18	539	1,851	0	0	0	0
8:00 AM	0	14	0	18	0	0	1	0	0	33	219	0	0	0	146	22	453	1,641	0	0	0	0
8:15 AM	0	22	0	23	0	0	0	0	0	24	228	0	0	0	127	10	434		0	0	0	0
8:30 AM	0	9	0	32	0	0	0	0	0	24	189	0	0	0	154	17	425		0	0	0	0
8:45 AM	0	12	0	23	0	0	0	0	0	24	156	0	0	0	96	18	329		0	0	0	0
Count Total	0	125	1	204	0	0	1	1	0	253	1,764	0	0	0	997	129	3,475		0	0	0	0
Peak Hour	0	69	1	103	0	0	1	0	0	130	983	0	0	0	556	61	1,904		0	0	0	0

(303) 216-2439
www.alltrafficdata.net

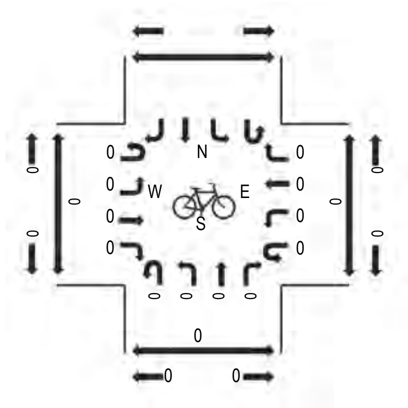
Location: 2 PETERSON RD & AIRPORT RD AM
Date: Thursday, May 18, 2023
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:00 AM - 07:15 AM

Peak Hour - Motorized Vehicles

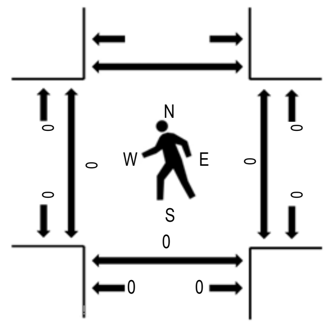


Note: Total study counts contained in parentheses.

Peak Hour - Bicycles



Peak Hour - Pedestrians



Traffic Counts - Motorized Vehicles

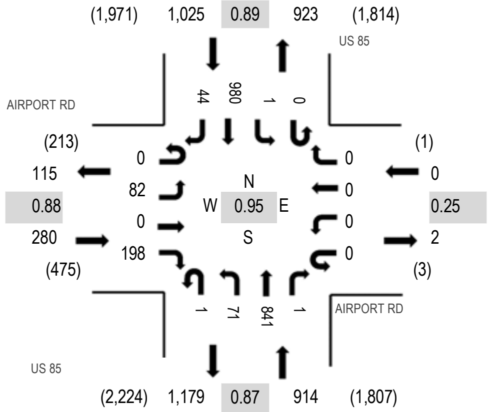
Interval Start Time	AIRPORT RD Eastbound U-Turn	Left	Thru	Right	AIRPORT RD Westbound U-Turn	Left	Thru	Right	PETERSON RD Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrian Crossings West	East	South	North
7:00 AM	0	0	34	4	0	6	49	0	0	12	0	3					108	426	0	0	0	
7:15 AM	0	0	38	4	0	5	44	0	0	7	0	7					105	415	0	0	0	
7:30 AM	0	0	42	5	0	2	47	0	0	3	0	6					105	398	0	0	0	
7:45 AM	0	0	46	3	0	2	49	0	0	4	0	4					108	384	0	0	0	
8:00 AM	0	0	27	2	0	8	47	0	0	9	0	4					97	365	0	0	0	
8:15 AM	0	0	39	7	0	3	31	0	0	5	0	3					88		0	0	0	
8:30 AM	0	0	38	3	0	8	36	0	0	3	0	3					91		0	0	0	
8:45 AM	0	0	26	12	1	4	36	0	0	8	0	2					89		0	0	0	
Count Total	0	0	290	40	1	38	339	0	0	51	0	32					791		0	0	0	
Peak Hour	0	0	160	16	0	15	189	0	0	26	0	20					426		0	0	0	

ALL TRAFFIC DATA SERVICES

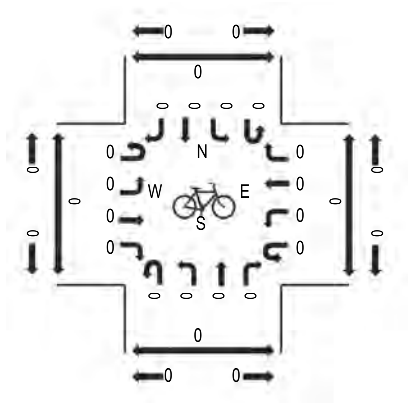
(303) 216-2439
www.alltrafficdata.net

Location: 1 US 85 & AIRPORT RD PM
Date: Thursday, May 18, 2023
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

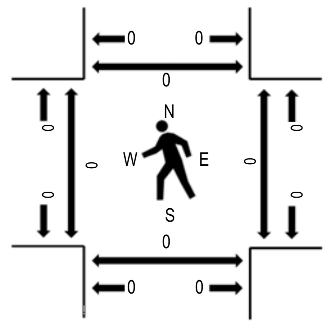
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

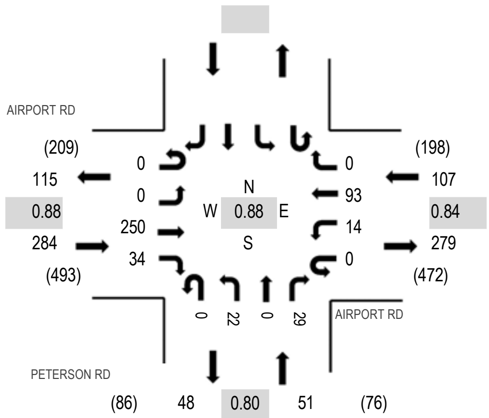
Traffic Counts - Motorized Vehicles

Interval Start Time	AIRPORT RD Eastbound U-Turn	Left	Thru	Right	AIRPORT RD Westbound U-Turn	Left	Thru	Right	US 85 Northbound U-Turn	Left	Thru	Right	US 85 Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrian Crossings West	East	South	North
4:00 PM	0	18	0	42	0	0	0	0	0	18	186	0	0	1	270	18	553	2,219	0	0	0	0
4:15 PM	0	21	0	61	0	0	0	0	0	17	220	0	0	0	249	13	581	2,205	0	0	0	0
4:30 PM	0	22	0	46	0	0	0	0	0	19	249	1	0	0	224	7	568	2,181	0	0	0	0
4:45 PM	0	21	0	49	0	0	0	0	1	17	186	0	0	0	237	6	517	2,110	0	0	0	0
5:00 PM	0	27	0	43	0	0	0	0	0	15	206	0	0	1	239	8	539	2,035	0	0	0	0
5:15 PM	0	17	0	47	0	0	0	0	0	21	208	0	0	0	254	10	557		0	0	0	0
5:30 PM	0	13	0	18	0	0	1	0	0	18	198	0	0	0	242	7	497		0	0	0	0
5:45 PM	0	7	0	23	0	0	0	0	0	14	213	0	2	0	179	4	442		0	0	0	0
Count Total	0	146	0	329	0	0	1	0	1	139	1,666	1	2	2	1,894	73	4,254		0	0	0	0
Peak Hour	0	82	0	198	0	0	0	0	1	71	841	1	0	1	980	44	2,219		0	0	0	0

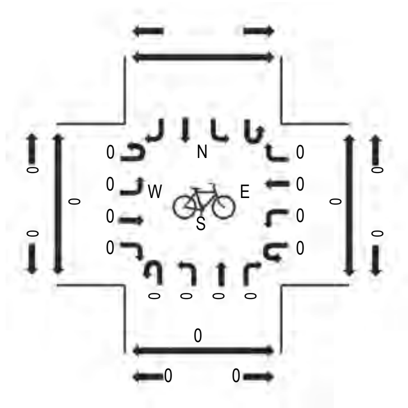
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 2 PETERSON RD & AIRPORT RD PM
Date: Thursday, May 18, 2023
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:15 PM - 04:30 PM

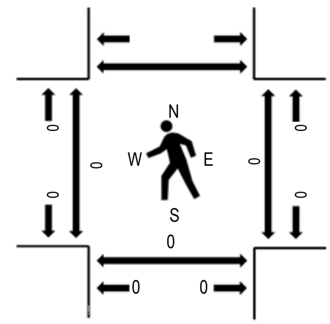
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	AIRPORT RD Eastbound U-Turn	Left	Thru	Right	AIRPORT RD Westbound U-Turn	Left	Thru	Right	PETERSON RD Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrian Crossings West	East	South	North
4:00 PM	0	0	55	10	0	5	27	0	0	11	0	5					113	442	0	0	0	
4:15 PM	0	0	73	9	0	4	27	0	0	3	0	9					125	430	0	0	0	
4:30 PM	0	0	58	7	0	1	19	0	0	5	0	11					101	405	0	0	0	
4:45 PM	0	0	64	8	0	4	20	0	0	3	0	4					103	376	0	0	0	
5:00 PM	0	0	62	8	0	0	16	0	1	6	0	8					101	325	0	0	0	
5:15 PM	0	0	62	8	0	1	26	0	0	3	0	0					100		0	0	0	
5:30 PM	0	0	29	9	0	6	25	0	0	1	0	2					72		0	0	0	
5:45 PM	1	0	28	2	0	3	14	0	0	2	0	2					52		0	0	0	
Count Total	1	0	431	61	0	24	174	0	1	34	0	41					767		0	0	0	
Peak Hour	0	0	250	34	0	14	93	0	0	22	0	29					442		0	0	0	

All Traffic Data Services

4. US 85 N.O. AIRPORT RD

NB	Time	Lights	Mediums	Trucks	Total
	5/18/2023	6	0	0	6
	5/18/2023 12:15:00 AM	4	0	0	4
	5/18/2023 12:30:00 AM	1	0	0	1
	5/18/2023 12:45:00 AM	2	0	0	2
	Hour	13	0	0	13
	5/18/2023 1:00:00 AM	1	0	0	1
	5/18/2023 1:15:00 AM	2	0	1	3
	5/18/2023 1:30:00 AM	1	0	0	1
	5/18/2023 1:45:00 AM	0	0	0	0
	Hour	4	0	1	5
	5/18/2023 2:00:00 AM	0	1	0	1
	5/18/2023 2:15:00 AM	1	0	1	2
	5/18/2023 2:30:00 AM	3	0	0	3
	5/18/2023 2:45:00 AM	3	0	0	3
	Hour	7	1	1	9
	5/18/2023 3:00:00 AM	3	0	0	3
	5/18/2023 3:15:00 AM	1	0	0	1
	5/18/2023 3:30:00 AM	3	1	0	4
	5/18/2023 3:45:00 AM	6	1	0	7
	Hour	13	2	0	15
	5/18/2023 4:00:00 AM	5	0	0	5
	5/18/2023 4:15:00 AM	7	0	0	7
	5/18/2023 4:30:00 AM	16	0	2	18
	5/18/2023 4:45:00 AM	24	0	0	24
	Hour	52	0	2	54
	5/18/2023 5:00:00 AM	31	0	1	32
	5/18/2023 5:15:00 AM	38	0	1	39
	5/18/2023 5:30:00 AM	66	0	1	67
	5/18/2023 5:45:00 AM	83	1	1	85
	Hour	218	1	4	223
	5/18/2023 6:00:00 AM	96	3	0	99
	5/18/2023 6:15:00 AM	134	3	2	139
	5/18/2023 6:30:00 AM	157	2	4	163
	5/18/2023 6:45:00 AM	197	6	2	205
	Hour	584	14	8	606
	5/18/2023 7:00:00 AM	211	3	4	218
	5/18/2023 7:15:00 AM	244	8	2	254
	5/18/2023 7:30:00 AM	253	4	5	262
	5/18/2023 7:45:00 AM	296	8	3	307
	Hour	1004	23	14	1041
	5/18/2023 8:00:00 AM	221	10	2	233
	5/18/2023 8:15:00 AM	236	9	5	250
	5/18/2023 8:30:00 AM	178	17	3	198
	5/18/2023 8:45:00 AM	152	13	3	168
	Hour	787	49	13	849
	5/18/2023 9:00:00 AM	101	12	7	120
	5/18/2023 9:15:00 AM	120	12	6	138
	5/18/2023 9:30:00 AM	128	8	3	139
	5/18/2023 9:45:00 AM	85	8	4	97
	Hour	434	40	20	494
	5/18/2023 10:00:00 AM	86	5	5	96
	5/18/2023 10:15:00 AM	94	11	7	112
	5/18/2023 10:30:00 AM	100	11	5	116
	5/18/2023 10:45:00 AM	108	12	6	126
	Hour	388	39	23	450
	5/18/2023 11:00:00 AM	101	15	4	120
	5/18/2023 11:15:00 AM	122	6	1	129
	5/18/2023 11:30:00 AM	79	10	4	93
	5/18/2023 11:45:00 AM	109	9	4	122
	Hour	411	40	13	464
	Grand Total	3,915	209	99	4,223
	Percentage	92.7%	4.9%	2.3%	

4. US 85 N.O. AIRPORT RD

NB	Time	Lights	Mediums	Trucks	Total
	5/18/2023 12:00:00 PM	108	6	5	119
	5/18/2023 12:15:00 PM	90	9	5	104
	5/18/2023 12:30:00 PM	87	10	3	100
	5/18/2023 12:45:00 PM	115	11	5	131
	Hour	400	36	18	454
	5/18/2023 1:00:00 PM	107	7	3	117
	5/18/2023 1:15:00 PM	102	11	5	118
	5/18/2023 1:30:00 PM	116	12	4	132
	5/18/2023 1:45:00 PM	115	6	4	125
	Hour	440	36	16	492
	5/18/2023 2:00:00 PM	109	10	8	127
	5/18/2023 2:15:00 PM	116	18	1	135
	5/18/2023 2:30:00 PM	137	11	3	151
	5/18/2023 2:45:00 PM	146	8	4	158
	Hour	508	47	16	571
	5/18/2023 3:00:00 PM	156	4	8	168
	5/18/2023 3:15:00 PM	160	10	6	176
	5/18/2023 3:30:00 PM	158	14	4	176
	5/18/2023 3:45:00 PM	180	14	1	195
	Hour	654	42	19	715
	5/18/2023 4:00:00 PM	194	5	5	204
	5/18/2023 4:15:00 PM	229	8	7	244
	5/18/2023 4:30:00 PM	253	12	6	271
	5/18/2023 4:45:00 PM	200	6	4	210
	Hour	876	31	22	929
	5/18/2023 5:00:00 PM	225	6	8	239
	5/18/2023 5:15:00 PM	212	8	6	226
	5/18/2023 5:30:00 PM	201	6	4	211
	5/18/2023 5:45:00 PM	212	6	2	220
	Hour	850	26	20	896
	5/18/2023 6:00:00 PM	129	9	2	140
	5/18/2023 6:15:00 PM	107	5	1	113
	5/18/2023 6:30:00 PM	101	2	1	104
	5/18/2023 6:45:00 PM	77	3	0	80
	Hour	414	19	4	437
	5/18/2023 7:00:00 PM	61	1	0	62
	5/18/2023 7:15:00 PM	54	5	0	59
	5/18/2023 7:30:00 PM	45	3	1	49
	5/18/2023 7:45:00 PM	59	1	1	61
	Hour	219	10	2	231
	5/18/2023 8:00:00 PM	40	0	1	41
	5/18/2023 8:15:00 PM	58	0	1	59
	5/18/2023 8:30:00 PM	27	0	0	27
	5/18/2023 8:45:00 PM	41	2	1	44
	Hour	166	2	3	171
	5/18/2023 9:00:00 PM	20	1	1	22
	5/18/2023 9:15:00 PM	37	0	1	38
	5/18/2023 9:30:00 PM	34	0	0	34
	5/18/2023 9:45:00 PM	19	2	0	21
	Hour	110	3	2	115
	5/18/2023 10:00:00 PM	13	0	1	14
	5/18/2023 10:15:00 PM	7	0	0	7
	5/18/2023 10:30:00 PM	5	0	0	5
	5/18/2023 10:45:00 PM	9	0	0	9
	Hour	34	0	1	35
	5/18/2023 11:00:00 PM	15	0	1	16
	5/18/2023 11:15:00 PM	5	1	0	6
	5/18/2023 11:30:00 PM	4	0	0	4
	5/18/2023 11:45:00 PM	4	0	0	4
	Hour	28	1	1	30
	Grand Total	4,699	253	124	5,076
	Percentage	92.6%	5.0%	2.4%	
	Total	8,614	462	223	9,299
	Percentage	92.6%	5.0%	2.4%	

All Traffic Data Services

4. US 85 N.O. AIRPORT RD

SB	Time	Lights	Mediums	Trucks	Total
	5/18/2023	7	0	0	7
	5/18/2023 12:15:00 AM	1	0	0	1
	5/18/2023 12:30:00 AM	4	0	1	5
	5/18/2023 12:45:00 AM	5	0	0	5
	Hour	17	0	1	18
	5/18/2023 1:00:00 AM	3	0	0	3
	5/18/2023 1:15:00 AM	3	0	0	3
	5/18/2023 1:30:00 AM	2	0	1	3
	5/18/2023 1:45:00 AM	4	0	1	5
	Hour	12	0	2	14
	5/18/2023 2:00:00 AM	1	0	0	1
	5/18/2023 2:15:00 AM	1	0	0	1
	5/18/2023 2:30:00 AM	1	0	1	2
	5/18/2023 2:45:00 AM	0	0	0	0
	Hour	3	0	1	4
	5/18/2023 3:00:00 AM	1	0	0	1
	5/18/2023 3:15:00 AM	1	0	0	1
	5/18/2023 3:30:00 AM	7	0	0	7
	5/18/2023 3:45:00 AM	5	0	0	5
	Hour	14	0	0	14
	5/18/2023 4:00:00 AM	3	0	1	4
	5/18/2023 4:15:00 AM	3	0	1	4
	5/18/2023 4:30:00 AM	4	0	1	5
	5/18/2023 4:45:00 AM	10	0	0	10
	Hour	20	0	3	23
	5/18/2023 5:00:00 AM	12	1	1	14
	5/18/2023 5:15:00 AM	19	2	2	23
	5/18/2023 5:30:00 AM	29	1	0	30
	5/18/2023 5:45:00 AM	56	4	2	62
	Hour	116	8	5	129
	5/18/2023 6:00:00 AM	49	3	1	53
	5/18/2023 6:15:00 AM	80	11	4	95
	5/18/2023 6:30:00 AM	96	13	1	110
	5/18/2023 6:45:00 AM	108	7	2	117
	Hour	333	34	8	375
	5/18/2023 7:00:00 AM	95	12	2	109
	5/18/2023 7:15:00 AM	98	10	7	115
	5/18/2023 7:30:00 AM	126	15	4	145
	5/18/2023 7:45:00 AM	156	7	4	167
	Hour	475	44	17	536
	5/18/2023 8:00:00 AM	151	14	3	168
	5/18/2023 8:15:00 AM	127	6	4	137
	5/18/2023 8:30:00 AM	154	6	11	171
	5/18/2023 8:45:00 AM	102	9	3	114
	Hour	534	35	21	590
	5/18/2023 9:00:00 AM	120	13	2	135
	5/18/2023 9:15:00 AM	109	7	8	124
	5/18/2023 9:30:00 AM	92	11	4	107
	5/18/2023 9:45:00 AM	89	9	3	101
	Hour	410	40	17	467
	5/18/2023 10:00:00 AM	89	5	4	98
	5/18/2023 10:15:00 AM	98	9	4	111
	5/18/2023 10:30:00 AM	79	7	7	93
	5/18/2023 10:45:00 AM	102	11	5	118
	Hour	368	32	20	420
	5/18/2023 11:00:00 AM	90	12	5	107
	5/18/2023 11:15:00 AM	84	9	2	95
	5/18/2023 11:30:00 AM	88	5	7	100
	5/18/2023 11:45:00 AM	90	6	10	106
	Hour	352	32	24	408
	Grand Total	2,654	225	119	2,998
	Percentage	88.5%	7.5%	4.0%	

4. US 85 N.O. AIRPORT RD

SB Time	Lights	Mediums	Trucks	Total
5/18/2023 12:00:00 PM	92	10	5	107
5/18/2023 12:15:00 PM	86	11	2	99
5/18/2023 12:30:00 PM	90	8	7	105
5/18/2023 12:45:00 PM	118	7	3	128
Hour	386	36	17	439
5/18/2023 1:00:00 PM	94	7	5	106
5/18/2023 1:15:00 PM	87	10	4	101
5/18/2023 1:30:00 PM	79	8	8	95
5/18/2023 1:45:00 PM	99	16	4	119
Hour	359	41	21	421
5/18/2023 2:00:00 PM	114	13	6	133
5/18/2023 2:15:00 PM	111	14	4	129
5/18/2023 2:30:00 PM	95	11	6	112
5/18/2023 2:45:00 PM	123	12	5	140
Hour	443	50	21	514
5/18/2023 3:00:00 PM	141	10	6	157
5/18/2023 3:15:00 PM	168	8	1	177
5/18/2023 3:30:00 PM	192	5	4	201
5/18/2023 3:45:00 PM	231	8	4	243
Hour	732	31	15	778
5/18/2023 4:00:00 PM	283	5	1	289
5/18/2023 4:15:00 PM	252	7	3	262
5/18/2023 4:30:00 PM	219	6	6	231
5/18/2023 4:45:00 PM	238	4	1	243
Hour	992	22	11	1025
5/18/2023 5:00:00 PM	239	8	1	248
5/18/2023 5:15:00 PM	254	6	4	264
5/18/2023 5:30:00 PM	245	4	0	249
5/18/2023 5:45:00 PM	183	2	0	185
Hour	921	20	5	946
5/18/2023 6:00:00 PM	209	3	1	213
5/18/2023 6:15:00 PM	165	2	2	169
5/18/2023 6:30:00 PM	120	2	0	122
5/18/2023 6:45:00 PM	109	2	0	111
Hour	603	9	3	615
5/18/2023 7:00:00 PM	101	3	0	104
5/18/2023 7:15:00 PM	81	1	1	83
5/18/2023 7:30:00 PM	76	0	1	77
5/18/2023 7:45:00 PM	75	1	0	76
Hour	333	5	2	340
5/18/2023 8:00:00 PM	65	0	0	65
5/18/2023 8:15:00 PM	68	0	0	68
5/18/2023 8:30:00 PM	56	0	2	58
5/18/2023 8:45:00 PM	54	0	0	54
Hour	243	0	2	245
5/18/2023 9:00:00 PM	68	0	0	68
5/18/2023 9:15:00 PM	58	1	0	59
5/18/2023 9:30:00 PM	50	0	0	50
5/18/2023 9:45:00 PM	53	0	0	53
Hour	229	1	0	230
5/18/2023 10:00:00 PM	42	1	0	43
5/18/2023 10:15:00 PM	29	0	1	30
5/18/2023 10:30:00 PM	37	2	0	39
5/18/2023 10:45:00 PM	27	0	0	27
Hour	135	3	1	139
5/18/2023 11:00:00 PM	38	2	0	40
5/18/2023 11:15:00 PM	48	0	0	48
5/18/2023 11:30:00 PM	47	0	0	47
5/18/2023 11:45:00 PM	24	0	0	24
Hour	157	2	0	159
Grand Total	5,533	220	98	5,851
Percentage	94.6%	3.8%	1.7%	
Total	8,187	445	217	8,849
Percentage	92.5%	5.0%	2.5%	

All Traffic Data Services

5. AIRPORT RD EAST OF BRANNAN SAND ACCESS

EB Time	Lights	Mediums	Trucks	Total
5/18/2023	1	0	0	1
5/18/2023 12:15:00 AM	0	0	0	0
5/18/2023 12:30:00 AM	0	0	0	0
5/18/2023 12:45:00 AM	1	0	0	1
Hour	2	0	0	2
5/18/2023 1:00:00 AM	0	0	0	0
5/18/2023 1:15:00 AM	2	0	0	2
5/18/2023 1:30:00 AM	0	0	0	0
5/18/2023 1:45:00 AM	0	0	0	0
Hour	2	0	0	2
5/18/2023 2:00:00 AM	0	0	0	0
5/18/2023 2:15:00 AM	0	0	0	0
5/18/2023 2:30:00 AM	0	0	0	0
5/18/2023 2:45:00 AM	0	0	0	0
Hour	0	0	0	0
5/18/2023 3:00:00 AM	2	0	0	2
5/18/2023 3:15:00 AM	1	0	0	1
5/18/2023 3:30:00 AM	0	0	0	0
5/18/2023 3:45:00 AM	0	0	0	0
Hour	3	0	0	3
5/18/2023 4:00:00 AM	0	0	0	0
5/18/2023 4:15:00 AM	0	0	0	0
5/18/2023 4:30:00 AM	3	0	0	3
5/18/2023 4:45:00 AM	4	0	0	4
Hour	7	0	0	7
5/18/2023 5:00:00 AM	2	0	0	2
5/18/2023 5:15:00 AM	4	0	0	4
5/18/2023 5:30:00 AM	7	0	0	7
5/18/2023 5:45:00 AM	5	0	0	5
Hour	18	0	0	18
5/18/2023 6:00:00 AM	9	0	0	9
5/18/2023 6:15:00 AM	15	2	0	17
5/18/2023 6:30:00 AM	12	0	0	12
5/18/2023 6:45:00 AM	23	0	0	23
Hour	59	2	0	61
5/18/2023 7:00:00 AM	34	1	0	35
5/18/2023 7:15:00 AM	40	1	1	42
5/18/2023 7:30:00 AM	44	1	0	45
5/18/2023 7:45:00 AM	45	2	0	47
Hour	163	5	1	169
5/18/2023 8:00:00 AM	26	3	0	29
5/18/2023 8:15:00 AM	38	4	0	42
5/18/2023 8:30:00 AM	36	3	2	41
5/18/2023 8:45:00 AM	35	0	0	35
Hour	135	10	2	147
5/18/2023 9:00:00 AM	23	1	0	24
5/18/2023 9:15:00 AM	19	2	2	23
5/18/2023 9:30:00 AM	15	1	0	16
5/18/2023 9:45:00 AM	17	1	1	19
Hour	74	5	3	82
5/18/2023 10:00:00 AM	12	4	0	16
5/18/2023 10:15:00 AM	27	1	1	29
5/18/2023 10:30:00 AM	23	6	0	29
5/18/2023 10:45:00 AM	16	4	0	20
Hour	78	15	1	94
5/18/2023 11:00:00 AM	23	2	0	25
5/18/2023 11:15:00 AM	21	4	0	25
5/18/2023 11:30:00 AM	19	3	0	22
5/18/2023 11:45:00 AM	18	6	1	25
Hour	81	15	1	97
Total	622	52	8	682
Percentage	91.2%	7.6%	1.2%	

ALL TRAFFIC DATA SERVICES

5. AIRPORT RD EAST OF BRANNAN SAND ACCESS

EB	Time	Lights	Mediums	Trucks	Total
	5/18/2023 12:00:00 PM	32	4	0	36
	5/18/2023 12:15:00 PM	19	5	0	24
	5/18/2023 12:30:00 PM	19	1	1	21
	5/18/2023 12:45:00 PM	18	2	1	21
	Hour	88	12	2	102
	5/18/2023 1:00:00 PM	27	4	2	33
	5/18/2023 1:15:00 PM	27	3	2	32
	5/18/2023 1:30:00 PM	18	1	1	20
	5/18/2023 1:45:00 PM	23	3	2	28
	Hour	95	11	7	113
	5/18/2023 2:00:00 PM	29	4	2	35
	5/18/2023 2:15:00 PM	27	1	4	32
	5/18/2023 2:30:00 PM	28	3	1	32
	5/18/2023 2:45:00 PM	30	2	1	33
	Hour	114	10	8	132
	5/18/2023 3:00:00 PM	40	4	1	45
	5/18/2023 3:15:00 PM	49	1	1	51
	5/18/2023 3:30:00 PM	43	3	0	46
	5/18/2023 3:45:00 PM	51	4	0	55
	Hour	183	12	2	197
	5/18/2023 4:00:00 PM	63	2	0	65
	5/18/2023 4:15:00 PM	79	2	0	81
	5/18/2023 4:30:00 PM	64	0	0	64
	5/18/2023 4:45:00 PM	68	3	1	72
	Hour	274	7	1	282
	5/18/2023 5:00:00 PM	69	0	0	69
	5/18/2023 5:15:00 PM	65	2	3	70
	5/18/2023 5:30:00 PM	38	0	0	38
	5/18/2023 5:45:00 PM	31	0	0	31
	Hour	203	2	3	208
	5/18/2023 6:00:00 PM	34	0	0	34
	5/18/2023 6:15:00 PM	20	0	0	20
	5/18/2023 6:30:00 PM	17	0	0	17
	5/18/2023 6:45:00 PM	13	0	0	13
	Hour	84	0	0	84
	5/18/2023 7:00:00 PM	6	0	0	6
	5/18/2023 7:15:00 PM	3	0	0	3
	5/18/2023 7:30:00 PM	9	0	0	9
	5/18/2023 7:45:00 PM	4	0	0	4
	Hour	22	0	0	22
	5/18/2023 8:00:00 PM	4	0	0	4
	5/18/2023 8:15:00 PM	6	0	0	6
	5/18/2023 8:30:00 PM	8	0	0	8
	5/18/2023 8:45:00 PM	7	0	0	7
	Hour	25	0	0	25
	5/18/2023 9:00:00 PM	5	0	0	5
	5/18/2023 9:15:00 PM	4	0	0	4
	5/18/2023 9:30:00 PM	6	0	0	6
	5/18/2023 9:45:00 PM	1	0	0	1
	Hour	16	0	0	16
	5/18/2023 10:00:00 PM	4	0	0	4
	5/18/2023 10:15:00 PM	2	0	0	2
	5/18/2023 10:30:00 PM	3	0	0	3
	5/18/2023 10:45:00 PM	0	0	0	0
	Hour	9	0	0	9
	5/18/2023 11:00:00 PM	3	0	0	3
	5/18/2023 11:15:00 PM	1	0	0	1
	5/18/2023 11:30:00 PM	1	0	0	1
	5/18/2023 11:45:00 PM	0	0	0	0
	Hour	5	0	0	5
	Total	1,118	54	23	1,195
	Percentage	93.6%	4.5%	1.9%	
	Grand Total	1,740	106	31	1,877
	Percentage	92.7%	5.6%	1.7%	

5. AIRPORT RD EAST OF BRANNAN SAND ACCESS

WB Time	Lights	Mediums	Trucks	Total
5/18/2023	1	0	0	1
5/18/2023 12:15:00 AM	2	0	0	2
5/18/2023 12:30:00 AM	0	0	0	0
5/18/2023 12:45:00 AM	0	0	0	0
Hour	3	0	0	3
5/18/2023 1:00:00 AM	1	0	0	1
5/18/2023 1:15:00 AM	0	0	0	0
5/18/2023 1:30:00 AM	1	0	0	1
5/18/2023 1:45:00 AM	0	0	0	0
Hour	2	0	0	2
5/18/2023 2:00:00 AM	1	0	0	1
5/18/2023 2:15:00 AM	0	0	0	0
5/18/2023 2:30:00 AM	1	0	0	1
5/18/2023 2:45:00 AM	0	0	0	0
Hour	2	0	0	2
5/18/2023 3:00:00 AM	0	0	0	0
5/18/2023 3:15:00 AM	0	0	0	0
5/18/2023 3:30:00 AM	0	0	0	0
5/18/2023 3:45:00 AM	0	0	0	0
Hour	0	0	0	0
5/18/2023 4:00:00 AM	1	0	0	1
5/18/2023 4:15:00 AM	4	0	0	4
5/18/2023 4:30:00 AM	2	0	0	2
5/18/2023 4:45:00 AM	3	0	0	3
Hour	10	0	0	10
5/18/2023 5:00:00 AM	5	0	0	5
5/18/2023 5:15:00 AM	7	0	0	7
5/18/2023 5:30:00 AM	15	0	0	15
5/18/2023 5:45:00 AM	16	0	0	16
Hour	43	0	0	43
5/18/2023 6:00:00 AM	13	2	0	15
5/18/2023 6:15:00 AM	11	4	0	15
5/18/2023 6:30:00 AM	19	2	0	21
5/18/2023 6:45:00 AM	37	0	0	37
Hour	80	8	0	88
5/18/2023 7:00:00 AM	58	0	0	58
5/18/2023 7:15:00 AM	49	2	0	51
5/18/2023 7:30:00 AM	44	4	0	48
5/18/2023 7:45:00 AM	46	3	1	50
Hour	197	9	1	207
5/18/2023 8:00:00 AM	54	2	0	56
5/18/2023 8:15:00 AM	28	4	2	34
5/18/2023 8:30:00 AM	36	1	0	37
5/18/2023 8:45:00 AM	41	1	0	42
Hour	159	8	2	169
5/18/2023 9:00:00 AM	26	0	1	27
5/18/2023 9:15:00 AM	16	1	1	18
5/18/2023 9:30:00 AM	19	3	0	22
5/18/2023 9:45:00 AM	13	2	0	15
Hour	74	6	2	82
5/18/2023 10:00:00 AM	12	1	0	13
5/18/2023 10:15:00 AM	17	3	1	21
5/18/2023 10:30:00 AM	19	1	1	21
5/18/2023 10:45:00 AM	16	6	1	23
Hour	64	11	3	78
5/18/2023 11:00:00 AM	15	3	0	18
5/18/2023 11:15:00 AM	6	6	1	13
5/18/2023 11:30:00 AM	25	3	0	28
5/18/2023 11:45:00 AM	20	4	0	24
Hour	66	16	1	83
Total	700	58	9	767
Percentage	91.3%	7.6%	1.2%	

5. AIRPORT RD EAST OF BRANNAN SAND ACCESS

WB	Time	Lights	Mediums	Trucks	Total
	5/18/2023 12:00:00 PM	12	6	2	20
	5/18/2023 12:15:00 PM	13	6	1	20
	5/18/2023 12:30:00 PM	22	2	1	25
	5/18/2023 12:45:00 PM	25	1	3	29
	Hour	72	15	7	94
	5/18/2023 1:00:00 PM	20	2	3	25
	5/18/2023 1:15:00 PM	24	2	1	27
	5/18/2023 1:30:00 PM	15	2	1	18
	5/18/2023 1:45:00 PM	23	2	1	26
	Hour	82	8	6	96
	5/18/2023 2:00:00 PM	28	3	2	33
	5/18/2023 2:15:00 PM	20	6	0	26
	5/18/2023 2:30:00 PM	17	2	1	20
	5/18/2023 2:45:00 PM	16	2	0	18
	Hour	81	13	3	97
	5/18/2023 3:00:00 PM	26	1	0	27
	5/18/2023 3:15:00 PM	20	0	0	20
	5/18/2023 3:30:00 PM	16	3	0	19
	5/18/2023 3:45:00 PM	25	2	1	28
	Hour	87	6	1	94
	5/18/2023 4:00:00 PM	33	1	1	35
	5/18/2023 4:15:00 PM	26	2	0	28
	5/18/2023 4:30:00 PM	24	0	0	24
	5/18/2023 4:45:00 PM	25	0	0	25
	Hour	108	3	1	112
	5/18/2023 5:00:00 PM	23	0	1	24
	5/18/2023 5:15:00 PM	26	0	0	26
	5/18/2023 5:30:00 PM	25	0	1	26
	5/18/2023 5:45:00 PM	18	0	0	18
	Hour	92	0	2	94
	5/18/2023 6:00:00 PM	12	0	0	12
	5/18/2023 6:15:00 PM	15	0	0	15
	5/18/2023 6:30:00 PM	10	0	0	10
	5/18/2023 6:45:00 PM	9	0	0	9
	Hour	46	0	0	46
	5/18/2023 7:00:00 PM	8	0	0	8
	5/18/2023 7:15:00 PM	11	0	0	11
	5/18/2023 7:30:00 PM	8	0	0	8
	5/18/2023 7:45:00 PM	10	0	0	10
	Hour	37	0	0	37
	5/18/2023 8:00:00 PM	10	0	0	10
	5/18/2023 8:15:00 PM	8	0	0	8
	5/18/2023 8:30:00 PM	4	0	0	4
	5/18/2023 8:45:00 PM	10	0	0	10
	Hour	32	0	0	32
	5/18/2023 9:00:00 PM	4	0	0	4
	5/18/2023 9:15:00 PM	5	0	0	5
	5/18/2023 9:30:00 PM	8	0	0	8
	5/18/2023 9:45:00 PM	4	0	0	4
	Hour	21	0	0	21
	5/18/2023 10:00:00 PM	2	0	0	2
	5/18/2023 10:15:00 PM	3	0	0	3
	5/18/2023 10:30:00 PM	2	0	0	2
	5/18/2023 10:45:00 PM	1	0	0	1
	Hour	8	0	0	8
	5/18/2023 11:00:00 PM	1	0	0	1
	5/18/2023 11:15:00 PM	2	0	0	2
	5/18/2023 11:30:00 PM	1	0	0	1
	5/18/2023 11:45:00 PM	1	0	0	1
	Hour	5	0	0	5
	Total	671	45	20	736
	Percentage	91.2%	6.1%	2.7%	
	Grand Total	1,371	103	29	1,503
	Percentage	91.2%	6.9%	1.9%	

This table is formatted to be printed on 11" x 17" paper.

Peak Hour Truck Percentage for All Volume Scenarios

Morning Peak Hour

US 85 / Airport Road

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
NBLT	110	20	130	15%	114	21	135	15%	114	31	145	21%	205	68	273	25%	205	78	283	28%
NB Thru	959	24	983	2%	997	25	1,022	2%	997	25	1,022	2%	---				---			
SB Thru	511	45	556	8%	527	46	573	8%	527	46	573	8%	---				---			
SBRT	49	12	61	20%	51	12	63	20%	51	24	75	32%	84	20	104	20%	84	32	116	28%
EBLT	47	22	69	32%	51	24	75	32%	51	35	86	40%	161	75	236	32%	161	86	247	35%
EBRT	84	19	103	18%	90	21	111	18%	90	31	121	25%	287	65	352	18%	287	75	362	21%

Airport Road / Peterson Road

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
NBLT	18	8	26	31%	18	8	26	31%	18	8	26	31%	18	8	26	31%	18	8	26	31%
NBRT	16	4	20	20%	16	4	20	20%	16	4	20	20%	16	4	20	20%	16	4	20	20%
EB Thru	129	31	160	19%	140	33	173	19%	140	54	194	28%	451	106	557	19%	451	127	578	22%
EBRT	13	3	16	19%	13	3	16	19%	13	3	16	19%	13	3	16	19%	13	3	16	19%
WBLT	12	3	15	20%	12	3	15	20%	12	3	15	20%	12	3	15	20%	12	3	15	20%
WB Thru	165	24	189	13%	180	26	204	13%	180	48	226	21%	593	82	675	12%	593	104	697	15%

Airport Road / Brannan East Access

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
SBLT	1	8	9	89%	1	8	9	89%	1	0	1	0%	1	8	9	89%	1	0	1	0%
SBRT	0	0	0	0%	0	0	0	0%	0	0	0	0%	0	0	0	0%	0	0	0	0%
EBLT	0	2	2	100%	0	2	2	100%	2	3	5	60%	0	2	2	100%	0	5	5	100%
EB Thru	99	12	111	11%	107	13	120	11%	115	34	149	23%	349	41	390	11%	357	62	419	15%
WBLT	2	4	6	67%	2	4	6	67%	2	4	6	67%	2	4	6	67%	2	4	6	67%
WB Thru	83	19	102	19%	89	21	110	19%	89	21	110	19%	313	65	378	17%	313	65	378	17%
WBRT	1	13	14	93%	1	13	14	93%	1	35	36	97%	1	13	14	93%	1	35	36	97%

Airport Road / Brannan West Access

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
SBLT	0	0	0	0%	0	0	0	0%	0	29	29	100%	0	0	0	0%	0	29	29	100%
SBRT	0	0	0	0%	0	0	0	0%	0	3	3	100%	0	0	0	0%	0	3	3	100%
EB Thru	99	14	113	12%	108	15	120	13%	108	18	125	14%	342	48	390	12%	351	48	399	12%
WB Thru	86	36	122	30%	93	39	110	35%	93	39	132	29%	255	123	378	33%	320	126	446	28%

This table is formatted to be printed on 11" x 17" paper.

Peak Hour Truck Percentage for All Volume Scenarios

Evening Peak Hour

US 85 / Airport Road

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
NBLT	63	9	72	13%	66	9	75	12%	66	12	78	16%	132	19	151	13%	132	22	154	14%
NB Thru	799	42	841	5%	831	44	875	5%	831	44	875	5%	---				---			
SB Thru	953	27	980	3%	981	28	1,009	3%	981	28	1,009	3%	---				---			
SBRT	38	6	44	14%	39	6	45	14%	39	12	51	24%	65	10	75	14%	65	16	81	20%
EBLT	77	5	82	6%	84	5	89	6%	84	9	93	10%	263	17	280	6%	263	21	284	7%
EBRT	188	10	198	5%	203	11	214	5%	203	13	216	6%	643	34	677	5%	643	36	679	5%

Airport Road / Peterson Road

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
NBLT	19	3	22	14%	19	3	22	14%	19	3	22	14%	19	3	22	14%	19	3	22	14%
NBRT	28	1	29	3%	28	1	29	3%	28	1	29	3%	28	1	29	3%	28	1	29	3%
EB Thru	242	8	250	3%	261	9	270	3%	261	15	276	5%	860	27	887	3%	860	33	893	4%
EBRT	28	6	34	18%	28	6	34	18%	28	6	34	18%	28	6	34	18%	28	6	34	18%
WBLT	14	0	14	0%	14	0	14	0%	14	0	14	0%	14	0	14	0%	14	0	14	0%
WB Thru	86	7	93	8%	92	8	100	8%	92	17	109	15%	313	24	337	7%	313	33	346	10%

Airport Road / Brannan East Access

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
SBLT	1	10	11	91%	1	10	11	91%	1	0	1	0%	1	10	11	91%	1	0	1	0%
SBRT	0	1	1	100%	0	1	1	100%	0	0	0	0%	0	1	1	100%	0	0	0	0%
EBLT	0	1	1	100%	0	1	1	100%	0	2	2	100%	0	1	1	100%	0	2	2	100%
EB Thru	148	4	152	3%	160	4	164	3%	170	10	180	6%	538	14	552	2%	548	20	568	3%
WBLT	0	0	0	0%	0	0	0	0%	0	0	0	0%	0	0	0	0%	0	0	0	0%
WB Thru	93	1	94	1%	101	1	102	1%	101	1	102	1%	337	3	340	1%	337	3	340	1%
WBRT	1	7	8	88%	1	7	8	88%	1	16	17	94%	1	7	8	88%	1	16	17	94%

Airport Road / Brannan West Access

Movement	Existing				Year 2024 Background				Year 2024 Total				Year 2040 Background				Year 2040 Total			
	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks	PV	Trucks	Total	% Trucks
SBLT	0	0	0	0%	0	0	0	0%	0	16	16	100%	0	0	0	0%	0	16	16	100%
SBRT	0	0	0	0%	0	0	0	0%	0	1	1	100%	0	0	0	0%	0	1	1	100%
EB Thru	148	5	153	3%	160	5	165	3%	160	6	166	4%	538	17	555	3%	538	18	556	3%
WB Thru	94	1	95	1%	102	1	103	1%	102	1	103	1%	341	3	344	1%	341	3	344	1%

Appendix D

VISTRO Analysis Results

Year 2023 Volumes

Brannon DougCO APM TIS

Vistro File: C:\...\AM 6-17-24.vistro
Report File: C:\...\2023 AM.pdf

Scenario 1 2023 AM
6/17/2024

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 85/Airport	Signalized	HCM 7th Edition	NB Left	0.302	15.1	B
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.064	12.4	B
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.030	12.1	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 85/Airport

Control Type:	Signalized	Delay (sec / veh):	15.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.302

Intersection Setup

Name	US 85			US 85			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	340.00	100.00	100.00	500.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85			US 85			Airport Road			Airport Road		
Base Volume Input [veh/h]	130	983	0	0	556	61	69	1	103	0	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	15.00	2.00	0.00	0.00	8.00	20.00	32.00	0.00	18.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	31	0	0	52	0	0	0
Total Hourly Volume [veh/h]	130	983	0	0	556	30	69	1	51	0	1	0
Peak Hour Factor	0.8700	0.8700	0.8700	0.9400	0.9400	0.9400	0.9000	0.9000	0.9000	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	282	0	0	148	8	19	0	14	0	0	0
Total Analysis Volume [veh/h]	149	1130	0	0	591	32	77	1	57	0	1	0
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Free Running (No Pattern)
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	1	6	0	4	4	0	0	8	0
Auxiliary Signal Groups												
Maximum Green [s]	20	90	0	10	90	0	30	30	0	0	25	0
Amber [s]	3.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	3.0	0.0
All red [s]	1.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	5	0	5	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	10	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	40.0	40.0	0.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
Advanced Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Free Running (No Pattern)

Split [s]	9	0	0	0	0	0	0	0	0	0	14	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	10	30	0	5	30	0	15	15	0	0	5	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
C, Calculated Cycle Length [s]	71	71	71	71	71	71	71	71
L, Total Lost Time per Cycle [s]	4.00	7.50	7.50	6.00	7.50	7.50	6.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	5.50	5.50	4.00	5.50	5.50	4.00	0.00
g_i, Effective Green Time [s]	10	38	38	0	30	30	14	16
g / C, Green / Cycle	0.13	0.53	0.53	0.00	0.42	0.42	0.20	0.23
(v / s)_i Volume / Saturation Flow Rate	0.09	0.30	0.30	0.00	0.17	0.02	0.09	0.00
s, saturation flow rate [veh/h]	1595	1870	1870	1810	3389	1360	1548	1879
c, Capacity [veh/h]	214	989	989	0	1433	575	385	416
d1, Uniform Delay [s]	29.45	11.33	11.33	0.00	14.36	12.14	24.96	21.38
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.05	0.52	0.52	0.00	0.19	0.04	0.55	0.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.70	0.57	0.57	0.00	0.41	0.06	0.35	0.00
d, Delay for Lane Group [s/veh]	33.50	11.86	11.86	0.00	14.55	12.18	25.51	21.38
Lane Group LOS	C	B	B	A	B	B	C	C
Critical Lane Group	No	Yes	No	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	2.58	5.35	5.35	0.00	3.08	0.29	1.97	0.01
50th-Percentile Queue Length [ft/ln]	64.43	133.64	133.64	0.00	77.09	7.13	49.17	0.32
95th-Percentile Queue Length [veh/ln]	4.64	9.14	9.14	0.00	5.55	0.51	3.54	0.02
95th-Percentile Queue Length [ft/ln]	115.97	228.43	228.43	0.00	138.76	12.84	88.51	0.57

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	33.50	11.86	11.86	0.00	14.55	12.18	25.51	25.51	25.51	21.38	21.38	21.38
Movement LOS	C	B	B	A	B	B	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	14.38			14.43			25.51			21.38		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	15.14											
Intersection LOS	B											
Intersection V/C	0.302											

Emissions

Vehicle Miles Traveled [mph]	30.18	114.42	114.42	0.00	102.70	5.56	5.53	0.03
Stops [stops/h]	130.54	270.75	270.75	0.00	312.37	14.45	99.63	0.64
Fuel consumption [US gal/h]	2.98	7.57	7.57	0.00	7.70	0.39	1.48	0.01
CO [g/h]	208.24	529.13	529.13	0.00	538.52	27.13	103.36	0.63
NOx [g/h]	40.52	102.95	102.95	0.00	104.78	5.28	20.11	0.12
VOC [g/h]	48.26	122.63	122.63	0.00	124.81	6.29	23.95	0.15

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	844	703
d_b, Bicycle Delay [s]	35.54	35.54	11.87	14.93
I_b,int, Bicycle LOS Score for Intersection	2.615	2.099	1.868	1.561
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	12.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.064

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	26	20	160	16	15	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	31.00	20.00	19.00	19.00	20.00	13.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	20	160	16	15	189
Peak Hour Factor	0.7700	0.7700	0.9000	0.9000	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	6	44	4	4	51
Total Analysis Volume [veh/h]	34	26	178	18	16	203
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.03	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	12.41	10.05	0.00	0.00	7.84	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.32	0.32	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	7.95	7.95	0.00	0.00	0.67	0.67
d_A, Approach Delay [s/veh]	11.39		0.00		0.57	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.70					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.030

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	9	0	0	2	111	0	6	102	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	89.00	2.00	0.00	100.00	11.00	2.00	67.00	19.00	93.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	9	0	0	2	111	0	6	102	14
Peak Hour Factor	0.8500	0.8500	0.8500	0.5800	0.5800	0.5800	0.8600	0.8600	0.8600	0.7900	0.7900	0.7900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	0	0	1	32	0	2	32	4
Total Analysis Volume [veh/h]	0	0	0	16	0	0	2	129	0	8	129	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.46	10.90	8.91	12.06	10.77	8.89	8.59	0.00	0.00	8.19	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.09	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	2.35	0.00	0.00	0.15	0.00	0.00	0.53	0.00	0.00
d_A, Approach Delay [s/veh]	10.09			12.06			0.13			0.42		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.91											
Intersection LOS	B											

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Scenario 1 2023 PM
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Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 85/Airport	Signalized	HCM 7th Edition	SB Left	0.363	19.7	B
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.052	12.3	B
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.048	12.0	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 85/Airport

Control Type:	Signalized	Delay (sec / veh):	19.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.363

Intersection Setup

Name	US 85			US 85			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	340.00	100.00	100.00	500.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85			US 85			Airport Road			Airport Road		
Base Volume Input [veh/h]	72	841	1	1	980	44	82	0	198	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	5.00	0.00	0.00	3.00	14.00	6.00	0.00	5.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	1	0	0	22	0	0	99	0	0	0
Total Hourly Volume [veh/h]	72	841	0	1	980	22	82	0	99	0	0	0
Peak Hour Factor	0.8700	0.8700	0.8700	0.8900	0.8900	0.8900	0.8800	0.8800	0.8800	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	242	0	0	275	6	23	0	28	0	0	0
Total Analysis Volume [veh/h]	83	967	0	1	1101	25	93	0	113	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Free Running (No Pattern)
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	1	6	0	4	4	0	0	8	0
Auxiliary Signal Groups												
Maximum Green [s]	20	90	0	10	90	0	30	30	0	0	25	0
Amber [s]	3.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	3.0	0.0
All red [s]	1.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	5	0	5	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	10	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	40.0	40.0	0.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
Advanced Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Free Running (No Pattern)

Split [s]	9	0	0	0	0	0	0	0	0	0	14	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	10	30	0	5	30	0	15	15	0	0	5	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
C, Calculated Cycle Length [s]	79	79	79	79	79	79	79	79
L, Total Lost Time per Cycle [s]	4.00	7.50	7.50	6.00	7.50	7.50	6.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	5.50	5.50	4.00	5.50	5.50	4.00	0.00
g_i, Effective Green Time [s]	8	37	37	0	31	31	21	23
g / C, Green / Cycle	0.11	0.48	0.48	0.00	0.40	0.40	0.27	0.30
(v / s)_i Volume / Saturation Flow Rate	0.05	0.26	0.26	0.00	0.31	0.02	0.13	0.00
s, saturation flow rate [veh/h]	1624	1825	1825	1810	3532	1436	1554	1898
c, Capacity [veh/h]	174	871	871	3	1403	571	491	563
d1, Uniform Delay [s]	33.05	14.61	14.61	39.23	20.75	14.53	23.78	0.00
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.03	0.55	0.55	66.12	1.00	0.03	0.57	0.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.48	0.55	0.55	0.36	0.78	0.04	0.42	0.00
d, Delay for Lane Group [s/veh]	35.08	15.16	15.16	105.34	21.75	14.56	24.35	0.00
Lane Group LOS	D	B	B	F	C	B	C	A
Critical Lane Group	Yes	No	No	No	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.55	5.74	5.74	0.07	8.41	0.27	3.14	0.00
50th-Percentile Queue Length [ft/ln]	38.75	143.59	143.59	1.73	210.26	6.66	78.58	0.00
95th-Percentile Queue Length [veh/ln]	2.79	9.67	9.67	0.12	13.17	0.48	5.66	0.00
95th-Percentile Queue Length [ft/ln]	69.74	241.85	241.85	3.12	329.17	11.98	141.44	0.00

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	35.08	15.16	15.16	105.34	21.75	14.56	24.35	24.35	24.35	0.00	0.00	0.00
Movement LOS	D	B	B	F	C	B	C	C	C	A	A	A
d_A, Approach Delay [s/veh]	16.74			21.66			24.35			0.00		
Approach LOS	B			C			C			A		
d_I, Intersection Delay [s/veh]	19.72											
Intersection LOS	B											
Intersection V/C	0.363											

Emissions

Vehicle Miles Traveled [mph]	16.81	97.92	97.92	0.17	191.33	4.34	8.43			0.00		
Stops [stops/h]	71.05	263.30	263.30	3.18	771.12	12.21	144.09			0.00		
Fuel consumption [US gal/h]	1.68	6.98	6.98	0.05	17.01	0.32	2.16			0.00		
CO [g/h]	117.22	487.74	487.74	3.22	1188.94	22.40	151.28			0.00		
NOx [g/h]	22.81	94.90	94.90	0.63	231.32	4.36	29.43			0.00		
VOC [g/h]	27.17	113.04	113.04	0.75	275.55	5.19	35.06			0.00		

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	764	637
d_b, Bicycle Delay [s]	39.26	39.26	15.00	18.24
I_b,int, Bicycle LOS Score for Intersection	2.427	2.508	2.063	1.560
Bicycle LOS	B	B	B	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.052

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	22	29	250	34	14	93
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	3.00	3.00	18.00	0.00	8.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	22	29	250	34	14	93
Peak Hour Factor	0.8000	0.8000	0.8800	0.8800	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	9	71	10	4	28
Total Analysis Volume [veh/h]	28	36	284	39	17	111
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.05	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	12.32	10.54	0.00	0.00	7.90	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.34	0.34	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	8.39	8.39	0.00	0.00	0.71	0.71
d_A, Approach Delay [s/veh]	11.32		0.00		1.05	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.67					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.0
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.048

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	11	0	1	1	152	0	0	94	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	91.00	2.00	100.00	100.00	3.00	2.00	2.00	1.00	88.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	11	0	1	1	152	0	0	94	8
Peak Hour Factor	1.0000	1.0000	1.0000	0.4300	0.4300	0.4300	0.9300	0.9300	0.9300	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	6	0	1	0	41	0	0	25	2
Total Analysis Volume [veh/h]	0	0	0	26	0	2	1	163	0	0	100	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.29	10.69	9.08	12.02	10.96	9.86	8.46	0.00	0.00	7.54	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.15	0.15	0.01	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	3.79	3.79	0.20	0.07	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.02			11.86			0.05			0.00		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.13											
Intersection LOS	B											

Year 2024 Traffic Volume Scenarios

Brannon DougCO APM TIS

Vistro File: C:\...\AM 6-17-24.vistro

Scenario 11 2024 Back AM

Report File: C:\...\2024 Back AM.pdf

6/17/2024

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 85/Airport	Signalized	HCM 7th Edition	NB Left	0.314	15.6	B
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.067	12.7	B
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.031	12.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 85/Airport

Control Type:	Signalized	Delay (sec / veh):	15.6
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.314

Intersection Setup

Name	US 85			US 85			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	340.00	100.00	100.00	500.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85			US 85			Airport Road			Airport Road		
Base Volume Input [veh/h]	130	983	0	0	556	61	69	1	103	0	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	15.00	2.00	0.00	0.00	8.00	20.00	32.00	0.00	18.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0400	1.0400	1.0400	1.0300	1.0300	1.0300	1.0800	1.0800	1.0800	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	32	0	0	56	0	0	0
Total Hourly Volume [veh/h]	135	1022	0	0	573	31	75	1	55	0	1	0
Peak Hour Factor	0.8700	0.8700	0.8700	0.9400	0.9400	0.9400	0.9000	0.9000	0.9000	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	39	294	0	0	152	8	21	0	15	0	0	0
Total Analysis Volume [veh/h]	155	1175	0	0	610	33	83	1	61	0	1	0
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Free Running (No Pattern)
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	1	6	0	4	4	0	0	8	0
Auxiliary Signal Groups												
Maximum Green [s]	20	90	0	10	90	0	30	30	0	0	25	0
Amber [s]	3.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	3.0	0.0
All red [s]	1.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	5	0	5	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	10	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	40.0	40.0	0.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
Advanced Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Free Running (No Pattern)

Split [s]	9	0	0	0	0	0	0	0	0	0	14	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	10	30	0	5	30	0	15	15	0	0	5	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
C, Calculated Cycle Length [s]	72	72	72	72	72	72	72	72
L, Total Lost Time per Cycle [s]	4.00	7.50	7.50	6.00	7.50	7.50	6.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	5.50	5.50	4.00	5.50	5.50	4.00	0.00
g_i, Effective Green Time [s]	10	38	38	0	30	30	15	17
g / C, Green / Cycle	0.13	0.53	0.53	0.00	0.42	0.42	0.20	0.23
(v / s)_i Volume / Saturation Flow Rate	0.10	0.31	0.31	0.00	0.18	0.02	0.09	0.00
s, saturation flow rate [veh/h]	1595	1870	1870	1810	3389	1360	1546	1881
c, Capacity [veh/h]	214	982	982	0	1421	570	392	427
d1, Uniform Delay [s]	29.82	11.79	11.79	0.00	14.76	12.40	24.99	21.26
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.62	0.59	0.59	0.00	0.21	0.04	0.58	0.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.72	0.60	0.60	0.00	0.43	0.06	0.37	0.00
d, Delay for Lane Group [s/veh]	34.44	12.38	12.38	0.00	14.96	12.45	25.57	21.26
Lane Group LOS	C	B	B	A	B	B	C	C
Critical Lane Group	No	Yes	No	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	2.74	5.79	5.79	0.00	3.27	0.30	2.13	0.01
50th-Percentile Queue Length [ft/ln]	68.50	144.72	144.72	0.00	81.68	7.50	53.28	0.32
95th-Percentile Queue Length [veh/ln]	4.93	9.73	9.73	0.00	5.88	0.54	3.84	0.02
95th-Percentile Queue Length [ft/ln]	123.30	243.36	243.36	0.00	147.03	13.50	95.91	0.57

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	34.44	12.38	12.38	0.00	14.96	12.45	25.57	25.57	25.57	21.26	21.26	21.26
Movement LOS	C	B	B	A	B	B	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	14.95			14.84			25.57			21.26		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	15.65											
Intersection LOS	B											
Intersection V/C	0.314											

Emissions

Vehicle Miles Traveled [mph]	31.39	118.98	118.98	0.00	106.00	5.73	5.94	0.03
Stops [stops/h]	137.63	290.76	290.76	0.00	328.22	15.07	107.05	0.64
Fuel consumption [US gal/h]	3.14	7.98	7.98	0.00	8.04	0.40	1.59	0.01
CO [g/h]	219.41	558.14	558.14	0.00	561.65	28.16	111.17	0.63
NOx [g/h]	42.69	108.59	108.59	0.00	109.28	5.48	21.63	0.12
VOC [g/h]	50.85	129.36	129.36	0.00	130.17	6.53	25.76	0.15

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	837	698
d_b, Bicycle Delay [s]	35.84	35.84	12.11	15.20
I_b,int, Bicycle LOS Score for Intersection	2.657	2.116	1.891	1.561
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	12.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.067

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	26	20	160	16	15	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	31.00	20.00	19.00	19.00	20.00	13.00
Growth Factor	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	20	173	16	15	204
Peak Hour Factor	0.7700	0.7700	0.9000	0.9000	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	6	48	4	4	55
Total Analysis Volume [veh/h]	34	26	192	18	16	219
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.03	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	12.75	10.18	0.00	0.00	7.87	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.33	0.33	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	8.26	8.26	0.00	0.00	0.67	0.67
d_A, Approach Delay [s/veh]	11.64		0.00		0.54	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.63					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.031

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	9	0	0	2	111	0	6	102	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	89.00	2.00	0.00	100.00	11.00	2.00	67.00	19.00	98.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	9	0	0	2	120	0	6	110	14
Peak Hour Factor	0.8500	0.8500	0.8500	0.5800	0.5800	0.5800	0.8600	0.8600	0.8600	0.7900	0.7900	0.7900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	4	0	0	1	35	0	2	35	4
Total Analysis Volume [veh/h]	0	0	0	16	0	0	2	140	0	8	139	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.64	11.06	8.96	12.32	10.93	8.94	8.63	0.00	0.00	8.22	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.10	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	2.44	0.00	0.00	0.15	0.00	0.00	0.54	0.00	0.00
d_A, Approach Delay [s/veh]	10.22			12.32			0.12			0.40		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.87											
Intersection LOS	B											

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Report File: C:\...\2024 Back PM.pdf

Scenario 11 2024 Back PM

6/17/2024

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 85/Airport	Signalized	HCM 7th Edition	SB Left	0.374	20.7	C
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.054	12.7	B
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.050	12.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 85/Airport

Control Type:	Signalized	Delay (sec / veh):	20.7
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.374

Intersection Setup

Name	US 85			US 85			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	340.00	100.00	100.00	500.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85			US 85			Airport Road			Airport Road		
Base Volume Input [veh/h]	72	841	1	1	980	44	82	0	198	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	12.00	5.00	0.00	0.00	3.00	14.00	6.00	0.00	5.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0400	1.0400	1.0400	1.0300	1.0300	1.0300	1.0800	1.0800	1.0800	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	1	0	0	23	0	0	107	0	0	0
Total Hourly Volume [veh/h]	75	875	0	1	1009	22	89	0	107	0	0	0
Peak Hour Factor	0.8700	0.8700	0.8700	0.8900	0.8900	0.8900	0.8800	0.8800	0.8800	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	251	0	0	283	6	25	0	30	0	0	0
Total Analysis Volume [veh/h]	86	1006	0	1	1134	25	101	0	122	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Free Running (No Pattern)
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	1	6	0	4	4	0	0	8	0
Auxiliary Signal Groups												
Maximum Green [s]	20	90	0	10	90	0	30	30	0	0	25	0
Amber [s]	3.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	3.0	0.0
All red [s]	1.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	5	0	5	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	10	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	40.0	40.0	0.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
Advanced Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Free Running (No Pattern)

Split [s]	9	0	0	0	0	0	0	0	0	0	14	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	10	30	0	5	30	0	15	15	0	0	5	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
C, Calculated Cycle Length [s]	83	83	83	83	83	83	83	83
L, Total Lost Time per Cycle [s]	4.00	7.50	7.50	6.00	7.50	7.50	6.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	5.50	5.50	4.00	5.50	5.50	4.00	0.00
g_i, Effective Green Time [s]	9	40	40	0	34	34	23	25
g / C, Green / Cycle	0.10	0.48	0.48	0.00	0.40	0.40	0.28	0.31
(v / s)_i Volume / Saturation Flow Rate	0.05	0.28	0.28	0.00	0.32	0.02	0.14	0.00
s, saturation flow rate [veh/h]	1638	1825	1825	1810	3532	1436	1552	1900
c, Capacity [veh/h]	170	883	883	3	1431	582	499	577
d1, Uniform Delay [s]	35.34	15.35	15.35	41.61	21.73	15.02	25.00	0.00
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.30	0.58	0.58	67.19	1.03	0.03	0.63	0.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.50	0.57	0.57	0.37	0.79	0.04	0.45	0.00
d, Delay for Lane Group [s/veh]	37.65	15.93	15.93	108.80	22.76	15.05	25.63	0.00
Lane Group LOS	D	B	B	F	C	B	C	A
Critical Lane Group	Yes	No	No	No	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.73	6.45	6.45	0.07	9.30	0.28	3.65	0.00
50th-Percentile Queue Length [ft/ln]	43.25	161.15	161.15	1.78	232.53	7.05	91.33	0.00
95th-Percentile Queue Length [veh/ln]	3.11	10.61	10.61	0.13	14.30	0.51	6.58	0.00
95th-Percentile Queue Length [ft/ln]	77.85	265.24	265.24	3.20	357.57	12.69	164.40	0.00

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	37.65	15.93	15.93	108.80	22.76	15.05	25.63	25.63	25.63	0.00	0.00	0.00
Movement LOS	D	B	B	F	C	B	C	C	C	A	A	A
d_A, Approach Delay [s/veh]	17.64			22.67			25.63			0.00		
Approach LOS	B			C			C			A		
d_I, Intersection Delay [s/veh]	20.72											
Intersection LOS	C											
Intersection V/C	0.374											

Emissions

Vehicle Miles Traveled [mph]	17.42	101.87	101.87	0.17	197.06	4.34	9.13	0.00
Stops [stops/h]	74.74	278.47	278.47	3.07	803.64	12.18	157.83	0.00
Fuel consumption [US gal/h]	1.79	7.36	7.36	0.05	17.81	0.32	2.41	0.00
CO [g/h]	125.03	514.66	514.66	3.23	1244.57	22.56	168.53	0.00
NOx [g/h]	24.33	100.13	100.13	0.63	242.15	4.39	32.79	0.00
VOC [g/h]	28.98	119.28	119.28	0.75	288.44	5.23	39.06	0.00

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	720	600
d_b, Bicycle Delay [s]	41.67	41.67	17.07	20.42
I_b,int, Bicycle LOS Score for Intersection	2.461	2.536	2.104	1.560
Bicycle LOS	B	B	B	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	12.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.054

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	22	29	250	34	14	93
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	3.00	3.00	18.00	0.00	8.00
Growth Factor	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	22	29	270	34	14	100
Peak Hour Factor	0.8000	0.8000	0.8800	0.8800	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	9	77	10	4	30
Total Analysis Volume [veh/h]	28	36	307	39	17	119
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.05	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	12.66	10.74	0.00	0.00	7.96	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.35	0.35	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	8.73	8.73	0.00	0.00	0.71	0.71
d_A, Approach Delay [s/veh]	11.58		0.00		0.99	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.61					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.050

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	11	0	1	1	152	0	0	94	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	91.00	2.00	100.00	100.00	3.00	2.00	2.00	1.00	88.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	11	0	1	1	164	0	0	102	8
Peak Hour Factor	1.0000	1.0000	1.0000	0.4300	0.4300	0.4300	0.9300	0.9300	0.9300	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	6	0	1	0	44	0	0	27	2
Total Analysis Volume [veh/h]	0	0	0	26	0	2	1	176	0	0	109	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.47	10.85	9.15	12.29	11.15	9.92	8.49	0.00	0.00	7.57	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.16	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	3.94	3.94	0.20	0.07	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.16			12.12			0.05			0.00		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.08											
Intersection LOS	B											

Brannon DougCO APM TIS

Vistro File: C:\...\AM 6-17-24.vistro
Scenario 8 2024 Total AM

Report File: C:\...\2024 Total AM.pdf
6/17/2024

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 85/Airport	Signalized	HCM 7th Edition	NB Left	0.314	17.2	B
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.072	13.3	B
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.003	10.9	B
4	West Access	Two-way stop	HCM 7th Edition	SB Left	0.065	12.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 85/Airport

Control Type:	Signalized	Delay (sec / veh):	17.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.314

Intersection Setup

Name	US 85			US 85			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	340.00	100.00	100.00	500.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85			US 85			Airport Road			Airport Road		
Base Volume Input [veh/h]	130	983	0	0	556	61	69	1	103	0	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	21.00	2.00	0.00	0.00	8.00	32.00	40.00	0.00	25.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0400	1.0400	1.0400	1.0300	1.0300	1.0300	1.0800	1.0800	1.0800	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	0	0	0	12	11	0	10	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	38	0	0	61	0	0	0
Total Hourly Volume [veh/h]	145	1022	0	0	573	37	86	1	60	0	1	0
Peak Hour Factor	0.8700	0.8700	0.8700	0.9400	0.9400	0.9400	0.9000	0.9000	0.9000	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	294	0	0	152	10	24	0	17	0	0	0
Total Analysis Volume [veh/h]	167	1175	0	0	610	39	96	1	67	0	1	0
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Free Running (No Pattern)
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	1	6	0	4	4	0	0	8	0
Auxiliary Signal Groups												
Maximum Green [s]	20	90	0	10	90	0	30	30	0	0	25	0
Amber [s]	3.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	3.0	0.0
All red [s]	1.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	5	0	5	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	10	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	40.0	40.0	0.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
Advanced Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Free Running (No Pattern)

Split [s]	9	0	0	0	0	0	0	0	0	0	14	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	10	30	0	5	30	0	15	15	0	0	5	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
C, Calculated Cycle Length [s]	74	74	74	74	74	74	74	74
L, Total Lost Time per Cycle [s]	4.00	7.50	7.50	6.00	7.50	7.50	6.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	5.50	5.50	4.00	5.50	5.50	4.00	0.00
g_i, Effective Green Time [s]	10	38	38	0	30	30	17	19
g / C, Green / Cycle	0.14	0.51	0.51	0.00	0.40	0.40	0.23	0.25
(v / s)_i Volume / Saturation Flow Rate	0.11	0.31	0.31	0.00	0.18	0.03	0.11	0.00
s, saturation flow rate [veh/h]	1509	1870	1870	1810	3389	1207	1542	1892
c, Capacity [veh/h]	206	959	959	0	1367	487	424	473
d1, Uniform Delay [s]	31.24	12.89	12.89	0.00	16.17	13.70	24.82	20.84
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.48	0.64	0.64	0.00	0.23	0.07	0.58	0.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.81	0.61	0.61	0.00	0.45	0.08	0.39	0.00
d, Delay for Lane Group [s/veh]	38.73	13.53	13.53	0.00	16.40	13.77	25.39	20.84
Lane Group LOS	D	B	B	A	B	B	C	C
Critical Lane Group	No	Yes	No	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	3.24	6.33	6.33	0.00	3.56	0.39	2.46	0.01
50th-Percentile Queue Length [ft/ln]	81.00	158.29	158.29	0.00	88.89	9.75	61.60	0.32
95th-Percentile Queue Length [veh/ln]	5.83	10.46	10.46	0.00	6.40	0.70	4.44	0.02
95th-Percentile Queue Length [ft/ln]	145.81	261.46	261.46	0.00	160.00	17.55	110.88	0.58

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	38.73	13.53	13.53	0.00	16.40	13.77	25.39	25.39	25.39	20.84	20.84	20.84
Movement LOS	D	B	B	A	B	B	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	16.67			16.24			25.39			20.84		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	17.20											
Intersection LOS	B											
Intersection V/C	0.314											

Emissions

Vehicle Miles Traveled [mph]	33.82	118.98	118.98	0.00	106.00	6.78	6.71			0.03		
Stops [stops/h]	156.77	306.35	306.35	0.00	344.06	18.87	119.22			0.62		
Fuel consumption [US gal/h]	3.57	8.21	8.21	0.00	8.30	0.49	1.78			0.01		
CO [g/h]	249.86	573.78	573.78	0.00	580.18	34.43	124.60			0.62		
NOx [g/h]	48.61	111.64	111.64	0.00	112.88	6.70	24.24			0.12		
VOC [g/h]	57.91	132.98	132.98	0.00	134.46	7.98	28.88			0.14		

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	806	672
d_b, Bicycle Delay [s]	37.20	37.20	13.25	16.40
I_b,int, Bicycle LOS Score for Intersection	2.667	2.126	1.931	1.561
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	13.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.072

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	26	20	160	16	15	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	31.00	20.00	28.00	19.00	20.00	21.00
Growth Factor	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	21	0	0	22
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	20	194	16	15	226
Peak Hour Factor	0.7700	0.7700	0.9000	0.9000	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	6	54	4	4	61
Total Analysis Volume [veh/h]	34	26	216	18	16	243
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.03	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	13.32	10.41	0.00	0.00	7.93	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.35	0.35	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	8.78	8.78	0.00	0.00	0.67	0.67
d_A, Approach Delay [s/veh]	12.06		0.00		0.49	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.54					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	9	0	0	2	111	0	6	102	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	0.00	2.00	0.00	60.00	23.00	2.00	67.00	19.00	97.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	3	21	0	0	0	22
Diverted Trips [veh/h]	0	0	0	-8	0	0	0	8	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	1	0	0	5	149	0	6	110	36
Peak Hour Factor	0.8500	0.8500	0.8500	0.5800	0.5800	0.5800	0.8600	0.8600	0.8600	0.7900	0.7900	0.7900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	1	43	0	2	35	11
Total Analysis Volume [veh/h]	0	0	0	2	0	0	6	173	0	8	139	46
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	11.15	11.65	9.14	10.92	11.27	8.94	8.27	0.00	0.00	8.32	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.25	0.00	0.00	0.41	0.00	0.00	0.55	0.00	0.00
d_A, Approach Delay [s/veh]	10.65			10.92			0.28			0.34		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.37											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: West Access

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.065

Intersection Setup

Name	Site Access		Waterton Road		Airport Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Site Access		Waterton Road		Airport Road	
Base Volume Input [veh/h]	0	0	0	113	122	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	100.00	100.00	2.00	14.00	29.00	2.00
Growth Factor	1.0000	1.0000	28.0000	1.0800	1.0800	28.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	21	3	0	3	0	0
Diverted Trips [veh/h]	8	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	3	0	125	132	0
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	1	0	37	39	0
Total Analysis Volume [veh/h]	34	4	0	147	155	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.32	10.27	0.00	0.00	0.00	0.00
Movement LOS	B	B		A	A	
95th-Percentile Queue Length [veh/ln]	0.21	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	5.17	0.44	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.10		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.35					
Intersection LOS	B					

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Vistro File: C:\...\PM 6-17-24.vistro
Scenario 8 2024 Total PM

Report File: C:\...\2024 Total PM.pdf
6/17/2024

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	US 85/Airport	Signalized	HCM 7th Edition	SB Left	0.378	21.1	C
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.056	12.9	B
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.003	10.6	B
4	West Access	Two-way stop	HCM 7th Edition	SB Left	0.037	12.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: US 85/Airport

Control Type:	Signalized	Delay (sec / veh):	21.1
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.378

Intersection Setup

Name	US 85			US 85			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	1	0	0	0	0	0	0
Entry Pocket Length [ft]	340.00	100.00	100.00	500.00	100.00	500.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85			US 85			Airport Road			Airport Road		
Base Volume Input [veh/h]	72	841	1	1	980	44	82	0	198	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	16.00	5.00	0.00	0.00	3.00	24.00	10.00	0.00	6.00	0.00	0.00	0.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0400	1.0400	1.0400	1.0300	1.0300	1.0300	1.0800	1.0800	1.0800	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	0	0	0	0	6	4	0	2	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	1	0	0	26	0	0	108	0	0	0
Total Hourly Volume [veh/h]	78	875	0	1	1009	25	93	0	108	0	0	0
Peak Hour Factor	0.8700	0.8700	0.8700	0.8900	0.8900	0.8900	0.8800	0.8800	0.8800	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	251	0	0	283	7	26	0	31	0	0	0
Total Analysis Volume [veh/h]	90	1006	0	1	1134	28	106	0	123	0	0	0
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Active Pattern	Free Running (No Pattern)
Coordination Type	*Free Running*
Actuation Type	*Fully actuated*
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	1	6	0	4	4	0	0	8	0
Auxiliary Signal Groups												
Maximum Green [s]	20	90	0	10	90	0	30	30	0	0	25	0
Amber [s]	3.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	3.0	0.0
All red [s]	1.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	5	0	5	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	10	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	5.5	0.0	4.0	5.5	0.0	4.0	4.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	40.0	40.0	0.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0
Advanced Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Advanced Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Free Running (No Pattern)

Split [s]	9	0	0	0	0	0	0	0	0	0	14	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	10	30	0	5	30	0	15	15	0	0	5	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall	No	Yes		No	Yes			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	R	C	C
C, Calculated Cycle Length [s]	85	85	85	85	85	85	85	85
L, Total Lost Time per Cycle [s]	4.00	7.50	7.50	6.00	7.50	7.50	6.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	5.50	5.50	4.00	5.50	5.50	4.00	0.00
g_i, Effective Green Time [s]	9	41	41	0	34	34	24	26
g / C, Green / Cycle	0.10	0.48	0.48	0.00	0.40	0.40	0.29	0.31
(v / s)_i Volume / Saturation Flow Rate	0.06	0.28	0.28	0.00	0.32	0.02	0.15	0.00
s, saturation flow rate [veh/h]	1581	1825	1825	1810	3532	1309	1549	1900
c, Capacity [veh/h]	165	882	882	3	1427	529	504	584
d1, Uniform Delay [s]	36.03	15.62	15.62	42.25	22.16	15.37	25.22	0.00
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.80	0.58	0.58	67.48	1.04	0.04	0.64	0.00
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.55	0.57	0.57	0.37	0.79	0.05	0.45	0.00
d, Delay for Lane Group [s/veh]	38.83	16.20	16.20	109.73	23.20	15.41	25.87	0.00
Lane Group LOS	D	B	B	F	C	B	C	A
Critical Lane Group	Yes	No	No	No	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.86	6.58	6.58	0.07	9.50	0.32	3.81	0.00
50th-Percentile Queue Length [ft/ln]	46.57	164.58	164.58	1.79	237.62	8.11	95.34	0.00
95th-Percentile Queue Length [veh/ln]	3.35	10.79	10.79	0.13	14.56	0.58	6.86	0.00
95th-Percentile Queue Length [ft/ln]	83.82	269.78	269.78	3.22	364.03	14.61	171.61	0.00

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	38.83	16.20	16.20	109.73	23.20	15.41	25.87	25.87	25.87	0.00	0.00	0.00
Movement LOS	D	B	B	F	C	B	C	C	C	A	A	A
d_A, Approach Delay [s/veh]	18.06			23.09			25.87			0.00		
Approach LOS	B			C			C			A		
d_I, Intersection Delay [s/veh]	21.13											
Intersection LOS	C											
Intersection V/C	0.378											

Emissions

Vehicle Miles Traveled [mph]	18.23	101.87	101.87	0.17	197.06	4.87	9.37	0.00
Stops [stops/h]	79.24	280.06	280.06	3.04	808.70	13.81	162.23	0.00
Fuel consumption [US gal/h]	1.90	7.40	7.40	0.05	17.93	0.36	2.49	0.00
CO [g/h]	132.76	517.21	517.21	3.24	1253.61	25.47	173.88	0.00
NOx [g/h]	25.83	100.63	100.63	0.63	243.91	4.96	33.83	0.00
VOC [g/h]	30.77	119.87	119.87	0.75	290.54	5.90	40.30	0.00

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	0	709	591
d_b, Bicycle Delay [s]	42.31	42.31	17.63	21.01
I_b,int, Bicycle LOS Score for Intersection	2.465	2.541	2.116	1.560
Bicycle LOS	B	B	B	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	12.9
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.056

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	22	29	250	34	14	93
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	3.00	5.00	18.00	0.00	15.00
Growth Factor	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	6	0	0	9
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	22	29	276	34	14	109
Peak Hour Factor	0.8000	0.8000	0.8800	0.8800	0.8400	0.8400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	9	78	10	4	32
Total Analysis Volume [veh/h]	28	36	314	39	17	130
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.05	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	12.86	10.81	0.00	0.00	7.98	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.36	0.36	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	8.90	8.90	0.00	0.00	0.71	0.71
d_A, Approach Delay [s/veh]	11.71		0.00		0.92	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.57					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	10.6
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	11	0	1	1	152	0	0	94	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	0.00	2.00	0.00	100.00	6.00	2.00	2.00	1.00	94.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0800	1.0000	1.0000	1.0800	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	1	6	0	0	0	9
Diverted Trips [veh/h]	0	0	0	-10	0	-1	0	10	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	1	0	0	2	180	0	0	102	17
Peak Hour Factor	1.0000	1.0000	1.0000	0.4300	0.4300	0.4300	0.9300	0.9300	0.9300	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	1	48	0	0	27	5
Total Analysis Volume [veh/h]	0	0	0	2	0	0	2	194	0	0	109	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.67	11.08	9.25	10.57	10.96	8.79	8.52	0.00	0.00	7.61	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.23	0.23	0.00	0.15	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.33			10.57			0.09			0.00		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.12											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: West Access

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name	Site Access		Waterton Road		Airport Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Site Access		Waterton Road		Airport Road	
Base Volume Input [veh/h]	0	0	0	153	95	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	100.00	100.00	2.00	4.00	1.00	2.00
Growth Factor	1.0000	1.0000	28.0000	1.0800	1.0800	28.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	1	0	0
Diverted Trips [veh/h]	10	1	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	1	0	166	103	0
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	0	49	30	0
Total Analysis Volume [veh/h]	19	1	0	195	121	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.26	10.00	0.00	0.00	0.00	0.00
Movement LOS	B	A		A	A	
95th-Percentile Queue Length [veh/ln]	0.11	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.87	0.10	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.14		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.72					
Intersection LOS	B					

Year 2040 Traffic Volume Scenarios

Brannon DougCO APM TIS

Vistro File: C:\...\AM 11-17-23.vistro
Report File: C:\...\2040 Back AM.pdf

Scenario 12 2040 Back AM
11/17/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.205	37.3	E
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.057	26.6	D
8	US 85 SB Ramps	Signalized	HCM 7th Edition	SB Right	0.382	5.5	A
9	US 85 NB Ramps	Signalized	HCM 7th Edition	NB Left	0.482	18.0	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	37.3
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.205

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	26	20	160	16	15	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	31.00	20.00	19.00	19.00	20.00	12.00
Growth Factor	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	10	0	0	29
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	20	557	16	15	675
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	5	151	4	4	181
Total Analysis Volume [veh/h]	28	22	605	17	16	726
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.20	0.05	0.01	0.00	0.02	0.01
d_M, Delay for Movement [s/veh]	37.29	18.72	0.00	0.00	9.12	0.00
Movement LOS	E	C	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.96	0.96	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	23.99	23.99	0.00	0.00	0.67	0.67
d_A, Approach Delay [s/veh]	29.12		0.00		0.20	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	1.13					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	26.6
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.057

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	9	0	0	2	111	0	6	102	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	89.00	2.00	0.00	100.00	11.00	2.00	67.00	17.00	93.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	10	0	0	29	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	9	0	0	2	390	0	6	378	14
Peak Hour Factor	0.8500	0.8500	0.8500	0.9200	0.5800	0.9200	0.9200	0.9200	0.8600	0.7900	0.7900	0.7900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	2	0	0	1	106	0	2	120	4
Total Analysis Volume [veh/h]	0	0	0	10	0	0	2	424	0	8	478	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	19.74	18.82	10.71	26.65	18.49	11.09	10.11	0.00	0.00	9.23	0.00	0.00
Movement LOS	C	C	B	D	C	B	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.18	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	4.47	0.00	0.00	0.21	0.00	0.00	0.70	0.00	0.00
d_A, Approach Delay [s/veh]	16.43			26.65			0.05			0.15		
Approach LOS	C			D			A			A		
d_I, Intersection Delay [s/veh]	0.38											
Intersection LOS	D											

Intersection Level Of Service Report
Intersection 8: US 85 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	5.5
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.382

Intersection Setup

Name				US 85 SB Ramp			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present				No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name				US 85 SB Ramp			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	0	0	61	0	70	103	0	131	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	20.00	2.00	32.00	18.00	2.00	25.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.7000	1.7000	1.7000	1.0000	3.4200	3.4200	3.4200	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	30	0	0	0	10	0	77	29	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	52	0	0	176	0	0	0
Total Hourly Volume [veh/h]	0	0	0	30	0	52	0	249	176	77	477	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	8	0	14	0	68	48	21	130	0
Total Analysis Volume [veh/h]	0	0	0	33	0	57	0	271	191	84	518	0
Presence of On-Street Parking				No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	0	0	0	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	0	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	0	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	0	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk					No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	0	0	0	14	0	0	56	0	0	56	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	0	0	0	10	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall					No			No			No	
Maximum Recall					No			No			No	
Pedestrian Recall					No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group		C	R	C	R	L	C
C, Cycle Length [s]		70	70	70	70	70	70
L, Total Lost Time per Cycle [s]		4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]		0.00	0.00	0.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]		2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]		8	8	54	54	54	54
g / C, Green / Cycle		0.12	0.12	0.77	0.77	0.77	0.77
(v / s)_i Volume / Saturation Flow Rate		0.02	0.04	0.19	0.14	0.09	0.34
s, saturation flow rate [veh/h]		1781	1360	1420	1385	930	1525
c, Capacity [veh/h]		213	163	1088	1061	734	1168
d1, Uniform Delay [s]		27.64	28.32	2.37	2.22	3.98	2.90
k, delay calibration		0.11	0.11	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor		1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]		0.33	1.29	0.55	0.37	0.32	1.22
d3, Initial Queue Delay [s]		0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio		1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor		1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity		0.15	0.35	0.25	0.18	0.11	0.44
d, Delay for Lane Group [s/veh]		27.98	29.60	2.91	2.59	4.30	4.12
Lane Group LOS		C	C	A	A	A	A
Critical Lane Group		No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]		0.50	0.91	0.72	0.47	0.37	1.69
50th-Percentile Queue Length [ft/ln]		12.47	22.65	17.94	11.87	9.36	42.24
95th-Percentile Queue Length [veh/ln]		0.90	1.63	1.29	0.85	0.67	3.04
95th-Percentile Queue Length [ft/ln]		22.45	40.76	32.30	21.36	16.85	76.03

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	27.98	27.98	29.60	0.00	2.91	2.59	4.30	4.12	0.00
Movement LOS				C	C	C		A	A	A	A	
d_A, Approach Delay [s/veh]	0.00			29.01			2.78			4.15		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	5.54											
Intersection LOS	A											
Intersection V/C	0.382											

Emissions

Vehicle Miles Traveled [mph]		3.03	5.23	8.59	6.06	1.98	12.20
Stops [stops/h]		25.66	46.59	36.91	24.42	19.26	86.89
Fuel consumption [US gal/h]		0.45	0.82	0.72	0.48	0.26	1.42
CO [g/h]		31.75	57.04	50.21	33.90	18.27	99.04
NOx [g/h]		6.18	11.10	9.77	6.60	3.55	19.27
VOC [g/h]		7.36	13.22	11.64	7.86	4.23	22.95

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	286	1486	1486
d_b, Bicycle Delay [s]	35.00	25.71	2.31	2.31
I_b,int, Bicycle LOS Score for Intersection	4.132	1.794	2.612	2.553
Bicycle LOS	D	A	B	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 9: US 85 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	18.0
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.482

Intersection Setup

Name	US 85 NB Ramp						Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No						No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85 NB Ramp						Airport Road			Airport Road		
Base Volume Input [veh/h]	130	0	0	0	0	0	69	1	0	0	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	25.00	2.00	2.00	2.00	2.00	2.00	32.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	2.1000	2.1000	2.1000	1.0000	1.0000	1.0000	3.4200	3.4200	1.0000	1.0000	3.4200	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	26	0	0	0	0	40	0	0	106	87
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	13	0	0	0	0	0	0	0	0	44
Total Hourly Volume [veh/h]	273	0	13	0	0	0	236	43	0	0	109	43
Peak Hour Factor	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	74	0	4	0	0	0	64	12	0	0	30	12
Total Analysis Volume [veh/h]	297	0	14	0	0	0	257	47	0	0	118	47
Presence of On-Street Parking	No		No				No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	30	0	0	0	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	0	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No						No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	20	0	0	0	0	0	50	0	0	50	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	0	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No						Yes			Yes	
Maximum Recall		No						No			No	
Pedestrian Recall		No						No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C		L	C	C
C, Cycle Length [s]	70	70		70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00		4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00		2.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00		2.00	2.00	2.00
g_i, Effective Green Time [s]	16	16		46	46	46
g / C, Green / Cycle	0.23	0.23		0.66	0.66	0.66
(v / s)_i Volume / Saturation Flow Rate	0.20	0.01		0.28	0.03	0.09
s, saturation flow rate [veh/h]	1452	1589		927	1870	1780
c, Capacity [veh/h]	332	363		655	1229	1170
d1, Uniform Delay [s]	26.26	21.07		7.90	4.23	4.54
k, delay calibration	0.11	0.11		0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00		1.00	1.00	1.00
d2, Incremental Delay [s]	8.42	0.04		1.76	0.06	0.25
d3, Initial Queue Delay [s]	0.00	0.00		0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00		1.00	1.00	1.00
PF, progression factor	1.00	1.00		1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.89	0.04		0.39	0.04	0.14
d, Delay for Lane Group [s/veh]	34.68	21.12		9.66	4.29	4.79
Lane Group LOS	C	C		A	A	A
Critical Lane Group	Yes	No		Yes	No	No
50th-Percentile Queue Length [veh/ln]	5.31	0.18		2.08	0.20	0.77
50th-Percentile Queue Length [ft/ln]	132.86	4.40		52.11	5.05	19.22
95th-Percentile Queue Length [veh/ln]	9.09	0.32		3.75	0.36	1.38
95th-Percentile Queue Length [ft/ln]	227.37	7.92		93.80	9.09	34.59

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	34.68	21.12	21.12	0.00	0.00	0.00	9.66	4.29	0.00	0.00	4.79	4.79
Movement LOS	C	C	C				A	A			A	A
d_A, Approach Delay [s/veh]	34.07			0.00			8.83			4.79		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	18.04											
Intersection LOS	B											
Intersection V/C	0.482											

Emissions

Vehicle Miles Traveled [mph]	28.20	1.33		6.05	1.11	4.02
Stops [stops/h]	272.88	9.04		107.03	10.37	39.47
Fuel consumption [US gal/h]	4.76	0.16		1.35	0.14	0.54
CO [g/h]	333.04	11.52		94.08	10.06	38.07
NOx [g/h]	64.80	2.24		18.31	1.96	7.41
VOC [g/h]	77.19	2.67		21.80	2.33	8.82

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	456	0	1312	1312
d_b, Bicycle Delay [s]	20.88	35.05	4.15	4.15
I_b,int, Bicycle LOS Score for Intersection	2.094	4.132	2.061	1.904
Bicycle LOS	B	D	B	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Brannon DougCO APM TIS

Vistro File: C:\...\PM 11-17-23.vistro
Report File: C:\...\2040 Back PM.pdf

Scenario 12 2040 Back PM
11/19/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.160	35.0	D
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.072	28.3	D
8	US 85 SB Ramps	Signalized	HCM 7th Edition	SB Left	0.297	6.2	A
9	US 85 NB Ramps	Signalized	HCM 7th Edition	NB Left	0.345	10.1	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	35.0
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.160

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	22	29	250	34	14	93
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	3.00	3.00	18.00	0.00	7.00
Growth Factor	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	32	0	0	19
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	22	29	887	34	14	337
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	8	241	9	4	92
Total Analysis Volume [veh/h]	24	32	964	37	15	366
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.10	0.01	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	34.97	22.65	0.00	0.00	10.16	0.00
Movement LOS	D	C	A	A	B	A
95th-Percentile Queue Length [veh/ln]	1.02	1.02	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	25.54	25.54	0.00	0.00	0.63	0.63
d_A, Approach Delay [s/veh]	27.93		0.00		0.40	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	1.19					
Intersection LOS	D					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	28.3
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.072

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	11	0	1	1	152	0	0	94	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	91.00	2.00	100.00	100.00	3.00	2.00	2.00	1.00	88.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	32	0	0	19	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	11	0	1	1	552	0	0	340	8
Peak Hour Factor	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9300	0.9300	0.9300	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	3	0	0	0	148	0	0	90	2
Total Analysis Volume [veh/h]	0	0	0	12	0	1	1	594	0	0	362	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	20.35	19.18	12.13	28.34	20.69	12.08	9.49	0.00	0.00	8.67	0.00	0.00
Movement LOS	C	C	B	D	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.23	0.23	0.01	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	5.77	5.77	0.15	0.09	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.22			27.09			0.02			0.00		
Approach LOS	C			D			A			A		
d_I, Intersection Delay [s/veh]	0.37											
Intersection LOS	D											

Intersection Level Of Service Report
Intersection 8: US 85 SB Ramps

Control Type:	Signalized		Delay (sec / veh):	6.2
Analysis Method:	HCM 7th Edition		Level Of Service:	A
Analysis Period:	15 minutes		Volume to Capacity (v/c):	0.297

Intersection Setup

Name				US 85 SB Ramp			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present				No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name				US 85 SB Ramp			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	1	0	44	0	82	198	0	72	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	14.00	2.00	6.00	5.00	2.00	13.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.7000	1.7000	1.7000	1.0000	3.4200	3.4200	3.4200	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	96	0	0	0	32	0	50	19	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	38	0	0	339	0	0	0
Total Hourly Volume [veh/h]	0	0	0	98	0	37	0	312	338	50	265	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	27	0	10	0	85	92	14	72	0
Total Analysis Volume [veh/h]	0	0	0	107	0	40	0	339	367	54	288	0
Presence of On-Street Parking				No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	0	0	0	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	0	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	0	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	0	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk					No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	0	0	0	14	0	0	46	0	0	46	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	0	0	0	10	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall					No			No			No	
Maximum Recall					No			No			No	
Pedestrian Recall					No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group		C	R	C	R	L	C
C, Cycle Length [s]		60	60	60	60	60	60
L, Total Lost Time per Cycle [s]		4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]		0.00	0.00	0.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]		2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]		9	9	43	43	43	43
g / C, Green / Cycle		0.15	0.15	0.71	0.71	0.71	0.71
(v / s)_i Volume / Saturation Flow Rate		0.06	0.03	0.19	0.24	0.07	0.17
s, saturation flow rate [veh/h]		1781	1436	1810	1551	742	1705
c, Capacity [veh/h]		274	221	1290	1105	572	1215
d1, Uniform Delay [s]		22.84	22.08	3.05	3.25	4.94	2.98
k, delay calibration		0.11	0.11	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor		1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]		0.90	0.39	0.50	0.81	0.33	0.46
d3, Initial Queue Delay [s]		0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio		1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor		1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity		0.39	0.18	0.26	0.33	0.09	0.24
d, Delay for Lane Group [s/veh]		23.74	22.47	3.55	4.05	5.27	3.44
Lane Group LOS		C	C	A	A	A	A
Critical Lane Group		Yes	No	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]		1.35	0.49	0.97	1.16	0.26	0.81
50th-Percentile Queue Length [ft/ln]		33.68	12.15	24.17	28.92	6.56	20.26
95th-Percentile Queue Length [veh/ln]		2.42	0.87	1.74	2.08	0.47	1.46
95th-Percentile Queue Length [ft/ln]		60.62	21.86	43.51	52.06	11.81	36.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	23.74	23.74	22.47	0.00	3.55	4.05	5.27	3.44	0.00
Movement LOS				C	C	C		A	A	A	A	
d_A, Approach Delay [s/veh]	0.00			23.40			3.81			3.73		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	6.20											
Intersection LOS	A											
Intersection V/C	0.297											

Emissions

Vehicle Miles Traveled [mph]		9.82	3.67	10.75	11.63	1.27	6.79
Stops [stops/h]		80.83	29.15	58.01	69.42	15.75	48.63
Fuel consumption [US gal/h]		1.37	0.50	1.01	1.17	0.20	0.75
CO [g/h]		95.60	34.60	70.43	81.45	13.79	52.41
NOx [g/h]		18.60	6.73	13.70	15.85	2.68	10.20
VOC [g/h]		22.16	8.02	16.32	18.88	3.20	12.15

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	333	1400	1400
d_b, Bicycle Delay [s]	30.00	20.83	2.70	2.70
I_b,int, Bicycle LOS Score for Intersection	4.132	1.865	3.284	2.124
Bicycle LOS	D	A	C	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 9: US 85 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	10.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.345

Intersection Setup

Name	US 85 NB Ramp						Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No						No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85 NB Ramp						Airport Road			Airport Road		
Base Volume Input [veh/h]	72	0	1	0	0	0	82	1	0	0	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	13.00	2.00	2.00	2.00	2.00	2.00	6.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	2.1000	2.1000	2.1000	1.0000	1.0000	1.0000	3.4200	3.4200	1.0000	1.0000	3.4200	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	86	0	0	0	0	128	0	0	69	57
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	44	0	0	0	0	0	0	0	0	29
Total Hourly Volume [veh/h]	151	0	44	0	0	0	280	131	0	0	72	28
Peak Hour Factor	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	41	0	12	0	0	0	76	36	0	0	20	8
Total Analysis Volume [veh/h]	164	0	48	0	0	0	304	142	0	0	78	30
Presence of On-Street Parking	No		No				No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	30	0	0	0	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	0	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No						No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	14	0	0	0	0	0	46	0	0	46	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	0	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No						Yes			Yes	
Maximum Recall		No						No			No	
Pedestrian Recall		No						No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C		L	C	C
C, Cycle Length [s]	60	60		60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00		4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00		2.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00		2.00	2.00	2.00
g_i, Effective Green Time [s]	10	10		42	42	42
g / C, Green / Cycle	0.16	0.16		0.70	0.70	0.70
(v / s)_i Volume / Saturation Flow Rate	0.10	0.03		0.24	0.08	0.06
s, saturation flow rate [veh/h]	1624	1589		1244	1870	1783
c, Capacity [veh/h]	266	261		935	1315	1254
d1, Uniform Delay [s]	23.43	21.72		4.73	2.87	2.83
k, delay calibration	0.11	0.11		0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00		1.00	1.00	1.00
d2, Incremental Delay [s]	2.31	0.34		0.92	0.17	0.14
d3, Initial Queue Delay [s]	0.00	0.00		0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00		1.00	1.00	1.00
PF, progression factor	1.00	1.00		1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.62	0.18		0.33	0.11	0.09
d, Delay for Lane Group [s/veh]	25.74	22.06		5.66	3.04	2.96
Lane Group LOS	C	C		A	A	A
Critical Lane Group	Yes	No		Yes	No	No
50th-Percentile Queue Length [veh/ln]	2.20	0.57		1.39	0.38	0.28
50th-Percentile Queue Length [ft/ln]	54.90	14.34		34.78	9.43	7.10
95th-Percentile Queue Length [veh/ln]	3.95	1.03		2.50	0.68	0.51
95th-Percentile Queue Length [ft/ln]	98.81	25.82		62.60	16.97	12.78

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	25.74	22.06	22.06	0.00	0.00	0.00	5.66	3.04	0.00	0.00	2.96	2.96
Movement LOS	C	C	C				A	A			A	A
d_A, Approach Delay [s/veh]	24.91			0.00			4.83			2.96		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	10.12											
Intersection LOS	B											
Intersection V/C	0.345											

Emissions

Vehicle Miles Traveled [mph]	15.57	4.56		7.16	3.35	2.63
Stops [stops/h]	131.42	34.34		83.26	22.58	17.00
Fuel consumption [US gal/h]	2.23	0.59		1.11	0.35	0.27
CO [g/h]	155.61	41.44		77.24	24.48	18.69
NOx [g/h]	30.28	8.06		15.03	4.76	3.64
VOC [g/h]	36.06	9.60		17.90	5.67	4.33

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	333	0	1397	1397
d_b, Bicycle Delay [s]	20.91	30.07	2.74	2.74
I_b,int, Bicycle LOS Score for Intersection	1.982	4.132	2.296	1.786
Bicycle LOS	A	D	B	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Brannon DougCO APM TIS

Vistro File: C:\...\AM 11-17-23.vistro

Report File: C:\...\2040 Total AM.pdf

Scenario 10 2040 Total AM

11/17/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.219	40.1	E
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.004	20.4	C
4	West Access	Two-way stop	HCM 7th Edition	SB Left	0.141	25.3	D
8	US 85 SB Ramps	Signalized	HCM 7th Edition	SB Right	0.408	5.9	A
9	US 85 NB Ramps	Signalized	HCM 7th Edition	NB Left	0.517	20.8	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	40.1
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.219

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	26	20	160	16	15	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	31.00	20.00	22.00	19.00	20.00	15.00
Growth Factor	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	31	0	0	51
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	20	578	16	15	697
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	5	157	4	4	187
Total Analysis Volume [veh/h]	28	22	628	17	16	749
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.22	0.05	0.01	0.00	0.02	0.01
d_M, Delay for Movement [s/veh]	40.07	19.87	0.00	0.00	9.20	0.00
Movement LOS	E	C	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.03	1.03	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	25.86	25.86	0.00	0.00	0.67	0.67
d_A, Approach Delay [s/veh]	31.18		0.00		0.19	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	1.17					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	20.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	9	0	0	2	111	0	6	102	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	0.00	2.00	0.00	100.00	15.00	2.00	67.00	17.00	97.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	3	31	0	0	29	22
Diverted Trips [veh/h]	0	0	0	-8	0	0	0	8	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	1	0	0	5	419	0	6	378	36
Peak Hour Factor	0.8500	0.8500	0.8500	0.9200	0.5800	0.9200	0.9200	0.9200	0.8600	0.7900	0.7900	0.7900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	1	114	0	2	120	11
Total Analysis Volume [veh/h]	0	0	0	1	0	0	5	455	0	8	478	46
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	21.04	20.16	10.95	20.41	19.25	11.09	10.28	0.00	0.00	9.35	0.00	0.00
Movement LOS	C	C	B	C	C	B	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.32	0.00	0.00	0.55	0.00	0.00	0.73	0.00	0.00
d_A, Approach Delay [s/veh]	17.39			20.41			0.11			0.14		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	0.15											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 4: West Access

Control Type:	Two-way stop	Delay (sec / veh):	25.3
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.141

Intersection Setup

Name	Site Access		Waterton Road		Airport Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Site Access		Waterton Road		Airport Road	
Base Volume Input [veh/h]	0	0	0	113	122	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	100.00	100.00	2.00	12.00	28.00	2.00
Growth Factor	1.0000	1.0000	28.0000	3.4200	3.4200	28.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	21	3	0	13	29	0
Diverted Trips [veh/h]	6	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	27	3	0	399	446	0
Peak Hour Factor	0.9200	0.9200	0.8500	0.9200	0.9200	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	1	0	108	121	0
Total Analysis Volume [veh/h]	29	3	0	434	485	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.14	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	25.32	13.52	0.00	0.00	0.00	0.00
Movement LOS	D	B		A	A	
95th-Percentile Queue Length [veh/ln]	0.48	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	12.03	0.53	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	24.22		0.00		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.81					
Intersection LOS	D					

Intersection Level Of Service Report
Intersection 8: US 85 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	5.9
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.408

Intersection Setup

Name				US 85 SB Ramp			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present				No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name				US 85 SB Ramp			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	0	0	61	0	70	103	0	131	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	28.00	2.00	35.00	21.00	2.00	28.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.7000	1.7000	1.7000	1.0000	3.4200	3.4200	3.4200	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	30	0	12	0	21	10	77	39	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	58	0	0	181	0	0	0
Total Hourly Volume [veh/h]	0	0	0	30	0	58	0	260	181	77	487	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	8	0	16	0	71	49	21	132	0
Total Analysis Volume [veh/h]	0	0	0	33	0	63	0	283	197	84	529	0
Presence of On-Street Parking				No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	0	0	0	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	0	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	0	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	0	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk					No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	0	0	0	14	0	0	56	0	0	56	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	0	0	0	10	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall					No			No			No	
Maximum Recall					No			No			No	
Pedestrian Recall					No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group		C	R	C	R	L	C
C, Cycle Length [s]		70	70	70	70	70	70
L, Total Lost Time per Cycle [s]		4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]		0.00	0.00	0.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]		2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]		9	9	53	53	53	53
g / C, Green / Cycle		0.12	0.12	0.76	0.76	0.76	0.76
(v / s)_i Volume / Saturation Flow Rate		0.02	0.05	0.21	0.15	0.09	0.36
s, saturation flow rate [veh/h]		1781	1258	1375	1347	915	1480
c, Capacity [veh/h]		220	155	1048	1027	713	1128
d1, Uniform Delay [s]		27.39	28.30	2.49	2.32	4.27	3.08
k, delay calibration		0.11	0.11	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor		1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]		0.31	1.70	0.63	0.42	0.34	1.40
d3, Initial Queue Delay [s]		0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio		1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor		1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity		0.15	0.41	0.27	0.19	0.12	0.47
d, Delay for Lane Group [s/veh]		27.71	30.00	3.13	2.73	4.61	4.48
Lane Group LOS		C	C	A	A	A	A
Critical Lane Group		No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]		0.50	1.01	0.80	0.51	0.40	1.85
50th-Percentile Queue Length [ft/ln]		12.40	25.35	19.88	12.85	9.91	46.24
95th-Percentile Queue Length [veh/ln]		0.89	1.83	1.43	0.92	0.71	3.33
95th-Percentile Queue Length [ft/ln]		22.32	45.63	35.78	23.12	17.84	83.23

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	27.71	27.71	30.00	0.00	3.13	2.73	4.61	4.48	0.00
Movement LOS				C	C	C		A	A	A	A	
d_A, Approach Delay [s/veh]	0.00			29.21			2.97			4.50		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	5.88											
Intersection LOS	A											
Intersection V/C	0.408											

Emissions

Vehicle Miles Traveled [mph]		3.03	5.78	8.97	6.25	1.98	12.46
Stops [stops/h]		25.51	52.15	40.89	26.43	20.39	95.12
Fuel consumption [US gal/h]		0.45	0.91	0.78	0.51	0.27	1.52
CO [g/h]		31.57	63.66	54.20	35.84	19.08	106.33
NOx [g/h]		6.14	12.39	10.55	6.97	3.71	20.69
VOC [g/h]		7.32	14.75	12.56	8.31	4.42	24.64

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	286	1486	1486
d_b, Bicycle Delay [s]	35.00	25.71	2.31	2.31
I_b,int, Bicycle LOS Score for Intersection	4.132	1.814	2.650	2.571
Bicycle LOS	D	A	B	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 9: US 85 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	20.8
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.517

Intersection Setup

Name	US 85 NB Ramp						Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No						No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85 NB Ramp						Airport Road			Airport Road		
Base Volume Input [veh/h]	130	0	0	0	0	0	69	1	0	0	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	28.00	2.00	2.00	2.00	2.00	2.00	35.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	2.1000	2.1000	2.1000	1.0000	1.0000	1.0000	3.4200	3.4200	1.0000	1.0000	3.4200	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	26	0	0	0	11	40	0	0	106	87
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	13	0	0	0	0	0	0	0	0	44
Total Hourly Volume [veh/h]	283	0	13	0	0	0	247	43	0	0	109	43
Peak Hour Factor	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	77	0	4	0	0	0	67	12	0	0	30	12
Total Analysis Volume [veh/h]	308	0	14	0	0	0	268	47	0	0	118	47
Presence of On-Street Parking	No		No				No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	30	0	0	0	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	0	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No						No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	20	0	0	0	0	0	50	0	0	50	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	0	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No						Yes			Yes	
Maximum Recall		No						No			No	
Pedestrian Recall		No						No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C		L	C	C
C, Cycle Length [s]	70	70		70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00		4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00		2.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00		2.00	2.00	2.00
g_i, Effective Green Time [s]	16	16		46	46	46
g / C, Green / Cycle	0.23	0.23		0.66	0.66	0.66
(v / s)_i Volume / Saturation Flow Rate	0.22	0.01		0.30	0.03	0.09
s, saturation flow rate [veh/h]	1409	1589		897	1870	1780
c, Capacity [veh/h]	323	365		637	1228	1169
d1, Uniform Delay [s]	26.68	21.03		8.16	4.25	4.56
k, delay calibration	0.11	0.11		0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00		1.00	1.00	1.00
d2, Incremental Delay [s]	14.43	0.04		2.03	0.06	0.25
d3, Initial Queue Delay [s]	0.00	0.00		0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00		1.00	1.00	1.00
PF, progression factor	1.00	1.00		1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.95	0.04		0.42	0.04	0.14
d, Delay for Lane Group [s/veh]	41.11	21.08		10.20	4.30	4.81
Lane Group LOS	D	C		B	A	A
Critical Lane Group	Yes	No		Yes	No	No
50th-Percentile Queue Length [veh/ln]	6.08	0.18		2.26	0.20	0.77
50th-Percentile Queue Length [ft/ln]	151.93	4.39		56.54	5.07	19.32
95th-Percentile Queue Length [veh/ln]	10.12	0.32		4.07	0.37	1.39
95th-Percentile Queue Length [ft/ln]	253.01	7.90		101.78	9.13	34.77

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	41.11	21.08	21.08	0.00	0.00	0.00	10.20	4.30	0.00	0.00	4.81	4.81
Movement LOS	D	C	C				B	A			A	A
d_A, Approach Delay [s/veh]	40.24			0.00			9.32			4.81		
Approach LOS	D			A			A			A		
d_I, Intersection Delay [s/veh]	20.80											
Intersection LOS	C											
Intersection V/C	0.517											

Emissions

Vehicle Miles Traveled [mph]	29.24	1.33		6.31	1.11	4.02
Stops [stops/h]	312.06	9.02		116.14	10.42	39.68
Fuel consumption [US gal/h]	5.50	0.16		1.46	0.14	0.55
CO [g/h]	384.75	11.51		101.89	10.09	38.20
NOx [g/h]	74.86	2.24		19.82	1.96	7.43
VOC [g/h]	89.17	2.67		23.61	2.34	8.85

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	456	0	1312	1312
d_b, Bicycle Delay [s]	20.88	35.05	4.15	4.15
I_b,int, Bicycle LOS Score for Intersection	2.112	4.132	2.079	1.904
Bicycle LOS	B	D	B	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Brannon DougCO APM TIS

Vistro File: C:\...\PM 11-17-23.vistro
Report File: C:\...\2040 Total PM.pdf

Scenario 10 10 2040 Total PM
11/19/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Airport/Peterson	Two-way stop	HCM 7th Edition	NB Left	0.164	36.3	E
3	East Access	Two-way stop	HCM 7th Edition	SB Left	0.004	20.6	C
4	West Access	Two-way stop	HCM 7th Edition	SB Left	0.091	26.1	D
8	US 85 SB Ramps	Signalized	HCM 7th Edition	SB Left	0.297	6.3	A
9	US 85 NB Ramps	Signalized	HCM 7th Edition	NB Left	0.354	10.2	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 2: Airport/Peterson

Control Type:	Two-way stop	Delay (sec / veh):	36.3
Analysis Method:	HCM 7th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.164

Intersection Setup

Name	Peterson Road		Airport Road		Airport Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Peterson Road		Airport Road		Airport Road	
Base Volume Input [veh/h]	22	29	250	34	14	93
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	20.00	4.00	18.00	0.00	10.00
Growth Factor	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	38	0	0	28
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	22	29	893	34	14	346
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	8	243	9	4	94
Total Analysis Volume [veh/h]	24	32	971	37	15	376
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.16	0.11	0.01	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	36.27	24.36	0.00	0.00	10.19	0.00
Movement LOS	E	C	A	A	B	A
95th-Percentile Queue Length [veh/ln]	1.08	1.08	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	27.09	27.09	0.00	0.00	0.63	0.63
d_A, Approach Delay [s/veh]	29.46		0.00		0.39	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	1.24					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	20.6
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	KECI Access			Site Access			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	640.00	100.00	100.00	100.00	100.00	150.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	500.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	KECI Access			Site Access			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	11	0	1	1	152	0	0	94	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	0.00	2.00	0.00	100.00	3.00	2.00	2.00	1.00	94.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	3.4200	1.0000	1.0000	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	1	38	0	0	19	9
Diverted Trips [veh/h]	0	0	0	-10	0	-1	0	10	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	1	0	0	2	568	0	0	340	17
Peak Hour Factor	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9300	0.9300	0.9300	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	1	153	0	0	90	5
Total Analysis Volume [veh/h]	0	0	0	1	0	0	2	611	0	0	362	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	20.91	19.75	12.29	20.62	19.46	10.24	9.54	0.00	0.00	8.72	0.00	0.00
Movement LOS	C	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.33	0.33	0.00	0.19	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.65			20.62			0.03			0.00		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	0.04											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 4: West Access

Control Type:	Two-way stop	Delay (sec / veh):	26.1
Analysis Method:	HCM 7th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.091

Intersection Setup

Name	Site Access		Waterton Road		Airport Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Site Access		Waterton Road		Airport Road	
Base Volume Input [veh/h]	0	0	0	153	95	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	100.00	100.00	2.00	3.00	1.00	2.00
Growth Factor	1.0000	1.0000	28.0000	3.4200	3.4200	28.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	33	19	0
Diverted Trips [veh/h]	10	1	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	1	0	556	344	0
Peak Hour Factor	0.9200	0.9200	0.8500	0.9200	0.9200	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	0	151	93	0
Total Analysis Volume [veh/h]	17	1	0	604	374	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	26.06	12.21	0.00	0.00	0.00	0.00
Movement LOS	D	B		A	A	
95th-Percentile Queue Length [veh/ln]	0.29	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	7.36	0.15	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	25.29		0.00		0.00	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	0.46					
Intersection LOS	D					

Intersection Level Of Service Report
Intersection 8: US 85 SB Ramps

Control Type:	Signalized	Delay (sec / veh):	6.3
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.297

Intersection Setup

Name				US 85 SB Ramp			Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	1	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present				No			No			No		
Crosswalk	No			No			No			No		

Volumes

Name				US 85 SB Ramp			Airport Road			Airport Road		
Base Volume Input [veh/h]	0	0	0	1	0	44	0	82	198	0	72	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	20.00	2.00	7.00	5.00	2.00	14.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	1.0000	1.0000	1.0000	1.7000	1.7000	1.7000	1.0000	3.4200	3.4200	3.4200	3.4200	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	96	0	6	0	36	2	50	22	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	41	0	0	340	0	0	0
Total Hourly Volume [veh/h]	0	0	0	98	0	40	0	316	339	50	268	0
Peak Hour Factor	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	27	0	11	0	86	92	14	73	0
Total Analysis Volume [veh/h]	0	0	0	107	0	43	0	343	368	54	291	0
Presence of On-Street Parking				No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	0	0	0	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	0	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	0	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	0	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk					No			No			No	
I1, Start-Up Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	0	0	0	14	0	0	46	0	0	46	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	0	0	0	10	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall					No			No			No	
Maximum Recall					No			No			No	
Pedestrian Recall					No			No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group		C	R	C	R	L	C
C, Cycle Length [s]		60	60	60	60	60	60
L, Total Lost Time per Cycle [s]		4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]		0.00	0.00	0.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]		2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]		9	9	43	43	43	43
g / C, Green / Cycle		0.15	0.15	0.71	0.71	0.71	0.71
(v / s)_i Volume / Saturation Flow Rate		0.06	0.03	0.19	0.24	0.07	0.17
s, saturation flow rate [veh/h]		1781	1360	1795	1551	738	1690
c, Capacity [veh/h]		276	210	1278	1104	568	1203
d1, Uniform Delay [s]		22.81	22.14	3.08	3.26	5.00	3.01
k, delay calibration		0.11	0.11	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor		1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]		0.89	0.47	0.52	0.81	0.33	0.48
d3, Initial Queue Delay [s]		0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio		1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor		1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity		0.39	0.20	0.27	0.33	0.10	0.24
d, Delay for Lane Group [s/veh]		23.70	22.61	3.59	4.08	5.33	3.48
Lane Group LOS		C	C	A	A	A	A
Critical Lane Group		Yes	No	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]		1.35	0.53	0.99	1.17	0.27	0.83
50th-Percentile Queue Length [ft/ln]		33.64	13.15	24.74	29.17	6.63	20.70
95th-Percentile Queue Length [veh/ln]		2.42	0.95	1.78	2.10	0.48	1.49
95th-Percentile Queue Length [ft/ln]		60.55	23.66	44.54	52.51	11.93	37.26

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	23.70	23.70	22.61	0.00	3.59	4.08	5.33	3.48	0.00
Movement LOS				C	C	C		A	A	A	A	
d_A, Approach Delay [s/veh]	0.00			23.39			3.84			3.77		
Approach LOS	A			C			A			A		
d_I, Intersection Delay [s/veh]	6.25											
Intersection LOS	A											
Intersection V/C	0.297											

Emissions

Vehicle Miles Traveled [mph]		9.82	3.94	10.87	11.67	1.27	6.86
Stops [stops/h]		80.73	31.55	59.38	70.01	15.91	49.68
Fuel consumption [US gal/h]		1.37	0.53	1.03	1.17	0.20	0.76
CO [g/h]		95.50	37.37	71.75	81.94	13.90	53.33
NOx [g/h]		18.58	7.27	13.96	15.94	2.70	10.38
VOC [g/h]		22.13	8.66	16.63	18.99	3.22	12.36

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	0	333	1400	1400
d_b, Bicycle Delay [s]	30.00	20.83	2.70	2.70
I_b,int, Bicycle LOS Score for Intersection	4.132	1.875	3.294	2.129
Bicycle LOS	D	A	C	B

Sequence

Ring 1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 9: US 85 NB Ramps

Control Type:	Signalized	Delay (sec / veh):	10.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.354

Intersection Setup

Name	US 85 NB Ramp						Airport Road			Airport Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	┐├						┐|			├		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No						No			No		
Crosswalk	No			No			No			No		

Volumes

Name	US 85 NB Ramp						Airport Road			Airport Road		
Base Volume Input [veh/h]	72	0	1	0	0	0	82	1	0	0	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	2.00	2.00	2.00	7.00	2.00	2.00	2.00	2.00	2.00
Proportion of CAVs [%]	0.00											
Growth Factor	2.1000	2.1000	2.1000	1.0000	1.0000	1.0000	3.4200	3.4200	1.0000	1.0000	3.4200	3.4200
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	0	86	0	0	0	4	128	0	0	69	57
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	44	0	0	0	0	0	0	0	0	29
Total Hourly Volume [veh/h]	154	0	44	0	0	0	284	131	0	0	72	28
Peak Hour Factor	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	0	12	0	0	0	77	36	0	0	20	8
Total Analysis Volume [veh/h]	167	0	48	0	0	0	309	142	0	0	78	30
Presence of On-Street Parking	No		No				No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Active Pattern	Pattern 1
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing (Basic)

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	0	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Maximum Green [s]	0	30	0	0	0	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Walk [s]	0	5	0	0	0	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	0	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No						No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Phasing & Timing: Pattern 1

Split [s]	0	14	0	0	0	0	0	46	0	0	46	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	0	0	0	10	0	0	10	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No						Yes			Yes	
Maximum Recall		No						No			No	
Pedestrian Recall		No						No			No	

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C		L	C	C
C, Cycle Length [s]	60	60		60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00		4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00		2.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00		2.00	2.00	2.00
g_i, Effective Green Time [s]	10	10		42	42	42
g / C, Green / Cycle	0.16	0.16		0.70	0.70	0.70
(v / s)_i Volume / Saturation Flow Rate	0.10	0.03		0.25	0.08	0.06
s, saturation flow rate [veh/h]	1609	1589		1234	1870	1783
c, Capacity [veh/h]	264	261		928	1315	1253
d1, Uniform Delay [s]	23.49	21.71		4.78	2.88	2.83
k, delay calibration	0.11	0.11		0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00		1.00	1.00	1.00
d2, Incremental Delay [s]	2.48	0.34		0.97	0.17	0.14
d3, Initial Queue Delay [s]	0.00	0.00		0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00		1.00	1.00	1.00
PF, progression factor	1.00	1.00		1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.63	0.18		0.33	0.11	0.09
d, Delay for Lane Group [s/veh]	25.98	22.05		5.74	3.04	2.97
Lane Group LOS	C	C		A	A	A
Critical Lane Group	Yes	No		Yes	No	No
50th-Percentile Queue Length [veh/ln]	2.25	0.57		1.43	0.38	0.28
50th-Percentile Queue Length [ft/ln]	56.26	14.34		35.74	9.45	7.11
95th-Percentile Queue Length [veh/ln]	4.05	1.03		2.57	0.68	0.51
95th-Percentile Queue Length [ft/ln]	101.26	25.81		64.34	17.00	12.80

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	25.98	22.05	22.05	0.00	0.00	0.00	5.74	3.04	0.00	0.00	2.97	2.97
Movement LOS	C	C	C				A	A			A	A
d_A, Approach Delay [s/veh]	25.10			0.00			4.89			2.97		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	10.24											
Intersection LOS	B											
Intersection V/C	0.354											

Emissions

Vehicle Miles Traveled [mph]	15.85	4.56		7.28	3.35	2.63
Stops [stops/h]	134.68	34.33		85.57	22.61	17.03
Fuel consumption [US gal/h]	2.28	0.59		1.13	0.35	0.27
CO [g/h]	159.35	41.42		79.25	24.51	18.71
NOx [g/h]	31.00	8.06		15.42	4.77	3.64
VOC [g/h]	36.93	9.60		18.37	5.68	4.34

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	0.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	0.00
I_p,int, Pedestrian LOS Score for Intersectio	0.000	0.000	0.000	0.000
Crosswalk LOS	F	F	F	F
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	333	0	1397	1397
d_b, Bicycle Delay [s]	20.91	30.07	2.74	2.74
I_b,int, Bicycle LOS Score for Intersection	1.987	4.132	2.304	1.786
Bicycle LOS	A	D	B	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants

Originally issued May 14, 2019
Revised July 22, 2019

Mr. Theron Olsen
Brannan Companies
2500 East Brannan Way
Denver, CO 80229

Subject: Brannan Asphalt Plant
Louviers, Colorado
Project No. 18.150
Revised Addendum No. 1

Dear Mr. Olsen:

Foundation alternatives for the proposed plant site were evaluated at a design team meeting on April 5, 2019. Foundation support for the large oil tank was a significant issue discussed. To provide a more accurate settlement analysis of the tank location, the team decided to drill additional borings at the tank location and perform additional laboratory and engineering analysis.

Cesare, Inc. (Cesare) had three additional borings drilled on April 11, 2019 at the tank location depicted as Borings B-7, B-8, and B-9 on the attached revised Figure 1. The driller advanced the borings using a CME 55 drill rig equipped with 6-1/2 inch outside diameter continuous flight hollow stem auger. The driller sampled the soil underlying the site using a modified California sampler and a standard split spoon sampler. The sampling was accomplished as described in our original report[1] for the project.

Cesare's field engineer returned the samples to our office where a professional staff member visually classified the soils and assigned testing. The testing included three gradation and Atterberg limits tests for classification and 10 swell/consolidation tests to evaluate the soils' reaction to loading and inundating with water. We described these tests in our original report. A revised summary of laboratory test results is attached with the additional laboratory results.

The borings encountered soils underlying the tank site consisting predominantly of interbedded silty and relatively clean sands, with lesser amounts of sandy clays and clayey sands extending to depths of about 53 feet below the ground surface. The borings encountered claystone bedrock below the soil that extended to the remaining depths explored of about 60 feet. Groundwater was discovered at 47 feet in Boring B-7 during drilling and measured at about 44 feet 4 days after drilling. We did not find groundwater in either of the other borings during or after drilling. The attached revised Figure 2, with a Key to Symbols, presents a more detailed description of the subsurface conditions encountered.

[1] Geotechnical Study, Brannan Asphalt Plant, Louviers, Colorado, dated January 9, 2019, Project No. 18.150

Corporate Office: 7108 South Alton Way, Building B • Centennial, CO 80112
Locations: Centennial • Frederick • Silverthorne • Salida/Crested Butte
Phone 303-220-0300 • www.cesareinc.com

The swell/consolidation test results indicate the soil underlying the tank exhibit collapse ranging from about 9% near the surface to practically nil at depth when wetted under a 2,000 pounds per square foot (psf) surcharge load. In the upper 30 feet, five of seven samples collapsed 3% and more. These collapse potentials are considered moderate to high. Should the entire soil profile to bedrock contact become wetted, the total estimated collapse under its own weight could be as much as about 14 inches and as much as 18 inches under the fully loaded tank.

Collapsible soils are relatively stable in their natural state and are typically capable of supporting foundation loads; however, should they become wetted, they will collapse, even under their own weight. The collapsible condition can be mitigated by various methods, including excavation and replacement as structural fill. This will provide a stable mat for the structure and reduce the potential of deeper collapsible soil becoming wetted.

As opposed to the expansive soil in the region that often become wetted simply by covering them, a specific source of moisture is required to wet collapsible soil, such as surface water ponding from irrigation or storm runoff. If a deep zone of collapsible soil is present, and a near surface zone is mitigated, excellent site grading preventing water ponding adjacent to the structure, along with moisture protection, is critical to satisfactory long-term performance of the structure. This approach of a near surface soil mitigation, along with excellent site grading and moisture protection, has been successful nationally and internationally to allow building construction in areas of high collapse potential soils.

A brief telephone discussion on May 10, 2019 indicated Brannan Companies (Brannan) is planning to improve the upper 20 feet of soil underlying the tank pad by removal and recompaction. Considering this for design purposes, we calculated settlement based on 20 feet of improved soil. Our calculation considered nominal elastic settlement in the improved soil and normal settlement of the underlying soil in its existing condition by interpolating data from the consolidation test results. Based on our analysis, we recommend a design settlement of about 2-1/2 inches, provided the untreated soil does not become wetted. This value should be used in design for both total and differential settlement, which is typically within a large steel tank's performance parameters. Should a source of moisture develop that fully wets the remaining collapsible soil, the potential settlement could approach the estimated maximum collapse, as presented above.

Regarding the planned soil improvements, Cesare emphasizes that the base of excavation should extend outside the tank a distance equal to the depth of excavation. The perimeter excavation slope should be flatter than 1 to 1, horizontal to vertical. The contractor shall bench the structural fill into the slope at a minimum 1 foot vertical intervals to the ground surface. The ground surface around the tank should slope away from the tank with a positive slope of at least 1%.

Considering the above, Cesare opines the tank can bear on a conventional ringwall foundation surrounding a center peaked pad covered with 1 foot of open graded gravel. Should the risk of future movement be considered too great, other mitigation methods should be considered or deep foundations with a mat type pier cap should be used. The minimum depth of deep foundations, particularly driven piles, should be considered as 55 feet from existing grades. An additional load from downdrag of 1,500 psf over the perimeter of each individual foundation element to a depth of 30 feet should be considered in deep foundation design. The remaining recommendations presented in our original report remain valid.

Brannan should attach this addendum to the original report and make it a part thereof. If you have any questions or comments regarding this addendum, please contact our office.

Sincerely,
CESARE, INC.

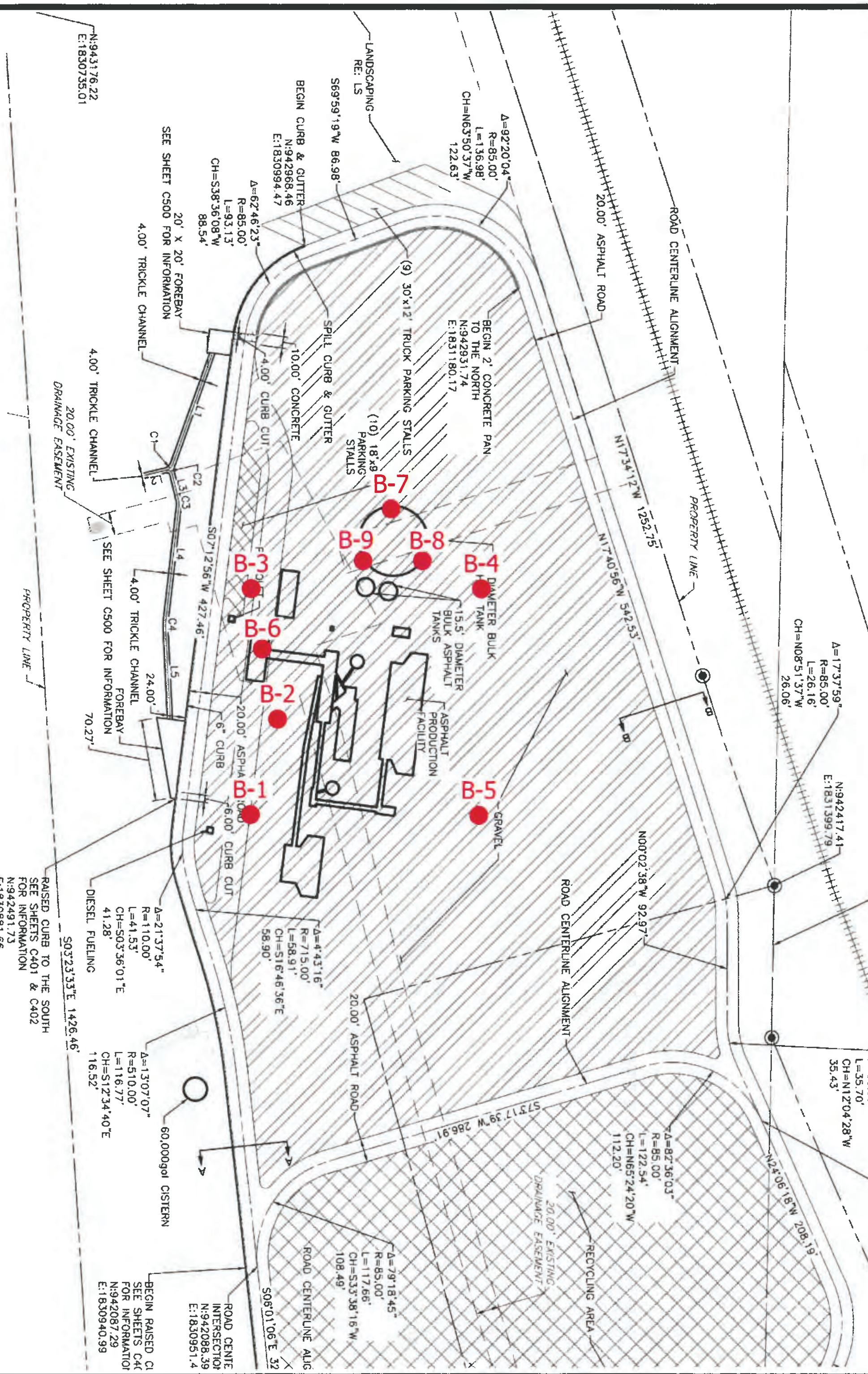
Jonathan A. Crystal, P.E.
Project Engineer

JAC2/ksm

Attachments

cc: Mr. Todd Yee, toddyee@j-tconsulting.com
Mr. Greg Lepetsos, lepetsos@msn.com

W:\2018\Centennial\18.100\18.150.A Brannan Asphalt Plant\ACAD\Fig 1 Site Location and Plan Rev.dwg 5/7/2019 8:08 AM



LEGEND:

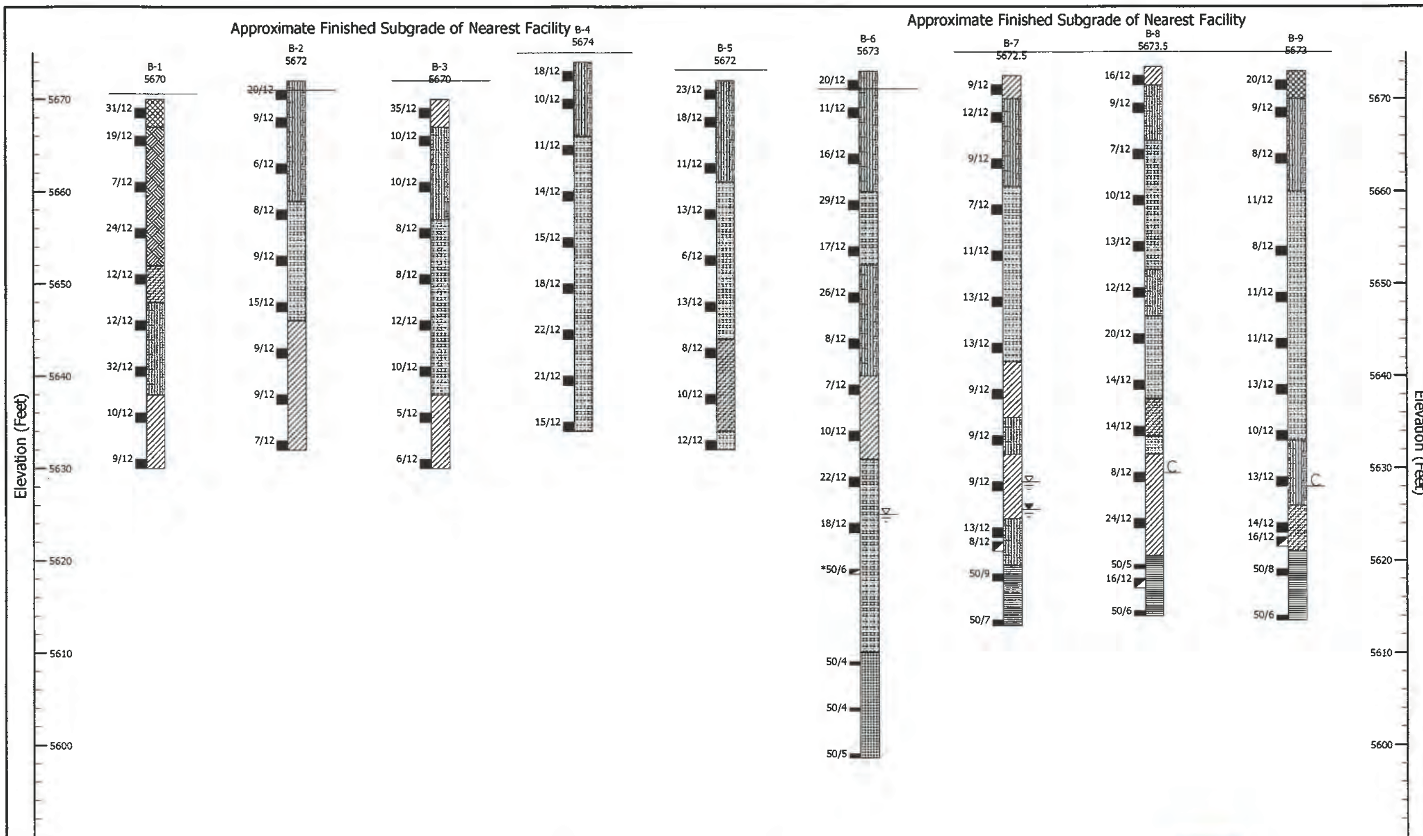
B-1 BORING NUMBER AND LOCATION

BACKGROUND IMAGE MODIFIED FROM "SEDALIA ASPHALT PRODUCTION FACILITY HORIZONTAL CONTROL PLAN" BY MARTIN/MARTIN, PROJECT NO 18.1013, DATED 10/23/18.

FIGURE 1
Boring Location Map Revised

PROJECT NO:	18.150		
PROJECT NAME:	Brannan Asphalt Plant		
DRAWN BY:	LAA	CHECKED BY:	JAC2
DWG DATE:	11.12.18	REV. DATE:	05.09.19

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants



PROJECT NO:	18.150	**FIGURE 2**	CESARE, INC. Geotechnical Engineers & Construction Materials Consultants
PROJECT NAME:	Brannan Asphalt Plant	Boring Logs Revised	
DWG DATE:	5/6/2019		

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	FILL; SAND, poorly graded, with silt and gravel, with concrete and asphalt fragments, black to brown to tan to light tan (SP-SM).
	POSSIBLE FILL: SAND, silty to clayey, loose to medium dense, slightly moist to moist, dark brown (SM, SC, A-2-4, A-6).
	SAND, clayey, medium dense, slightly moist, brown (SC).
	SAND, silty, occasional with gravel, loose to dense, slightly moist, brown to dark brown to tan (SM, A-1-b, A-2-4).
	CLAY, sandy, medium stiff to stiff, moist to very moist, occasional silty sand stringer, brown to olive brown to tan, (CL, A-6).
	SAND, well to poorly graded, relatively clean to with silt, occasional with gravel, loose to medium dense, slightly moist to moist, tan, (SW-SM, A-1-b).
	SANDSTONE; very hard, wet, gray (SP).
	CLAYSTONE, weathered to very hard, slightly to very moist, dark gray (CL).

Symbol	Description
Misc. Symbols	
	Water level during drilling
	Water level 4 days after drilling
	Depth to caving
Soil Samplers	
	Modified California sample
	Standard penetration test

Notes:

1. 31/12 indicates 31 blows with a 140-pound hammer falling 30 inches were required to drive a modified California barrel sampler 12 inches. *50/6 indicates 56 blows with a 140-pound hammer falling 30 inches were required to drive a standard penetration sampler 12 inches.

2. Exploratory borings B-1 through B-5 were drilled on September 21, 2018 and boring B-6 was drilled on December 19, 2018. All borings were drilled using a CME-55 drill rig equipped with 4-inch diameter continuous flight solid stem auger. Borings B-7 through B-9 were drilled on April 11 and 12, 2019 using a CME-55 drill rig equipped with 6-1/2 inch diameter continuous flight hollow strem auger.

3. Cesare interpolated boring elevations from a topographic map with contours provided by the client.

3. Groundwater was not encountered in borings B-1 through B-6, B-8 and B-9 during drilling. When checked 5 and 3 days later, the holes were open and dry. Groundwater was encountered in B-6 at about 42 feet and B-7 at about 47 feet during drilling. We measured groundwater at about 44 feet in B-7 when checked 4 days after drilling. The holes were filled after the latter water level measurements.

4. Contacts between soil units are approximate and may be gradational.

5. These logs are subject to the limitations, conclusions, and recommendations in this report.
Project No. 18.150.

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants

APPENDIX A

Laboratory Test Results

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants

SUMMARY OF LABORATORY TEST RESULTS
Brannan Asphalt Plant
Project No. 18.150

Sample Location		Natural	Natural	Water	Gradation			Atterberg Limits		Swell/Consolidation			
Boring	Depth (feet)	Dry Density (pcf)	Moisture Content (%)	Soluble Sulfates (%)	Gravel (%)	Sand (%)	Silt/ Clay (%)	Liquid Limit (%)	Plasticity Index (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)	Material Type
B-1	1			0.00									FILL: SAND, silty, brown (SM)
B-1	4	94.1	3.0							400	-3.5	N/A	POSSIBLE FILL; SAND, silty, brown (SM)
B-1	14				20	63	17	27	3				POSSIBLE FILL; SAND, silty, with gravel, brown (SM, A-1-b)
B-1	19	109.7	9.7							1,900	-0.5	N/A	SAND, clayey, dark brown (SC)
B-2	9				1	77	22	NV	NP				SAND, silty, tan, (SM, A-2-4)
B-2	34	98.7	18.9							3,400	-0.8	N/A	CLAY, sandy, brown, (CL, A-6)
B-3	4	96.9	4.9							400	-4.0	N/A	SAND, silty, friable, tan (SM)
B-3	9	103.2	4.1							900	-3.0	N/A	SAND, silty, friable, tan (SM)
B-3	34				0	21	79	32	14				CLAY, with sand, light brown, (CL, A-6)
B-4	19				17	77	6	NV	NP				SAND, well graded, with silt and gravel, tan (SW-SM, A-1-b)
B-5	1			0.00									SAND, silty, brown (SM)
B-5	29	90.9	14.7							2,900	-0.1	N/A	SAND, clayey, brown, (SC, A-6)
B-6	4	95.8	3.4							1,000	-3.7	N/A	SAND, silty, brown (SM)
B-6	19	96.2	4.9							1,000	-1.5	N/A	SAND, with silt, brown (SP-SM, A-2-4)
B-6	24	105.7	7.9							1,000	-0.3	N/A	SAND, silty, brown (SM)
B-7	1	91.1	10.7							2,000	-8.9	N/A	CLAY, sandy, dark brown (CL, A-6)
B-7	4	90.2	2.5							2,000	-6.7	N/A	SAND, silty (SM, A-2-4)
B-7	9	91.4	2.3			85	15	NV	NP	2,000	-1.7	N/A	SAND, silty (SM, A-2-4)
B-7	14	90.1	4.6							2,000	-1.9	N/A	SAND, with silt, brown (SP-SM, A-2-4)
B-7	19	83.5	3.0			96	4	NV	NP	2,000	-3.3	N/A	SAND, poorly graded (SP, A-1-b)
B-7	24	81.9	3.2							2,000	-3.6	N/A	SAND, with silt, brown (SP-SM, A-2-4)
B-7	29	82.7	3.4							2,000	-7.0	N/A	SAND, with silt, brown (SP-SM, A-2-4)
B-7	34	99.5	20.8			41	59	30	19	2,000	-0.3	N/A	CLAY, sandy, lean (CL, A-6(7))
B-7	39	94.0	6.5							2,000	-1.2	N/A	SAND, silty (SM, A-2-4)
B-7	44	90.7	26.4							2,000	-0.2	N/A	CLAY, sandy, lean (CL, A-6)

NP = nonplastic
NV = no value
N/A = not applicable

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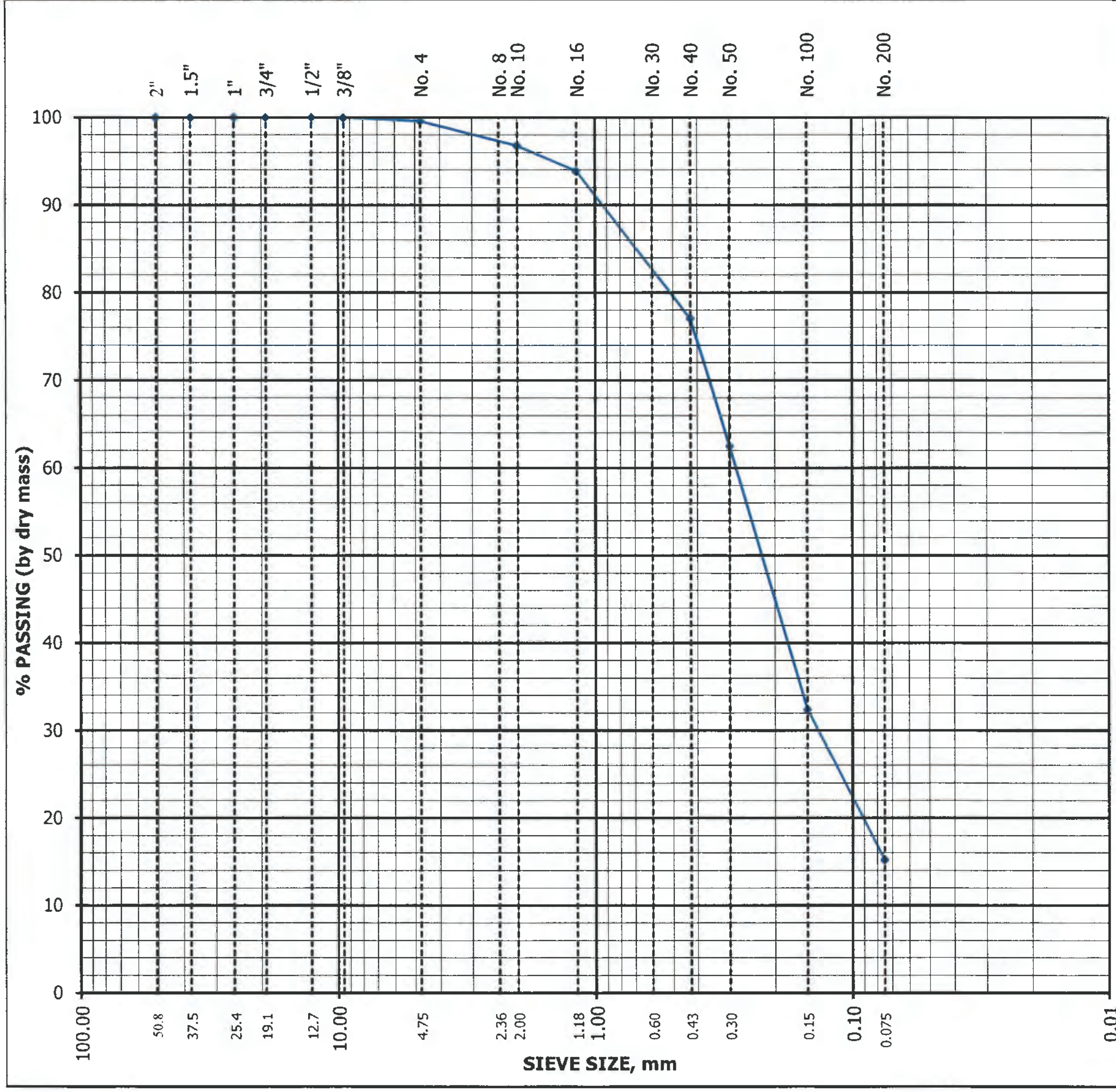
GRADATION PLOT - SOIL & AGGREGATE

Project Number:	18.150, Brannan Sand & Gravel	Date:	17-Apr-19
Project Name:	Brannan Asphalt Plant	Technician:	G. Hoyos
Lab ID Number:	192635	Reviewer:	J. Crystal
Sample Location:	B-7 at 9'		
Visual Description:	SAND, silty, tan		

AASHTO M 145 Classification: **A-2-4** **Group Index:** **0**

Unified Soil Classification System (ASTM D 2487): **(SM) Silty sand**



Sieve Size	% Passing
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	97
#16	94
#30	
#40	77
#50	62
#100	32
#200	15.2

Moisture (M) & Density (D)	
M, %:	2.3
D, pcf:	

LL	NV
PL	NP
PI	NP

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

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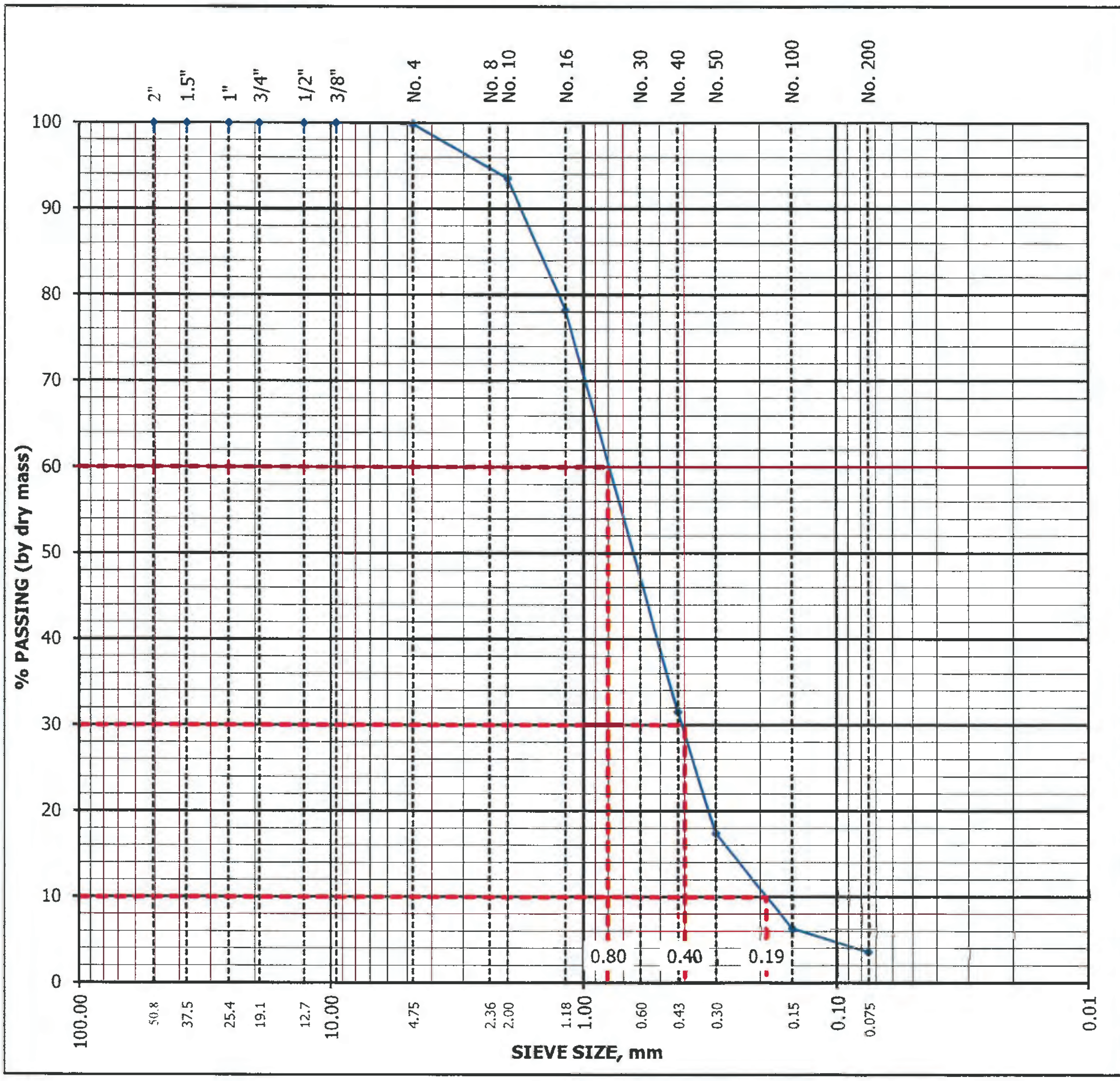
GRADATION PLOT - SOIL & AGGREGATE

Project Number:	18.150, Brannan Sand & Gravel	Date:	17-Apr-19
Project Name:	Brannan Asphalt Plant	Technician:	G. Hoyos
Lab ID Number:	192637	Reviewer:	J. Crystal
Sample Location:	B-7 at 19'		
Visual Description:	SAND, brown		

AASHTO M 145 Classification: A-1-b **Group Index:** 0

Unified Soil Classification System (ASTM D 2487): (SP) Poorly graded sand



Sieve Size	% Passing
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	100
#4	100
#8	
#10	94
#16	78
#30	
#40	32
#50	17
#100	6
#200	3.6

Moisture (M) & Density (D)	
M, %:	3.0
D, pcf:	

LL	NV
PL	NP
PI	NP

D_{60}	0.80
D_{30}	0.40
D_{10}	0.19
Cu	**4.21**
Cc	**1.05**

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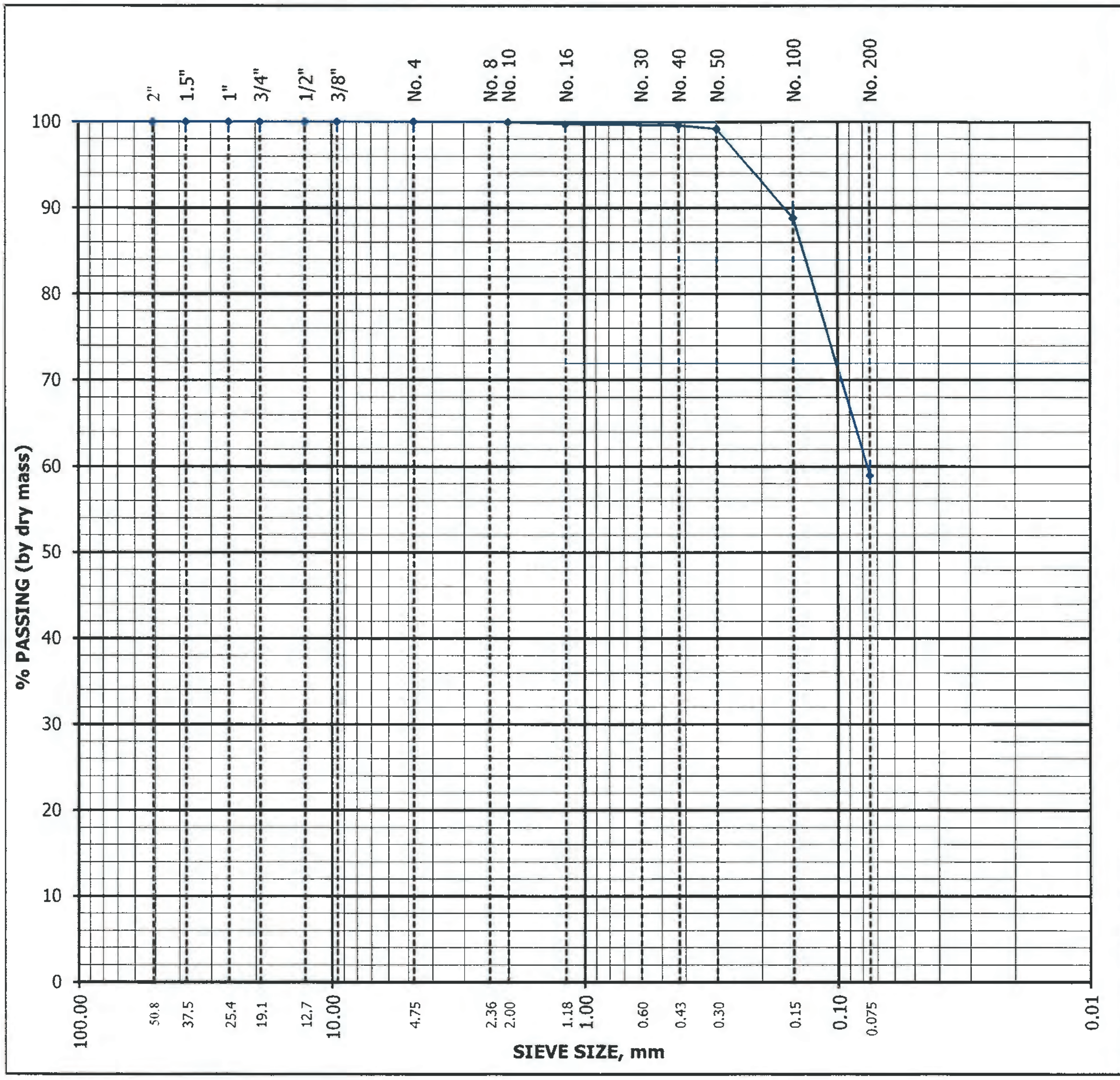
GRADATION PLOT - SOIL & AGGREGATE

Project Number:	18.150, Brannan Sand & Gravel	Date:	17-Apr-19
Project Name:	Brannan Asphalt Plant	Technician:	G. Hoyos
Lab ID Number:	192640	Reviewer:	J. Crystal
Sample Location:	B-7 at 34'		
Visual Description:	CLAY, sandy, gray		

AASHTO M 145 Classification: **A-6** **Group Index:** **7**
Unified Soil Classification System (ASTM D 2487): **(CL) Sandy lean clay**



Sieve Size	% Passing
2"	
1.5"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#8	
#10	100
#16	100
#30	
#40	100
#50	99
#100	89
#200	59.0

Moisture (M) & Density (D)	
M, %:	20.8
D, pcf:	

LL	30
PL	12
PI	19

D_{60}	
D_{30}	
D_{10}	
Cu	
Cc	

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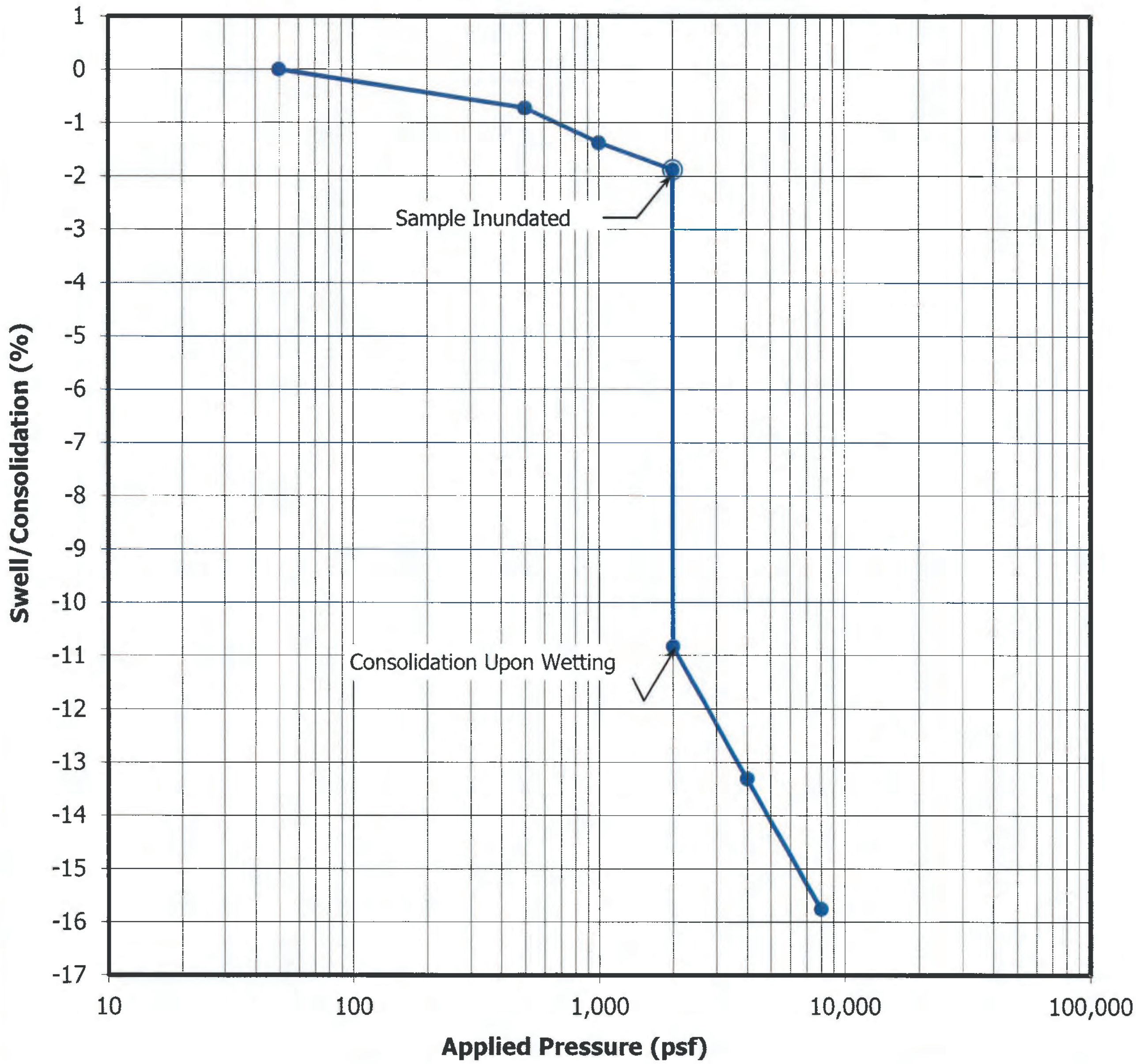
SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	1	CLAY, sandy, dark brown	94.1	10.7	2,000	-8.9	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192633

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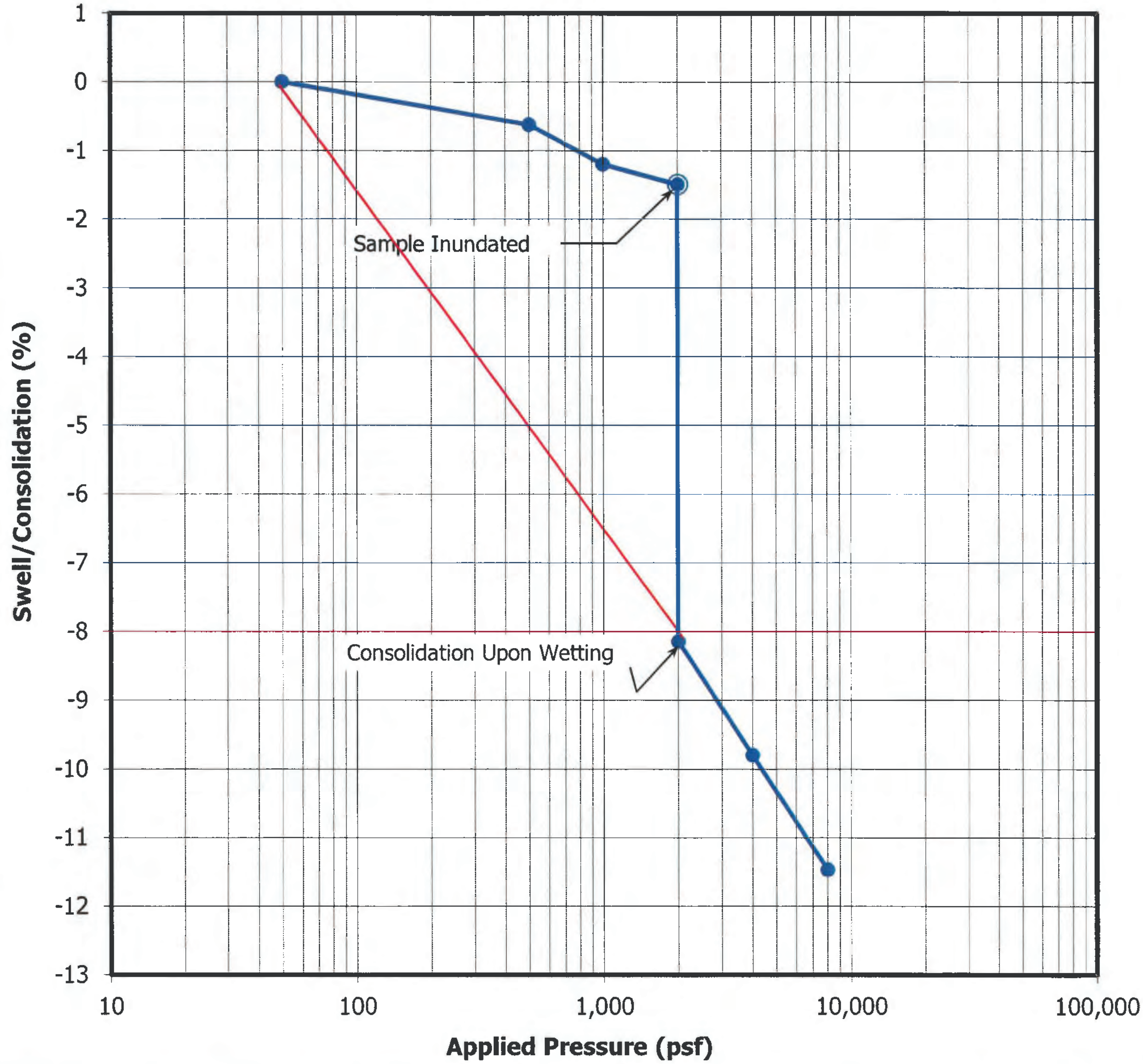
SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	4	SAND, silty, friable, brown	90.2	2.5	2,000	-6.7	NA

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192634

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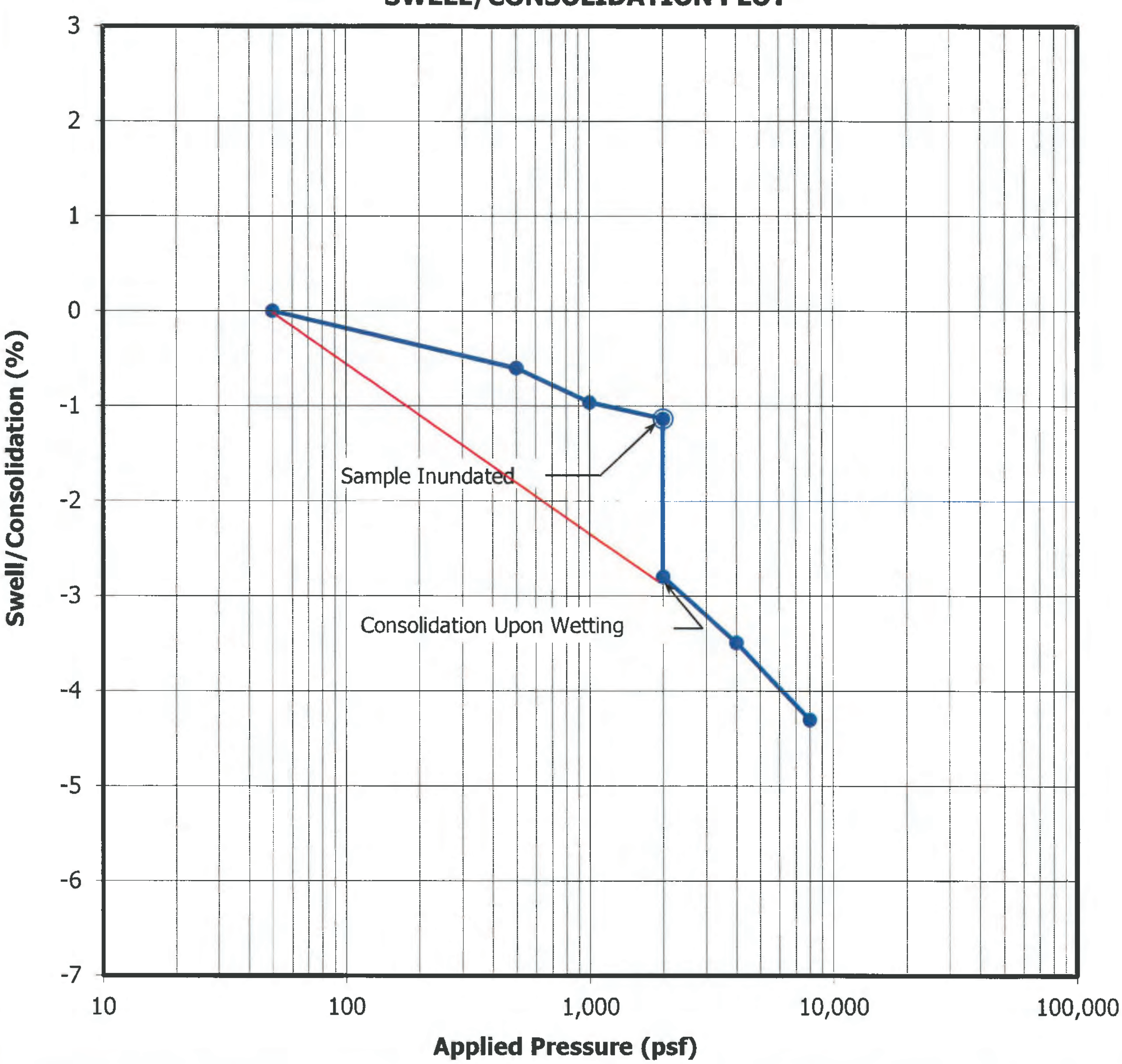
SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	9	SAND, silty, friable	91.4	2.3	2,000	-1.7	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192635

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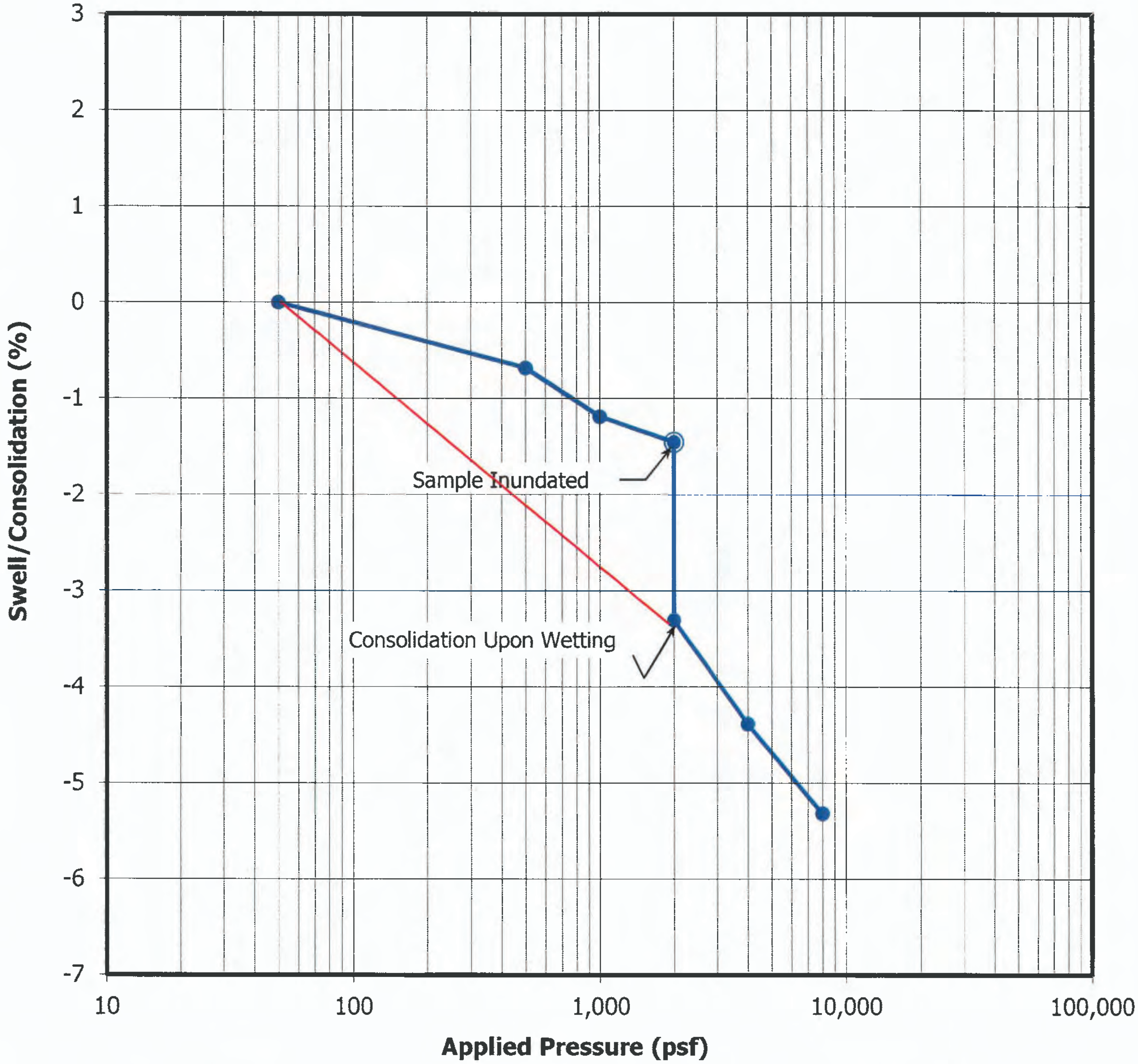
SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	14	SAND, with silt, friable, brown	90.1	4.6	2,000	-1.9	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192636

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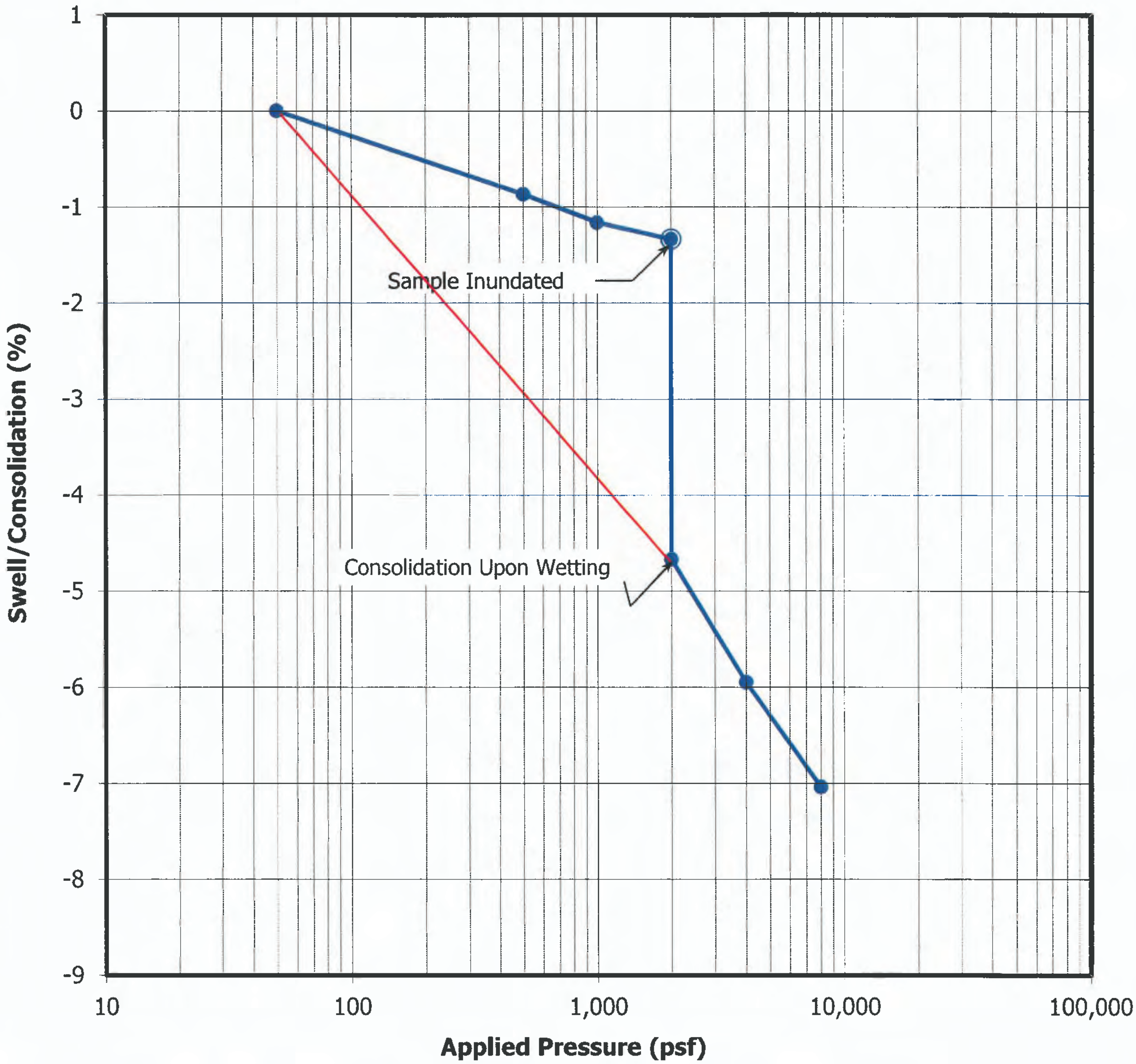
SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	19	SAND, with silt, friable, brown	83.5	3.0	2,000	-3.3	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192637

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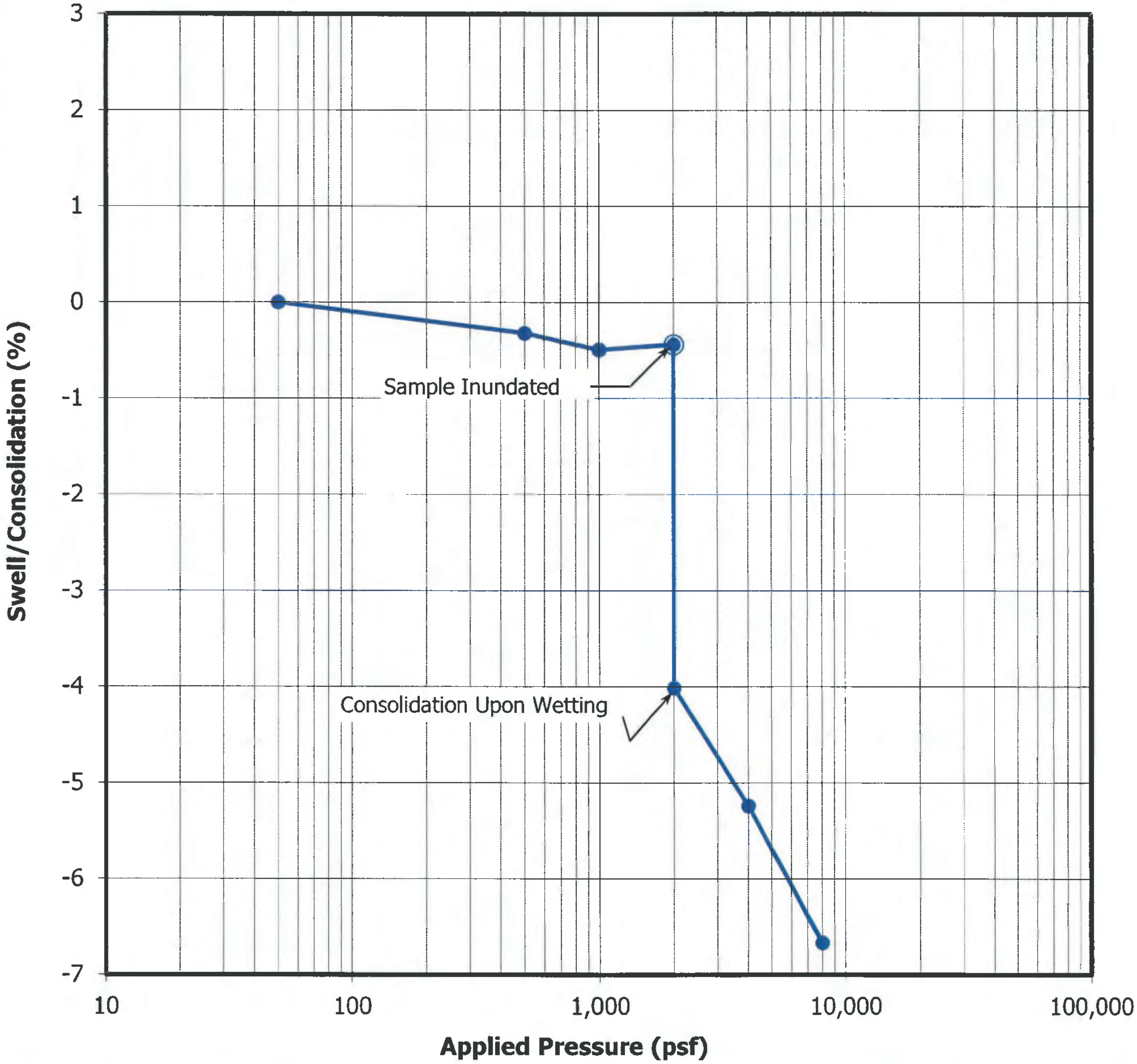
SWELL/CONSOLIDATION PLOT

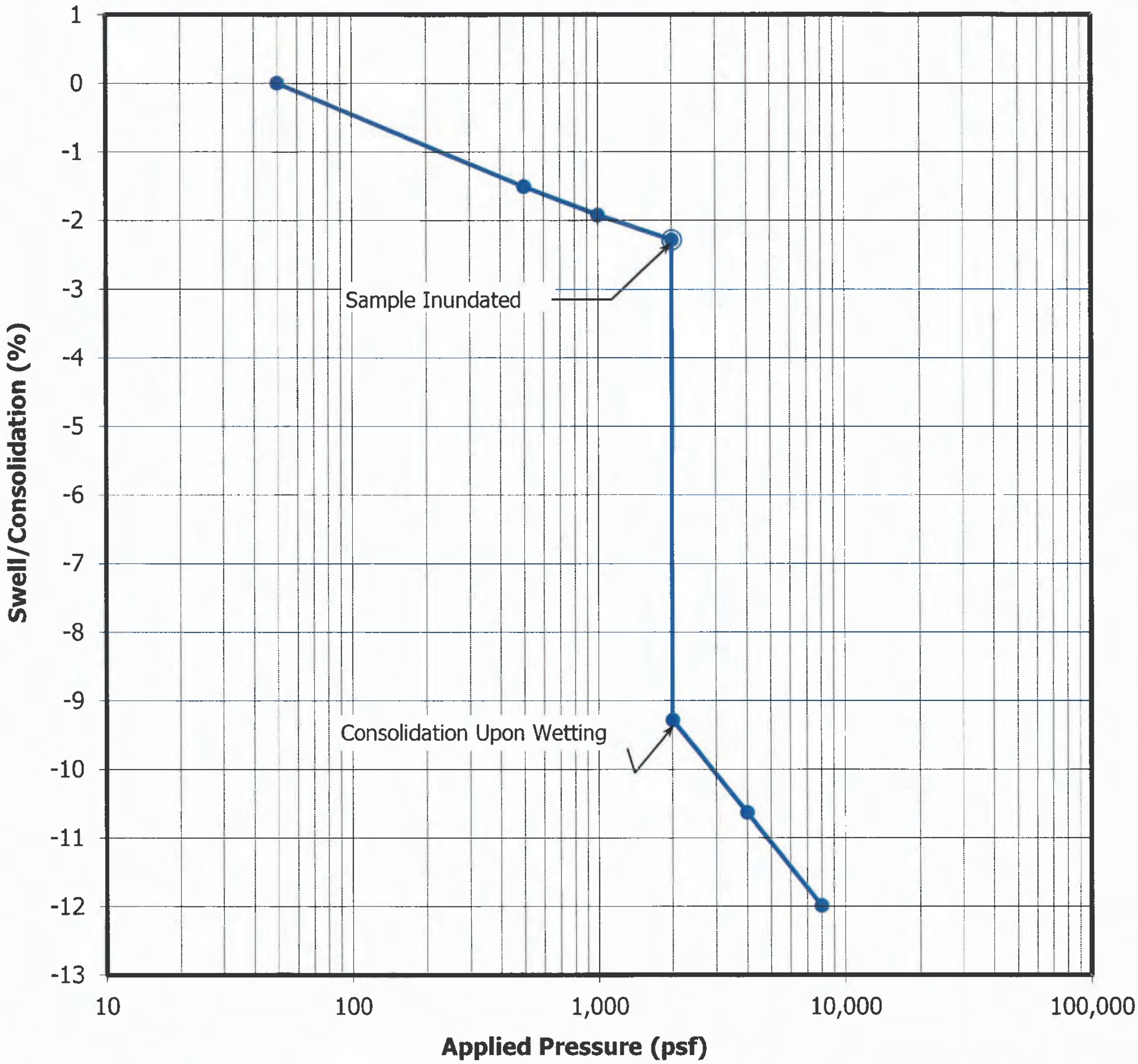


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	24	SAND, with silt, friable, brown	81.9	3.2	2,000	-3.6	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192638

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants

SWELL/CONSOLIDATION PLOT



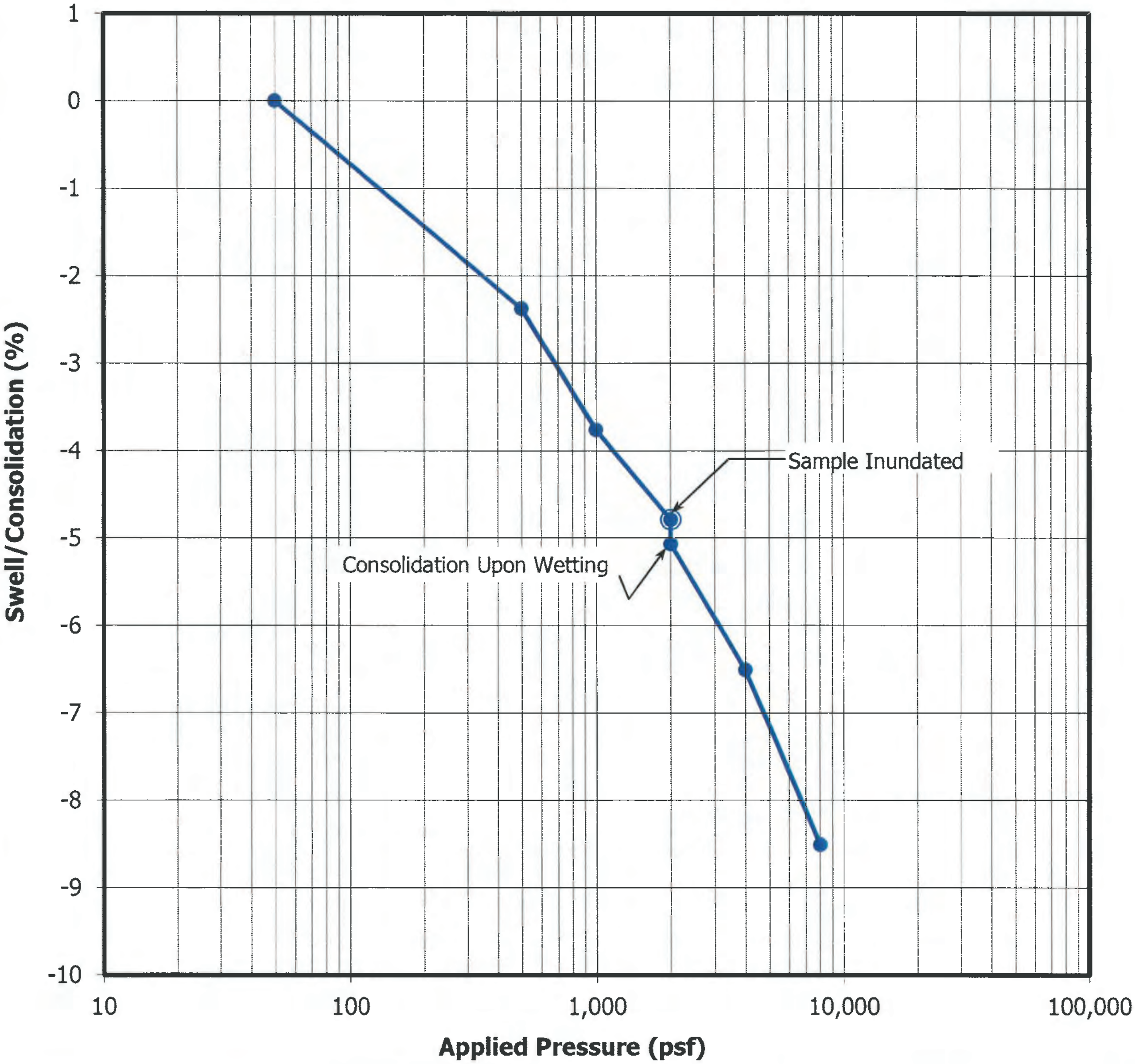
Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	29	SAND, with silt, friable, brown	82.7	3.4	2,000	-7.0	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192639

CESARE, INC.

Geotechnical Engineers & Construction Materials Consultants

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	34	CLAY, sandy, gray	99.5	20.8	2,000	-0.3	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192640

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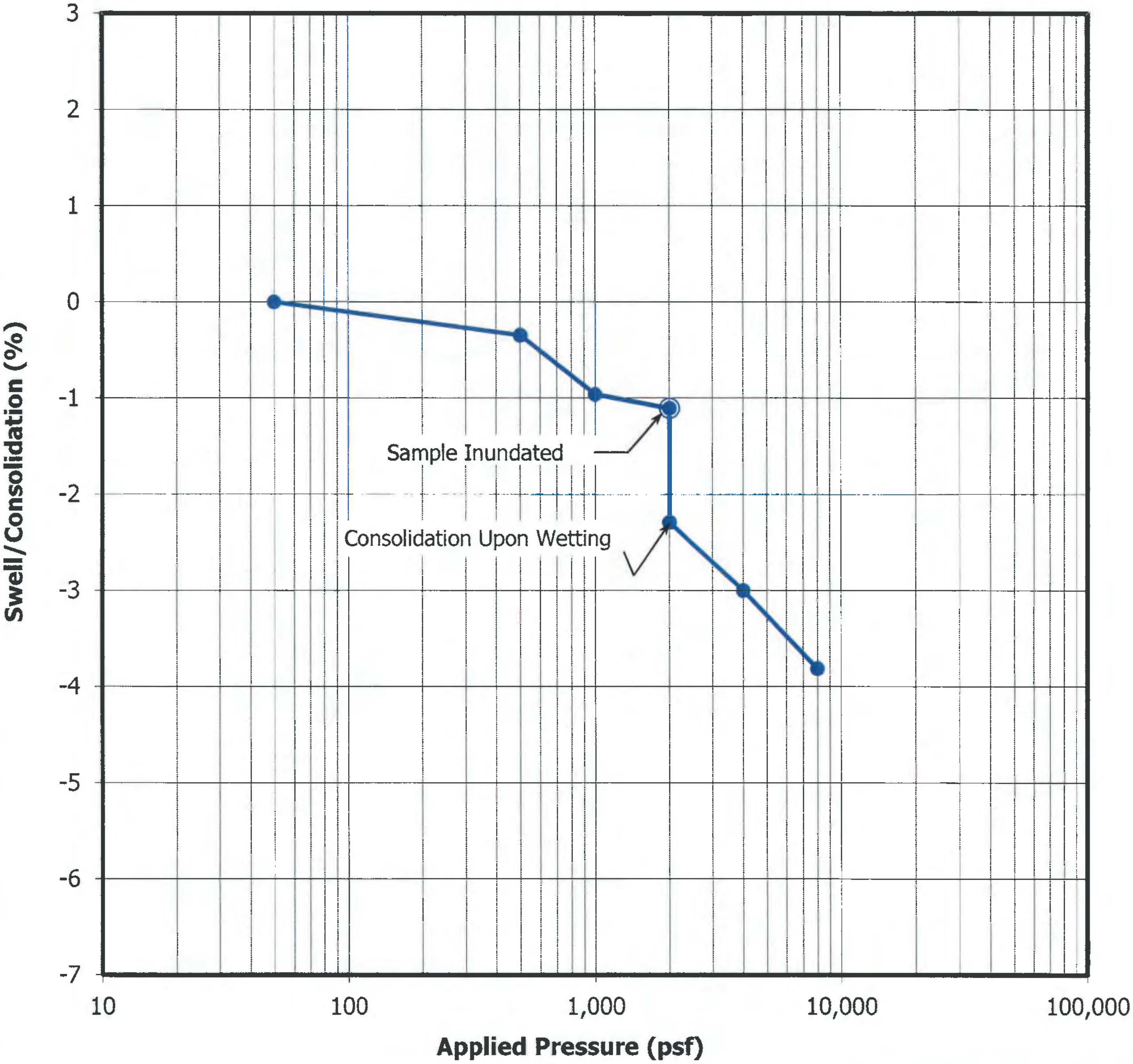
Geotechnical Engineers & Construction Materials Consultants

SWELL/CONSOLIDATION PLOT

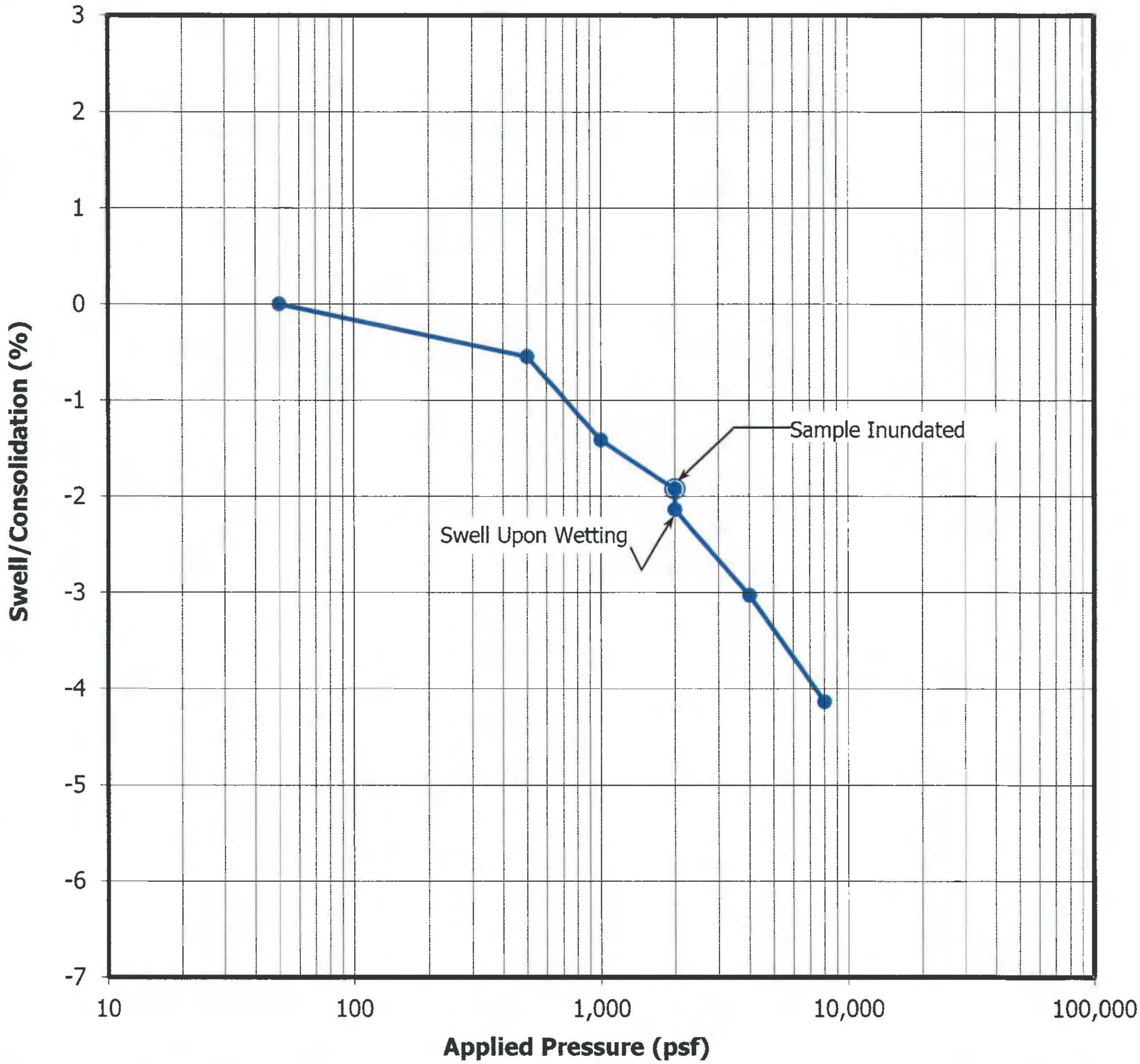


Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	39	SAND, silty, tan	94.0	6.5	2,000	-1.2	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192641

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants

SWELL/CONSOLIDATION PLOT



Sample Location	Sample Depth (ft)	Visual Description of Sample	Dry Density (pcf)	Moisture Content (%)	Inundation Pressure (psf)	Volume Change (%)	Swell Pressure (psf)
B-7	44	CLAY, silty, gray	90.7	26.4	2,000	-0.2	N/A

Project Number	Client	Project Name	Lab ID Number
18.150	Brannan Sand & Gravel	Brannan Asphalt Plant	192642

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants

August 27, 2019

Mr. Theran Olsen
Brannan Companies
2500 East Brannan Way
Denver, CO 80229

Subject: Brannan Asphalt Plant
Louviers, Colorado
Project No. 18.150

Dear Mr. Olsen:

Cesare, Inc. (Cesare) reviewed the letter from the Colorado Geologic Survey (CGS), dated August 19, 2019, as you requested. The letter, *"recommends the county request written verification that Cesare's settlement calculation includes the approximately 4.8% consolidation data point."*

This letter affirms that all consolidation test results were included in Cesare's settlement calculation. Cesare welcomes the opportunity to discuss the test results, our analysis, and our recommendations with the CGS.

If you have any questions or comments regarding this information, please contact our office.

Sincerely,
CESARE, INC.

Jonathan A Crystal

Jonathan A. Crystal, P.E.
Project Engineer

JAC2/ksm

cc: Mr. Todd Yee, toddyee@jtconsulting.com
Mr. Greg Lepetsos, lepetsos@msn.com
Mr. Alex Schatz, aschatz@brannan1.com

Corporate Office: 7108 South Alton Way, Building B • Centennial, CO 80112
Locations: Centennial • Frederick • Silverthorne • Salida/Crested Butte
Phone 303-220-0300 • www.cesareinc.com

Steve Kelton

From: Steve Kelton
Sent: Thursday, October 5, 2023 5:08 PM
To: 'carlson@mines.edu'
Subject: Transmittal of affirmation letter in response to CGS comments
Attachments: 2023.10.05.Brannan letter to CGS transmitting affirmation of calculations.pdf; 2022.07.20.CGS comments on Douglas County project.pdf; 2019.08.27.Cesare affirmation of calculations.pdf

Ms. Carlson:

Please see the attached documents regarding CGS's comments on our proposed Douglas County asphalt batch plant. We believe the attached letter from Cesare, Inc. satisfies your agency's concerns.

Thank you.

Steve Kelton, Associate Attorney
Brannan Companies
2500 Brannan Way
Denver, CO 80229

skelton@brannan1.com
desk: 303-383-6433
cell: 720-910-4376

BRANNAN Companies

BRANNAN

Sand and Gravel Co. / Ready Mix

Founded 1906

October 5, 2023

Jill Carlson, C.E.G.
Colorado Geological Survey
1801 Moly Road
Golden, CO 80401

Sent by email to carlson@mines.edu

Subject: Affirmation of settlement calculations

Dear Ms. Carlson:

In July 2022, you commented on behalf of CGS on our Douglas County proposal for an asphalt batch plant (US2021-002). Specifically, you referred to your agency's 2019 recommendation that "the county request written verification that Cesare's settlement calculation includes the approximately 4.8% pre-wetting consolidation data point."

The project continues to move forward and the County is still asking us to resolve this point. We thought we had; in our April 4, 2023 resubmittal, we included an August 27, 2019 letter from Cesare, Inc. (attached) that affirms that all consolidation test results were included in Cesare's settlement calculation.

We have attached the relevant documents for your files. Separately, we will apprise Heather Scott with the County and let her know that CGS's concern has been addressed and resolved. Please feel free to contact me if I can answer any additional questions (skelton@brannan1.com; 720.910.4376).

Sincerely,

BRANNAN SAND AND GRAVEL COMPANY, LLC

Steve Kelton

Steve Kelton
Associate Attorney

Attachments: CGS comments (July 20, 2022)
Cesare, Inc. Affirmation Letter (August 27, 2019)

2500 East Brannan Way | Denver | CO 80229 | 303.534.1231 Tel | 303.534.1236 Fax
www.brannan1.com

1801 Moly Road
Golden, Colorado 80401

Karen Berry
State Geologist

July 20, 2022

Heather Scott
Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104

Location:
NW¼ Section 3,
T7S, R68W, 6th P.M.
39.4744, -104.9947

Subject: Owens Industrial Park Filing 1, 1st Amendment, Lot 1A and Metes and Bounds Parcel 3rd Amendment
Brannan Sand & Gravel / Proposed Asphalt Batch Plant (US2021-002)
Douglas County, CO; CGS Unique No. DU-20-0002_3

Dear Heather:

Colorado Geological Survey has reviewed the Owens Industrial Park Filing 1, 1st Amendment, Lot 1A and Metes and Bounds Parcel 3rd Amendment – Brannan Sand & Gravel referral (US2021-002). I understand the applicant proposes an asphalt batch plant facility on approximately 19 acres of an overall 45-acre property containing an existing concrete plant and recycling operation at 5775/5779 Airport Road, Louviers. CGS previously reviewed US2018-010, a Use by Special Review – Amendment application for a hot-mix asphalt batch plant on the same site. That application was withdrawn on September 15, 2020.

No geologic or geotechnical information was included with the currently available referral documents, but CGS previously reviewed:

- Geotechnical Study, Brannan Asphalt Plant (Cesare, Inc., January 9, 2019),
- an addendum discussing foundation alternatives for the large 60 ft. diameter asphalt cement (oil) tank (Cesare, Inc., May 14, 2019), and
- Revised Brannan Asphalt Plant Addendum No. 1 (Cesare, Inc., July 22, 2019)

In their 1/9/2019 Geotechnical Study, Cesare observed thick, relatively low density, low strength soils. Cesare's laboratory test results indicate that the site soils are both hydrocompactive (exhibiting collapse under loading and wetting) and compressible (exhibiting compression under approximate foundation loads). In their 5/14/2019 addendum, Cesare provided several foundation alternatives for the large, 60 ft. diameter asphalt cement (oil) tank, but the large consolidation observed in several of Cesare's swell/consolidation tests, especially a sample of sandy clay collected from boring B-7 at a depth of 34 feet which exhibited approximately 5.5% compression under the approximate oil tank load of 2600 psf, indicate that **overexcavation may not be successful at reducing total and differential settlement to the "several inches" of deflection that can be tolerated by the (previously proposed) tank's flexible mat (sheet metal) base, regardless of efforts to prevent deep wetting of the site soils.** Cesare states on page 4 of their 1/19/2019 Geotechnical Study, and CGS agrees, "Due to the [tank's] large diameter, its load influence will extend quite deep, such that all the soil above the bedrock would be affected." This would include the relatively thick column of compressible soil beneath the overexcavated and replaced fill prism.

The revisions in Cesare's 7/22/2019 addendum primarily involve an explanation of collapsible soils, but the proposed mitigation for the observed low density, low strength, compressible and hydrocompactive soils is unchanged: excavate and replace as a compacted fill the upper 20 feet of soil beneath the oil tank. CGS agrees that proper site grading and control of surface water are typically effective at limiting wetting and hydrocompaction. Cesare refers to but does not define "moisture protection."

Cesare states (page 2 of the 7/22/2019 revised addendum), and CGS agrees, that most of the tested samples exhibited only minor (1-2%) consolidation in response to loading prior to inundation. However, it remains unclear whether Cesare's calculation indicating a design settlement of 2-1/2 inches includes the 4.8% consolidation observed under a 2000 psf load *prior to the addition of water* in the sample of sandy clay collected from boring B-7 at a depth of 34 feet. **CGS recommended (8/19/2019) that the county request written verification that Cesare's settlement calculation includes the approximately 4.8% pre-wetting consolidation data point.**

In the absence of the previously requested verification or an updated geotechnical investigation, analysis, and recommendations based on current development plans, **CGS continues to recommend straight shaft drilled pier or driven pile foundations for silos, oil tanks, and other heavily loaded structures.**

Thank you for the opportunity to review and comment on this update. If you have questions, please call me at (303) 384-2643, or e-mail carlson@mines.edu.

Sincerely,

Jill Carlson, C.E.G.
Engineering Geologist

CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants

August 27, 2019

Mr. Theran Olsen
Brannan Companies
2500 East Brannan Way
Denver, CO 80229

Subject: Brannan Asphalt Plant
Louviers, Colorado
Project No. 18.150

Dear Mr. Olsen:

Cesare, Inc. (Cesare) reviewed the letter from the Colorado Geologic Survey (CGS), dated August 19, 2019, as you requested. The letter, *"recommends the county request written verification that Cesare's settlement calculation includes the approximately 4.8% consolidation data point."*

This letter affirms that all consolidation test results were included in Cesare's settlement calculation. Cesare welcomes the opportunity to discuss the test results, our analysis, and our recommendations with the CGS.

If you have any questions or comments regarding this information, please contact our office.

Sincerely,
CESARE, INC.

Jonathan A. Crystal

Jonathan A. Crystal, P.E.
Project Engineer

JAC2/ksm

cc: Mr. Todd Yee, toddyee@jtconsulting.com
Mr. Greg Lepetsos, lepetsos@msn.com
Mr. Alex Schatz, aschatz@brannan1.com

18.150 Brannan Asphalt Plant CGS Response Letter 08.27.19

Corporate Office: 7108 South Alton Way, Building B • Centennial, CO 80112
Locations: Centennial • Frederick • Silverthorne • Salida/Crested Butte
Phone 303-220-0300 • www.cesareinc.com

Brannan Sand and Gravel Proposed Sedalia Asphalt Paving Materials Facility Noise Modeling Report

June 18, 2024

Prepared for:

Brannan Sand and Gravel
2500 East Brannan Way
Denver, CO 80229

Prepared by:

Behrens and Associates, Inc.
2320 Alaska Avenue
El Segundo, California 90245

Shaun Norris
Senior Acoustical Engineer

Jason Peetz
Engineering Manager

Corporate Office: El Segundo, California
Carson, California ~ Aledo, Texas ~ Longmont, Colorado ~ Smithton, Pennsylvania ~ Red Deer, Alberta
Oakland, California ~ Johnson City, Tennessee
Phone 800-679-8633 ~ Fax 310-331-1538
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1. Executive Summary

A noise modeling assessment was performed of the existing Sedalia Ready Mix Plant, Crushing Operations, and the proposed Asphalt Paving Materials Facility (APM) to be operated by Brannan Sand and Gravel (Brannan). When compared to legal standards, the results of the noise modeling indicate that all modeled receptors were predicted to comply with the Colorado Revised Statutes (CRS) A-weighted noise limits for all unmitigated scenarios.

This report also includes context for the modeled noise. For residential receptor locations, the noise from Brannan's existing and proposed operations may be perceived as "barely perceptible." The data to validate these conclusions is included herein or has already been separately submitted by Brannan as part of its application.

2. Introduction

The following report provides a noise modeling assessment of the existing Sedalia Ready Mix Plant and approved Crushing Operation as well as the proposed Sedalia APM to be operated by Brannan in relation to the Industrial Zoned allowable noise limits found in the Colorado Revised Statutes (CRS) 25-12-103 noise regulations per the Developmental Standards of the pending Use by Special Review (USR) permit application with Douglas County. The noise modeling includes currently operating equipment at the Sedalia Ready Mix Plant, and the previously operational Crushing Operations, as well as the proposed mechanical equipment of the Sedalia APM per project documents provided by Brannan dated 08/21/19 and reverified 9/22/23. Stand-alone crushing will be replaced by limited crushing, accessory to the concrete and asphalt paving material operations. Accessory crushing will be smaller in overall throughput and intermittent rather than continuous (i.e. “campaign” crushing). Prior modeling assumptions represent a maximum noise scenario. Reference to “existing crushing operations” reflect the assumption that compliance and mitigation assessment should utilize such a peak noise scenario. The Sedalia Ready Mix Plant and proposed Sedalia APM are located at 5775 Airport Road, Sedalia, CO. The existing site and proposed facility are bordered by agricultural, commercial, and industrial properties. Figure 2-1 identifies the facility location.

To model the predicted noise levels of the existing operations, an on-site sound level survey was conducted at the existing Sedalia Ready Mix Plant and Crushing Operation. To model the predicted noise levels of the proposed Sedalia APM, an on-site sound level survey was conducted at the asphalt plant currently in operation at 7271 Colorado Blvd, Commerce City, CO due to the similar operational capabilities between this facility and the proposed expansion. The equipment sound level data were used to construct several noise models using SoundPLAN 8.0 software.

The hours of operation, duration of activities, and other noise reduction steps were prepared by Brannan and are included in Appendix B.

The following is provided in this report:

- A brief introduction of the fundamentals of noise.
- A brief review of the ambient sound level survey data.
- A review of the applicable CRS 25-12-103 noise standards and USR noise limits.
- Discussion of noise modeling methodology and results.

Figure 2-1 Sedalia Facility Location

3. Noise Fundamentals

Sound is most commonly experienced by people as pressure waves passing through air. These rapid fluctuations in air pressure are processed by the human auditory system to produce the sensation of sound. The rate at which sound pressure changes occur is called the frequency. Frequency is usually measured as the number of oscillations per second or Hertz (Hz). Frequencies that can be heard by a healthy human ear range from approximately 20 Hz to 20,000 Hz. Toward the lower end of this range are low-pitched sounds, including those that might be described as a “rumble” or “boom”. At the higher end of the range are high-pitched sounds that might be described as a “screech” or “hiss”.

Environmental noise generally derives, in part, from a combination of distant noise sources. Such sources may include common experiences such as distant traffic, wind in trees, and distant industrial or farming activities. These distant sources create a low-level "background noise" in which no particular individual source is identifiable. Background noise is often relatively constant from moment to moment but varies slowly from hour to hour as natural forces change or as human activity follows its daily cycle.

Superimposed on this low-level, slowly varying background noise is a succession of identifiable noisy events of relatively brief duration. These events may include the passing of single-vehicles, aircraft flyovers, screeching of brakes, and other short-term events. The presence of these short-term events causes the noise level to fluctuate. Detailed acoustical definitions are provided in Appendix A.

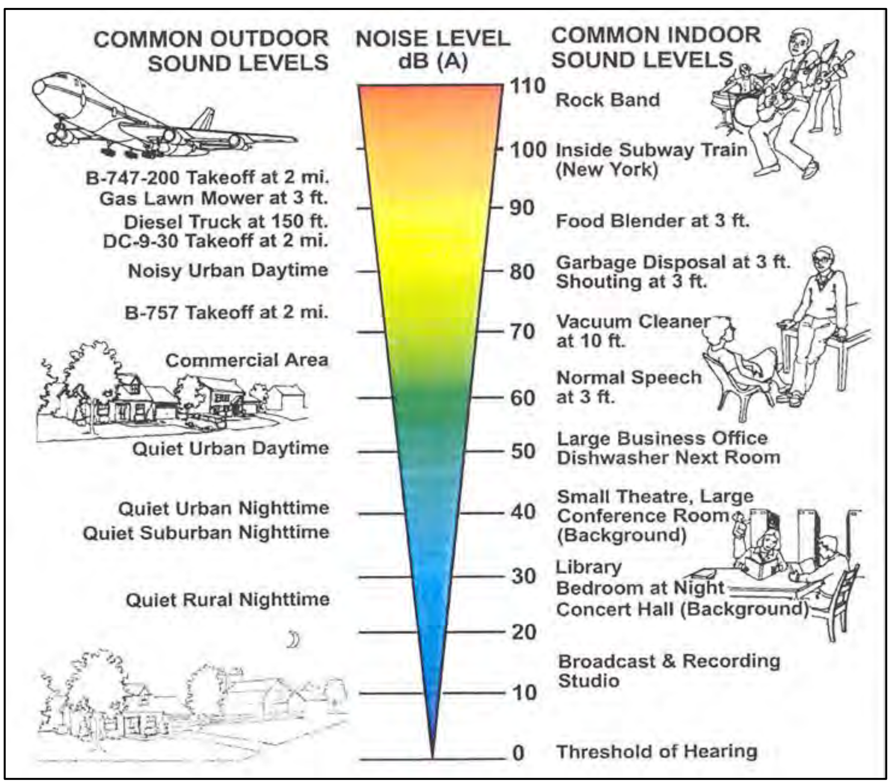

Figure 3-1 Typical Indoor and Outdoor Sound Levels

3.1 Decibel Addition

When combining two or more noise sources or noise levels (e.g., two machines operating simultaneously, ambient noise and operational noise) the sound levels add up. The logarithmic addition of noise levels ensures that the combined noise level reflects human perception accurately. If noise levels were added arithmetically, it wouldn't match how humans perceive the combined noise. Noise levels are added logarithmically because our perception of sound follows a logarithmic scale. The decibel scale, commonly used to measure noise levels, is logarithmic.

When adding noise levels logarithmically, the following formula is used:

$$Combined\ Noise\ Level\ (dB) = 10\log_{10}\left(10^{\left(\frac{Noise\ Level\ 1\ (dB)}{10}\right)} + 10^{\left(\frac{Noise\ Level\ 2\ (dB)}{10}\right)}\right)$$

Below is sample calculation demonstrating the addition of sound levels:

Noise Level 1: 50 dB (ambient noise level)
Noise Level 2: 50 dB (operational noise level)

$$Combined\ Noise\ Level\ (dB) = 53\ dB$$

3.2 Relative Loudness of Environmental Noise

Published data exists describing how humans generally respond to changes in relative loudness. Table 3-1, adapted from the Highway Traffic Noise: Analysis and Abatement Guidance (revised December 2011) published by the Federal Highway Administration, shows typical responses to changes in relative loudness.

Table 3-1 Decibel Changes, Loudness, and Relative Loudness[1]

Sound Level Change	Relative Loudness
0 dB(A)	Reference
-3 dB(A)	Barely Perceptible Change
-5 dB(A)	Readily Perceptible Change
-10 dB(A)	Half as Loud
-20 dB(A)	1/4 as Loud
-30 dB(A)	1/8 as Loud

The table describes reductions in noise levels, but the opposite holds true for increases in noise level.

[1] Table adapted from FHWA Highway Traffic Noise: Analysis and Abatement Guidance, revised December 2011

3.3 C-weighted Decibel Scale (dBC)

The C-weighted decibel scale, abbreviated dB(C) or dBC, is used less commonly than dBA, but has specific uses. The dBA scale was developed to mimic the sensitivity of the human ear at mid and lower volumes by filtering out lower frequency noise. Noise complaints can be generated due to loud, audible noise and assessed using dBA.

However, many complaints describe "rumbling," "shaking," or "rattling" of windows or structural elements. These complaints are not based on loud, audible noises, but rather induced structural vibration due the presence of low frequency noise. These types of complaints should be investigated using dBC (or unweighted low frequency octave band) measurements which do not discount low frequency noise like the A-weighted scale.

The study, *A simple Criterion for Low Frequency Noise Emission Assessment* by Norm Broner (2010) summarizes many used methods for assessing low frequency noise (LFN). Based on his research, Broner's recommendations are shown in Table 3-2 below:

Table 3-2 Criteria for Assessment of LFN

	Sensitive Receiver	Range	Criteria Leq (dBC)
Residential	Night time or plant operation 24/7	Desirable	60
		Maximum	65
	Daytime or Intermittent (1 – 2 hours)	Desirable	65
		Maximum	70
Commercial/ Office/ Industrial	Night time or plant operation 24/7	Desirable	70
		Maximum	75
	Daytime or Intermittent (1 – 2 hours)	Desirable	75
		Maximum	80

4. Ambient and Operational Sound Level Survey

An ambient and operational sound level survey was performed by Behrens and Associates – Environmental Noise Control (BAENC) at various points along the property line from Friday, October 18th to Tuesday, October 22nd, 2019 to measure and document the ambient and operational sound levels on and near the Sedalia Ready Mix Plant and Crushing Operation. The survey was conducted to measure the existing ambient noise levels of the area without the noise impact of the existing plant operations as well as to document the operational noise levels of the existing Sedalia Ready Mix Plant and Crushing Operation.

The existing noise environment consists of multiple noise sources contributing to a high ambient noise environment. The high ambient noise environment is due to human made sources, such as, operations from adjacent commercial businesses, road traffic noise due to the access to the adjacent CanAm highway, and the train traffic east of the Brannan plant. The Brannan Ready Mix Plant 13 Sedalia and surrounding environment can be seen in Figure 4-1.

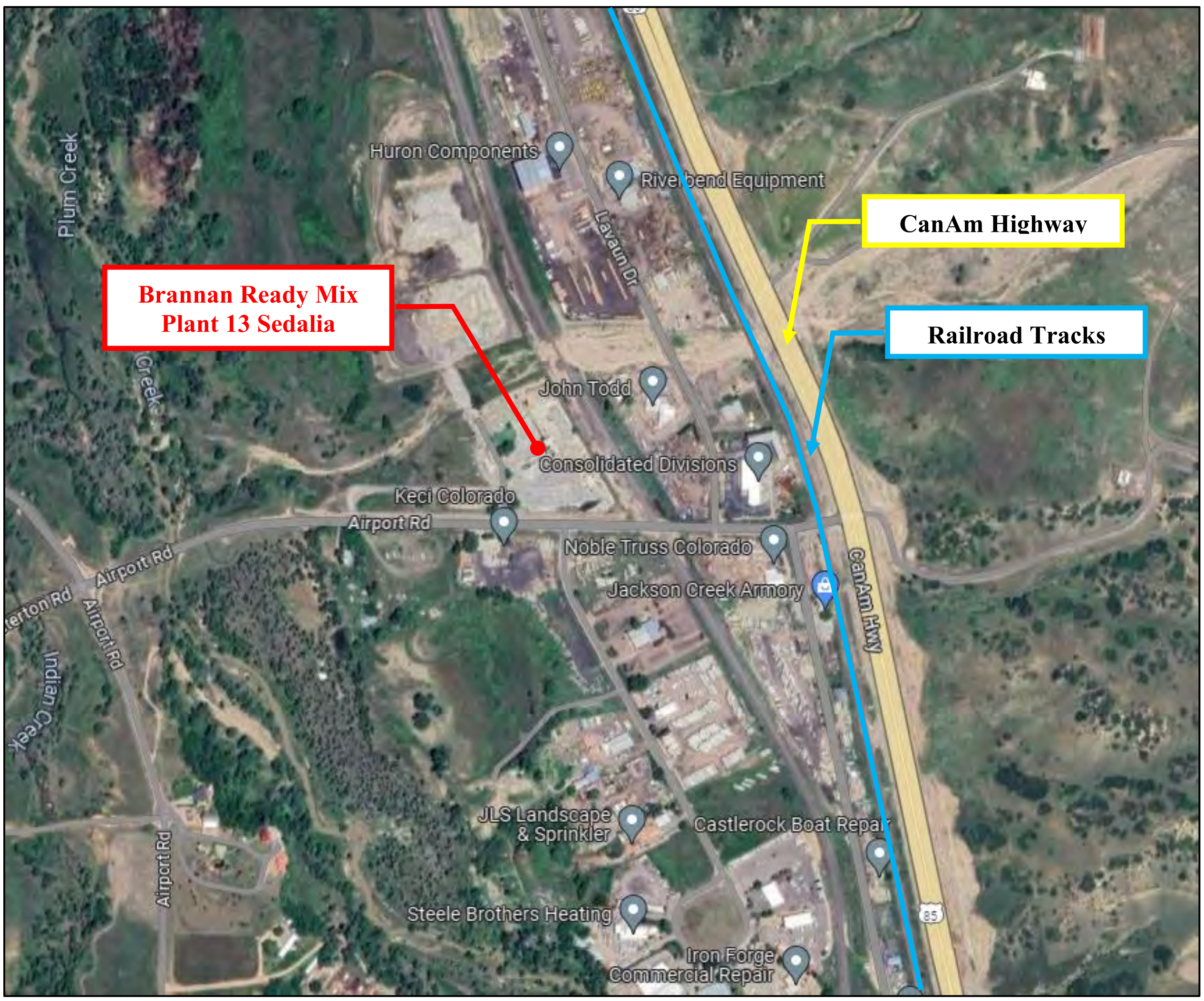

Figure 4-1 Brannan Ready Mix Plant 13 Sedalia and Surrounding Environment

The measured noise levels were used to calculate typical daytime (7am to 7pm) and nighttime (7pm to 7am) equivalent (Leq) values at the four monitoring locations shown in Figure 4-2. The full report including measured 1-hour and 15-minute Leq values are show graphically and in tables in a separate report authored by BAENC, titled *Brannan Sand and Gravel – Ready Mix Sedalia Plant – Sound Level Survey Report,* and dated November 8th, 2019. Additional technical data used in this report was provided to Brannan, who attached it to the April 4, 2023 submittal.

The calculated ambient daytime and nighttime noise levels are summarized in Table 4-1. The daytime and nighttime ambient dBA levels ranged from 54.2 dBA to 57.6 dBA at Locations 1 through 3 but recorded higher levels of 75.2 dBA and 72.4 dBA during daytime and nighttime periods respectively. The daytime and nighttime ambient dBC levels ranged from 67.5 dBC to 75.2 dBC at Locations 1 through 3 but recorded higher levels of 80.1 dBC and 78.0 dBC during daytime and nighttime periods respectively. Location 4 recorded higher ambient dBA and dBC levels than the other locations due to its closer proximity to other commercial and industrial properties in the area as well as its proximity to the operational industrial railway that borders the eastern property boundary.

The calculated operational daytime and nighttime noise levels are summarized in Table 4-2. The Sedalia Ready Mix Plant and Crushing Operation were confirmed to be operational by Brannan from 4:41 AM to 5:35 PM on Friday October 18th, from 5:06 AM to 1:05 PM on Saturday October 19th, not operational on Sunday October 20th, from 5:20 AM to 4:55 PM on Monday October 21st, and from 4:51 AM to 6:34 PM on Tuesday October 22nd. The recorded daytime and nighttime operational sound levels varied per location depending on proximity to the Sedalia Ready Mix Plant and Crushing Operation but were recorded to be in compliance with the existing industrial noise limits of the property throughout the survey period.

Note that the ambient data is higher than operational data for many of the recorded periods and there are several reasons for this. Not only were there approximately 30 more hours of ambient data than operational, the ambient data periods included more wind gust data which may not have been enough to drive the 15-minute average over the limit but likely influenced the data. Day 2 had high gusts which created some outlier data, which if removed, the overall Leqs in the tables would make more sense. Additionally, Locations 1 and 4 are in more of an urban environment, with Locations 2 and 3 being more representative of true ambient. The fact that ambient and operational are so close means that the contribution of the plant at this point is no more than the other ambient sounds. Lastly, with approximately 30 more hours of ambient data, a vast amount of additional train noise was collected, increasing the overall ambient levels.

Table 4-1 Measured Ambient L_{eq} Sound Levels (dBA, dBC)

Brannan Sand and Gravel – Sedalia Ready Mix Plant																
Day	Location 1				Location 2				Location 3				Location 4			
	Daytime Leq Ambient Noise Levels		Nighttime Leq Ambient Noise Levels		Daytime Leq Ambient Noise Levels		Nighttime Leq Ambient Noise Levels		Daytime Leq Ambient Noise Levels		Nighttime Leq Ambient Noise Levels		Daytime Leq Ambient Noise Levels		Nighttime Leq Ambient Noise Levels	
	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC
1	61.0	67.2	55.4	63.6	58.2	69.6	55.7	64.6	60.1	71.2	58.0	67.7	78.6	83.3	53.5	79.4
2	55.4	73.4	53.9	72.0	56.7	72.3	54.1	75.9	53.8	73.9	58.1	80.6	72.0	77.7	72.0	77.5
3	50.5	71.7	55.3	64.7	45.1	71.4	55.8	66.2	50.9	75.4	57.3	68.3	70.8	74.8	70.1	78.8
4			50.7	60.8			51.0	63.1			53.0	67.5			75.9	75.1
Overall Leq	**57.6**	**71.4**	**54.2**	**67.5**	**55.9**	**71.3**	**54.5**	**70.8**	**56.7**	**73.9**	**57.0**	**75.2**	**75.2**	**80.1**	**72.4**	**78.0**

Table 4-2 Measured Operational L_{eq} Sound Levels (dBA, dBC)

Brannan Sand and Gravel – Sedalia Ready-Mix Plant																
Day	Location 1				Location 2				Location 3				Location 4			
	Daytime Leq Operational Noise Levels		Nighttime Leq Operational Noise Levels		Daytime Leq Operational Noise Levels		Nighttime Leq Operational Noise Levels		Daytime Leq Operational Noise Levels		Nighttime Leq Operational Noise Levels		Daytime Leq Operational Noise Levels		Nighttime Leq Operational Noise Levels	
	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC	dBA	dBC
1	57.6	69.6	54.7	64.3	63.5	75.7	52.6	64.2	55.3	69.6	57.9	67.0	71.2	77.2	71.7	77.8
2	56.3	67.3			62.3	73.3			56.2	68.1			73.2	79.1		
3			56.9	64.9			53.8	65.0			56.0	65.3			71.2	76.6
4	55.3	69.0	56.4	68.8	63.3	77.1	61.4	73.3	51.1	73.1	55.1	68.3	63.2	73.9	71.9	79.1
Overall Leq	**55.2**	**67.5**	**54.8**	**65.3**	**61.8**	**74.4**	**56.5**	**68.3**	**53.5**	**69.5**	**55.3**	**65.8**	**69.5**	**76.0**	**70.4**	**76.7**

Figure 4-2 Ambient and Operational Monitoring Locations

5. Noise Standards

5.1 CRS 25-12-103 Noise Standards

The modeling analysis was developed to predict operational noise levels at code compliance points and verify compliance of operations with the CRS 25-12-103 noise standards. The CRS code establishes permissible sound levels by type of property and hours of the day.

With regards to the applicable zoning noise limits for the proposed expansion of the Sedalia facility, the Noise Control section of the Management Plan US2018-010 located on Sheet 2 of the submitted Use By Special Review (USR) Plan Exhibit – 2018-010 states "The operator shall maintain compliance with Colorado Revised Statues 25-12-103 maximum permissible noise levels and any applicable local ordinance at all times, and for industrial zoned areas, which is a maximum noise level of 80 dB, at the boundaries of the property, between 7:00 AM and 7:00 PM, and 75 dB between 7:00 PM and 7:00 AM".

Based on the specifications of CRS 25-12-103 and the USR Permit Management Plan, the industrial noise level limits listed in Table 5-1 are applicable to the site and will be used to assess the noise impact of the site.

Table 5-1 Colorado Noise Related Statues 25-12-103 (1) – Maximum Permissible Noise Levels

Zone	Maximum Noise (dBA) 7:00 am to next 7:00 pm	Maximum Noise (dBA) 7:00 pm to next 7:00 am
Residential	55 dBA	50 dBA
Commercial	60 dBA	55 dBA
Light Industrial	70 dBA	65 dBA
Industrial	80 dBA	75 dBA

5.2 Douglas County Zoning Resolution 17A Noise Standards

Douglas County Zoning Resolution 17A addresses noise regulations as it applies to all land within the unincorporated Douglas County and refers back to CRS 25-12-103 noise standards. Therefore, the noise standards stated are inherently included in the noise management plan per the project USR which is based on the CRS code.

5.3 Brannan Project Noise Standards

Though the CRS code is the only code directly applicable per the project USR, Brannan has elected to expand the noise modeling analysis by including an evaluation of C-scale (dBC) noise as well. In lieu of code language that specifically dictates compliance locations and compliance limits for C-scale noise, BAENC has elected to include modeling receptor locations in close proximity (25 ft. from) nearby occupied structures, which is industry best practice.

6. Sedalia APM Noise Modeling Methodology

6.1 Noise Modeling Methodology

The noise modeling was completed with three-dimensional computer noise modeling software. All models in this report were developed with SoundPLAN 8.0 software using the International Organization for Standardization (ISO) 9613-2 standard. Noise levels are predicted based on the locations, noise levels, and frequency spectra of the noise sources, and the geometry and reflective properties of the local terrain, buildings, and barriers. SoundPLAN 8.0 software simulates light downwind conditions in all directions to generate conservative assessments. The predicted noise levels represent only the contribution of the existing and proposed operations and do not include ambient noise or noise from other facilities. Actual field sound level measurements may vary from the modeled noise levels due to other noise sources such as traffic, other facilities, other human activity, or environmental factors.

Table 6-1 lists the modeled equipment list and associated source sound power levels for the Sedalia Ready Mix Plant. This data was calibrated from an on-site equipment sound level survey that was conducted by BAENC on October 22nd, 2019 at the Ready Mix Plant located at 5775 Airport Road in Sedalia, CO. The site was fully operational throughout the course of the survey. Each piece of equipment was surveyed under normal loading conditions with multiple sound level measurements taken in close proximity to and at increasing distances from the specific piece of equipment.

Table 6-2 lists the modeled equipment list and associated source sound power levels for the Sedalia Crushing Operation. This data was calibrated from an on-site equipment sound level survey that was conducted by BAENC on October 22nd, 2019 at the Crushing Operation located at 5775 Airport Road in Sedalia, CO. The site was fully operational throughout the course of the survey. Each piece of equipment was surveyed under normal loading conditions with multiple sound level measurements taken in close proximity to and at increasing distances from the specific piece of equipment.

Table 6-3 lists the modeled equipment list and associated source sound power levels for the proposed Sedalia APM. This data was calibrated from an on-site equipment sound level survey that was conducted by BAENC on October 25th, 2019 at the 400 ton per hour asphalt plant facility located at 7271 Colorado Blvd, Commerce City, CO. This site was chosen since the equipment and facility throughput rate (400 tons/hour) is intended to be duplicated for the proposed Sedalia facility expansion. The site was fully operational throughout the course of the survey. Each piece of equipment was surveyed under normal loading conditions with multiple sound level measurements taken in close proximity to and at increasing distances from the specific piece of equipment.

The unmitigated and mitigated modeling results are inclusive of the mechanical equipment listed in Table 6-1 through Table 6-3 only. The modeled equipment locations match the facility plot plant included on Sheet 5 of the Use Area Exhibit dated 03/22/23 and shown in Figure 6-1.

These assumptions and the methodology cited herein were reviewed and verified for the project as of September 22, 2023. Any discrepancy from previous equipment lists is based on Brannan's latest operational needs where it is the sole operator.

Table 6-1 Equipment Modeled for the Sedalia Ready Mix Plant

Quantity	Equipment Type	Calibrated Source Sound Power Level (Lw dBA)
1	Concrete Truck – Loading from Plant Mixer Station	107.8
1	Delivery Truck – Unloading Material to Plant	110.7
1	Plant Unload Pump for Delivery Trucks	110.9
1	Sedalia Ready Mix Plant Mixer	106.0
1	C-Ash Blower	105.2
1	Silo Auger	101.2
1	Plant Dust Collector	108.5

Table 6-2 Equipment Modeled for the Sedalia Crushing Operation

Quantity	Equipment Type	Source Sound Power Level (Lw dBA)
1	Impact Crusher	105.3
1	Jaw Crusher	102.9
1	Screen	105.5
1	Conveyor Generator	112.2

Table 6-3 Equipment Modeled for the Proposed Sedalia Asphalt Paving Materials Facility

Quantity	Equipment Type	Source Sound Power Level (Lw dBA)
1	Silo Conveyor – Top of Silo	85.2
1	Screen 1 – First Aggregate Screen	96.0
1	Screen 2 – Second Aggregate Screen	92.2
1	Baghouse Blower	100.7
1	Baghouse Exhaust	105.0
1	Drum Blower - Rear	108.3
1	Drum Blower – Side 1	109.1
1	Drum Blower – Side 2	107.9
1	Drum Body - Side	93.3
1	Drum Body - Front	100.9

6.2 Noise Sensitive Receptor Locations

Noise sensitive receptor locations represent specific calculation points within the model of the predicted noise levels. The noise sensitive receptor locations have been chosen to be consistent with the requirements of the CRS 25-12-103 noise standards and Brannan project noise standards. The requirements state that dBA noise levels shall comply with the applicable noise limits as measured at the property line. Figure 6-2 shows the noise sensitive receptor locations placed at various points along the site property line.

Per request by Brannan, to get a better idea of the noise levels experienced at the structures of nearby residences and commercial businesses, additional receptor points were included as shown in Figure 6-3. Both dBA and dBC noise levels were evaluated at these locations which were placed 25-feet from the structures.

Figure 6-1 Use Area Exhibit – US2021-002 Site Plot Plan dated 03/22/23

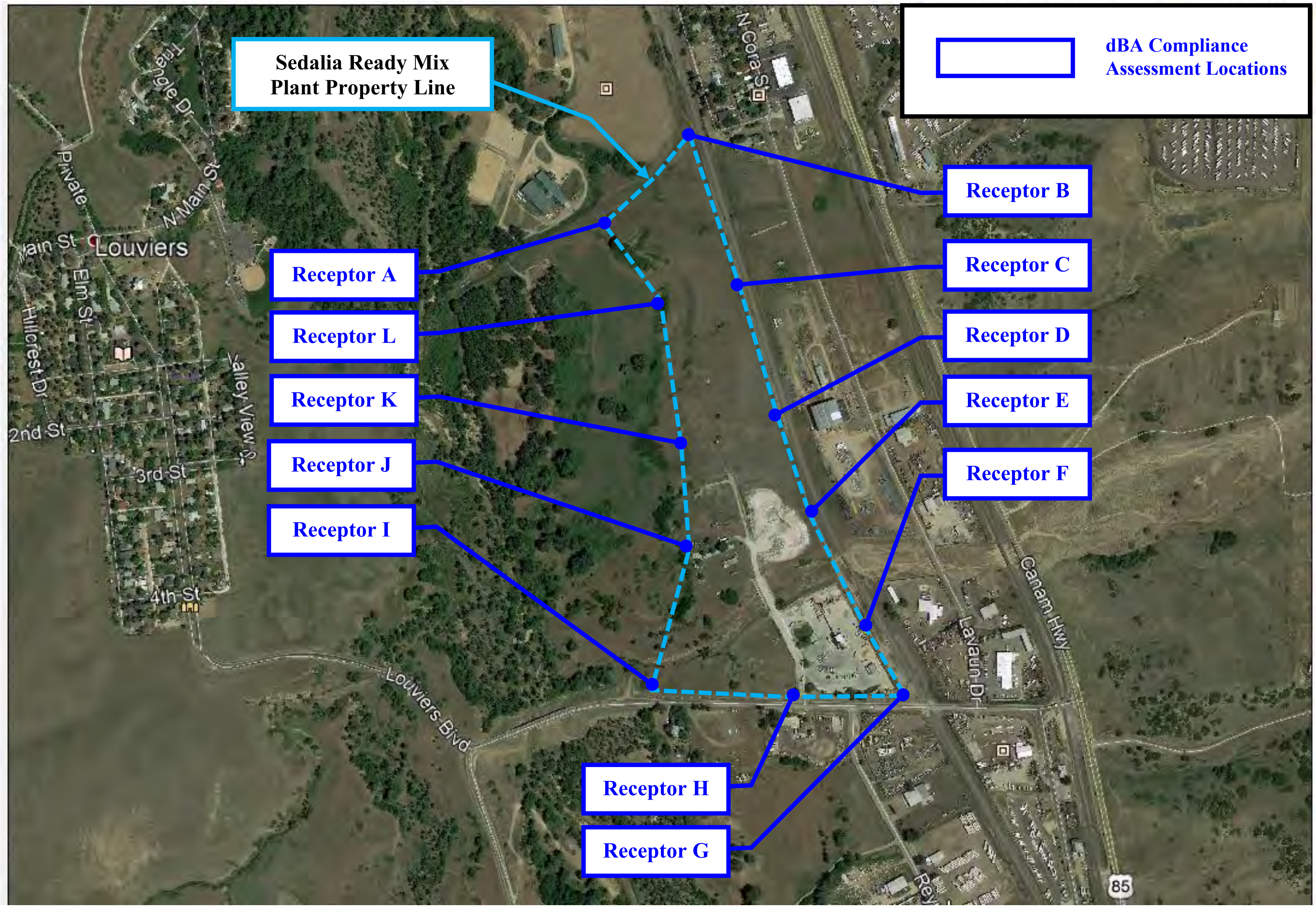

Figure 6-2 dBA Receptor Locations

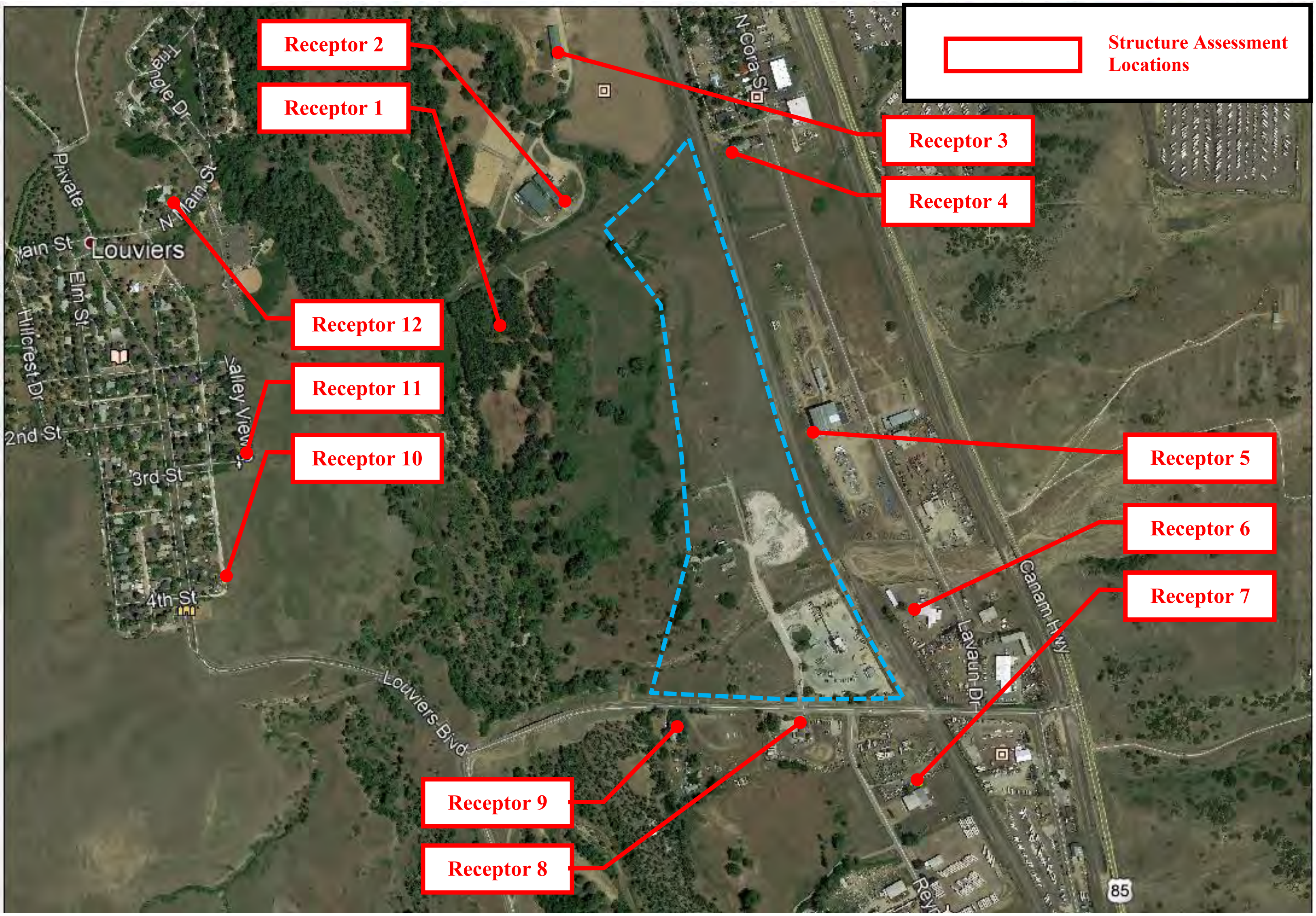

Figure 6-3 Structure Receptor Locations

7. Proposed Sedalia APM Noise Modeling Results

Several modeling scenarios were created to investigate the existing and proposed operational activities of the Ready Mix Plant and APM plant located in Sedalia, CO. Four different unmitigated scenarios were created that model the predicted noise levels produced from the existing Sedalia Ready Mix Plant, existing Sedalia Crushing Operation, and proposed Sedalia APM separately as well as another scenario to investigate the combined contribution of all three operations simultaneously. In all of these scenarios the plants and associated equipment are included in their current operational conditions with no modifications or other acoustical mitigation efforts that may affect how the sound propagates.

The predicted noise levels represent only the contribution of the project operations and do not include ambient noise or noise from other facilities. Ambient data is not included in the modeling results due to the fact that the ambient data varies by monitoring location and day to day, as indicated in Table 4-1, and therefore will have varying levels of contribution to the overall measured field sound levels depending on the time of day and location. Actual field sound level measurements may vary from the modeled noise levels due to other noise sources such as traffic, other facilities, other human activity, or environmental factors.

7.1 Unmitigated Noise Modeling Results

The results of the unmitigated noise modeling include four separate modeling scenarios that include the following operational activities: existing Sedalia Ready Mix Plant only, existing Sedalia Crushing Operation only, proposed Sedalia APM only, and combined operations of all three operations. The tabulated results of the noise modeling are presented in both A-weighted (dBA) and C-weighted (dBC) values per noise sensitive receptor location in Table 7-1 and Table 7-4. The locations in the tables correspond to the locations identified in Figure 6-2 and Figure 6-3. The results of the noise modeling are also shown as noise contour maps in Figure 7-1 through Figure 7-8. The noise contours are provided in 5 dB increments with the color scale indicating the sound level of each contour. Noise levels found in the noise contour maps are predicted based on the locations, noise levels, and frequency spectra of the noise sources, and the geometry and reflective properties of the local terrain.

The A-weighted noise modeling results listed in Table 7-1 indicate that the existing Sedalia Ready Mix Plant operations are predicted to currently be the largest single noise source at most receptor locations followed by the contributions from the Sedalia Crushing Operation. The A-weighted contribution from the proposed Sedalia APM is not predicted to significantly add to the Combined Operations noise levels. This indicates that if acoustical mitigation measures are desired to reduce A-weighted noise of the existing or proposed operations then the Sedalia Ready Mix Plant is the first area that needs to be addressed. The results of the unmitigated noise modeling indicate that all modeled receptors are predicted to comply with the A-weighted CRS noise limits for all unmitigated scenarios.

The C-weighted noise modeling results listed in Table 7-4 indicate that the existing Sedalia Crushing Operation and proposed Sedalia Asphalt Paving Materials Facility are predicted to be the main contributors of low frequency noise at the noise sensitive receptors. This indicates that if acoustical mitigation measures are desired to reduce C-weighted noise of the existing or proposed operations then the Sedalia Crushing Operation and Sedalia Asphalt Paving Materials Facility are the first areas that need to be addressed.

The A-weighted noise modeling results listed in Table 7-3 were provided to assess the noise level at the noise receptor locations considered for C-Weighted noise. These receptor locations are not compliance points for A-Weighted noise and were provided for informational purposes only.

Table 7-1 A-Weighted Unmitigated Noise Modeling Results

Noise Sensitive Receptor Location	Modeled Unmitigated Scenario			
	Sedalia Ready Mix Plant	Sedalia Crushing Operation	Sedalia Asphalt Paving Materials Facility	Combined Operations
A	42.6	34.0	44.2	45.9
B	50.1	36.0	40.5	50.6
C	54.9	38.2	39.5	55.1
D	64.5	43.5	50.6	64.7
E	70.8	52.6	46.9	70.9
F	71.4	55.9	42.5	71.5
G	56.2	52.0	41.0	57.1
H	62.1	53.7	41.8	62.7
I	51.8	49.7	42.9	54.3
J	51.1	50.1	53.6	56.6
K	40.3	41.5	50.6	51.4
L	44.2	36.7	48.6	49.9
CRS Noise Limit	**80.0 Day / 75.0 Night**			

In addition to the CRS Code compliance analysis, predicted sound levels were compared to measured ambient sound levels. To ensure a conservative analysis, measured nighttime sound levels were used to represent the ambient sound levels. Each modeled receptor location was matched with a representative ambient location from the ambient sound level survey detailed in Section 4. The perceptibility classifications are based on Table 3-1.

Table 7-2 Noise Modeling Results and Perceptibility of Noise

Noise Sensitive Receptor	Combined Operations	Representative Measured Ambient Data	Combined Operations + Ambient	Difference (Combined – Ambient)	Perceptibility of Noise
A	45.9	57.0	57.3	0.3	Barely Perceptible
B	50.6	57.0	57.9	0.9	Barely Perceptible
C	55.1	57.0	59.2	2.2	Barely Perceptible
D	64.7	57.0	65.4	8.4	Readily Perceptible
E	70.9	72.4	74.7	2.3	Barely Perceptible
F	71.5	72.4	75.0	2.6	Barely Perceptible
G	57.1	72.4	72.5	0.1	Barely Perceptible
H	62.7	72.4	72.8	0.4	Barely Perceptible
I	54.3	54.2	57.3	3.1	Barely Perceptible
J	56.6	54.5	58.7	4.2	Barely Perceptible
K	51.4	54.5	56.2	1.7	Barely Perceptible
L	49.9	54.5	55.8	1.3	Barely Perceptible

The predicted combined operational noise levels at adjacent residential and commercial structures can be seen in Table 7-3. Each modeled receptor location was matched with a representative ambient location from the ambient sound level survey detailed in Section 4. The perceptibility classifications are based on Table 3-1.

Table 7-3 Residential/Commercial A-Weighted Unmitigated Noise Modeling Results

Noise Sensitive Receptor	Combined Operations	Representative Measured Ambient Data	Combined Operations + Ambient	Difference (Combined – Ambient)	Perceptibility of Noise
1 - Residential	48.0	57.0	57.5	0.5	Barely Perceptible
2 - Commercial	42.2	57.0	57.1	0.1	Barely Perceptible
3 - Commercial	48.8	57.0	57.6	0.6	Barely Perceptible
4 - Residential	51.3	57.0	58.0	1.0	Barely Perceptible
5 - Commercial	62.6	72.4	72.8	0.4	Barely Perceptible
6 - Commercial	67.2	72.4	73.5	1.1	Barely Perceptible
7 - Commercial	53.1	72.4	72.5	0.1	Barely Perceptible
8 - Commercial	59.3	72.4	72.6	0.2	Barely Perceptible
9 - Residential	54.2	54.2	57.2	3.0	Barely Perceptible
10 - Residential	45.0	54.5	55.0	0.5	Barely Perceptible
11 - Residential	44.6	54.5	54.9	0.4	Barely Perceptible
12 - Residential	41.8	54.5	54.7	0.2	Barely Perceptible

The result of the noise modeling indicates that the combined operational C-weighted noise levels are below the daytime or intermittent residential dBC noise level limit of 70 dBC given in the Broner study. It should also be noted that the measured nighttime ambient C-weighted noise levels are often above the recommended low frequency noise level limit recommended by Broner, indicating a high low frequency noise environment.

Table 7-4 Residential C-Weighted Unmitigated Noise Modeling Results

Noise Sensitive Receptor Location	Modeled Unmitigated Scenario			
	Sedalia Ready Mix Plant	Sedalia Crushing Operation	Sedalia Asphalt Paving Materials Facility	Combined Operations
1 - Residential	43.3	54.9	57.9	60.1
2 - Commercial	43.3	49.8	53.0	55.3
3 - Commercial	49.4	51.2	54.9	57.2
4 - Residential	52.3	52.4	55.0	58.3
5 - Commercial	62.2	62.7	65.6	68.2
6 - Commercial	67.5	63.3	59.3	69.4
7 - Commercial	56.2	57.4	55.8	60.7
8 - Commercial	62.7	64.3	58.0	67.1
9 - Residential	56.2	61.6	59.9	64.6
10 - Residential	46.8	52.5	57.3	58.9
11 - Residential	46.2	52.5	58.0	59.4
12 - Residential	42.0	49.8	49.7	53.3

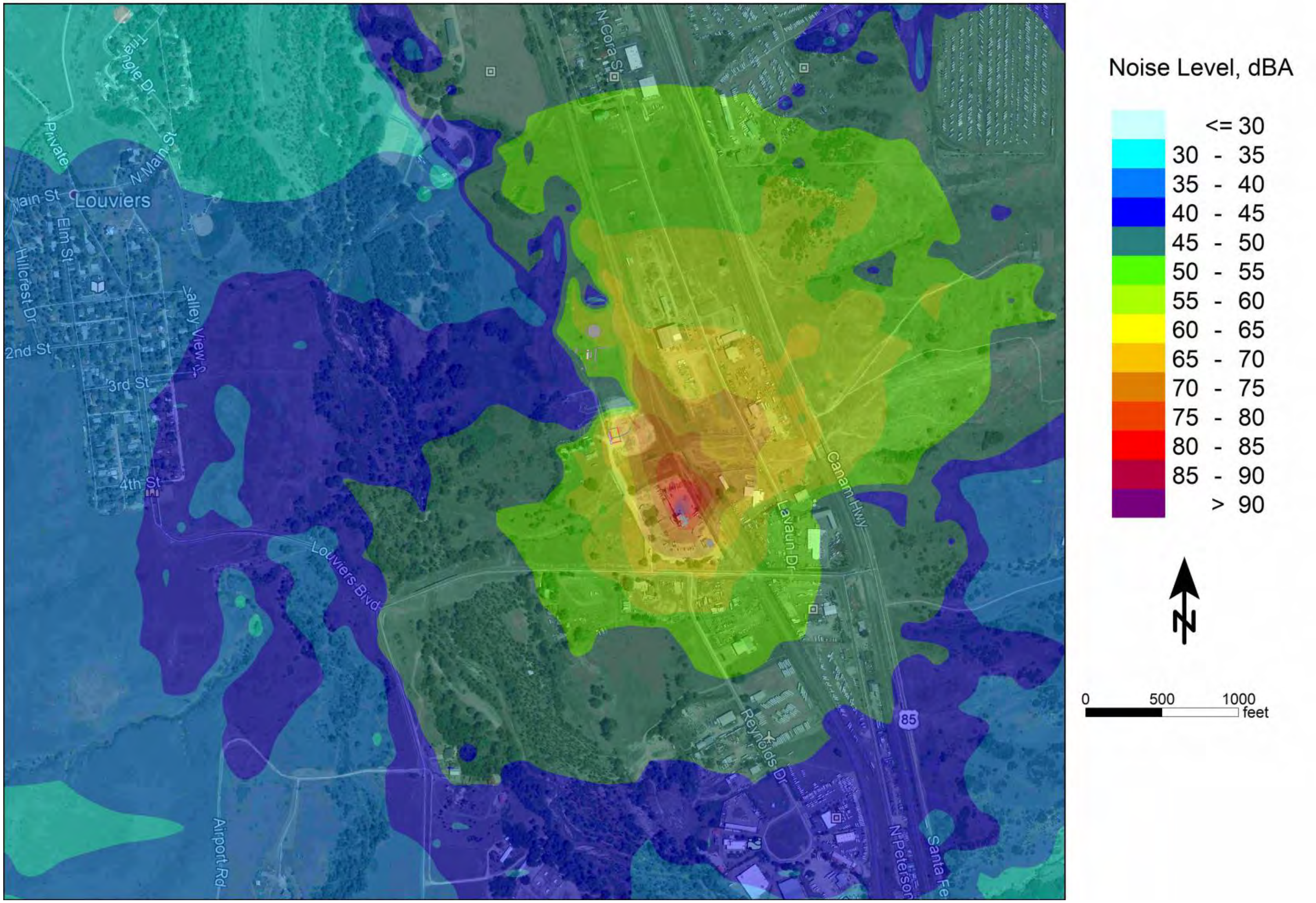

Figure 7-1 Unmitigated Modeling – Existing Sedalia Ready Mix Plant – Noise Contour Map (dBA)

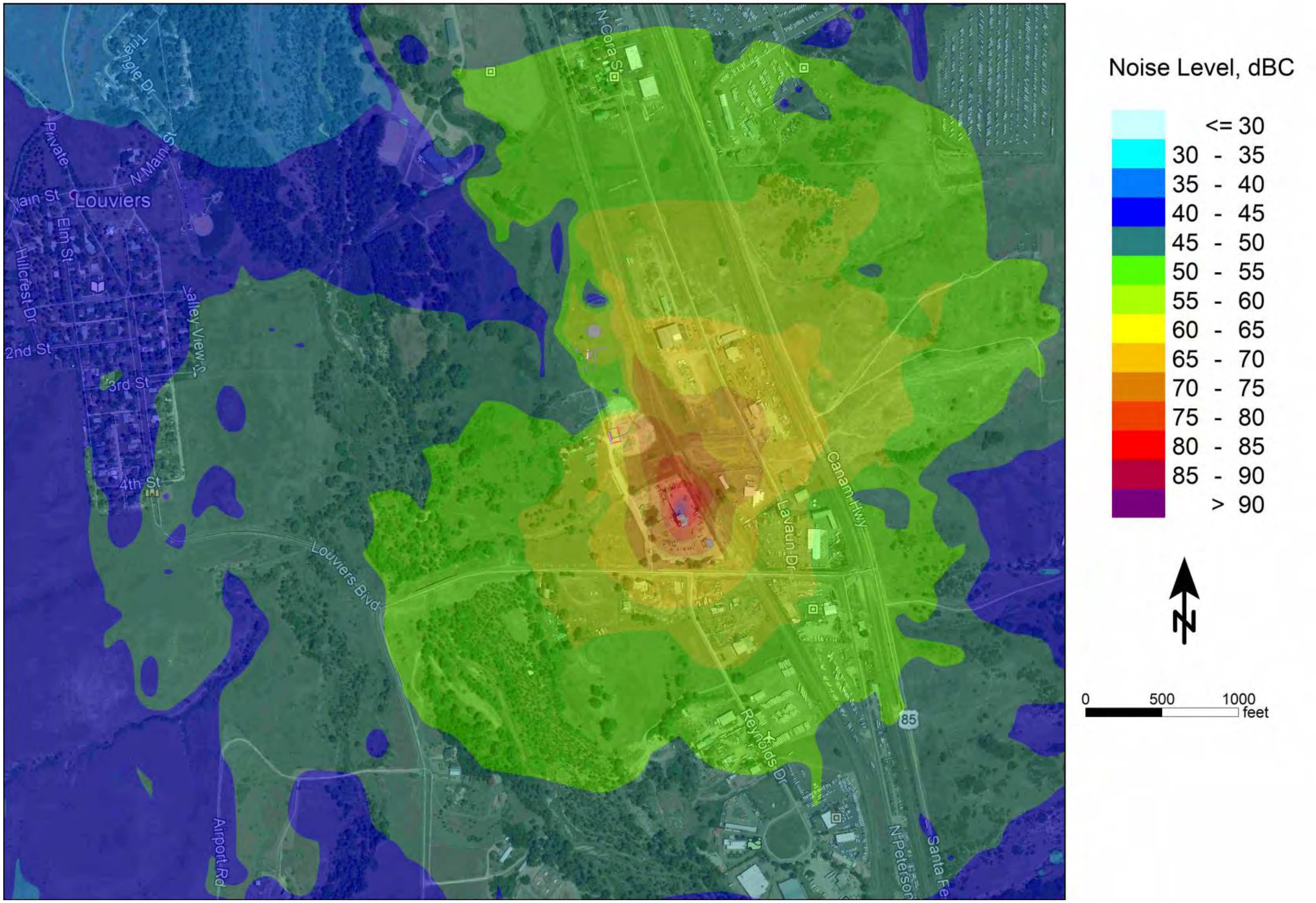

Figure 7-2 Unmitigated Modeling – Existing Sedalia Ready Mix Plant – Noise Contour Map (dBC)

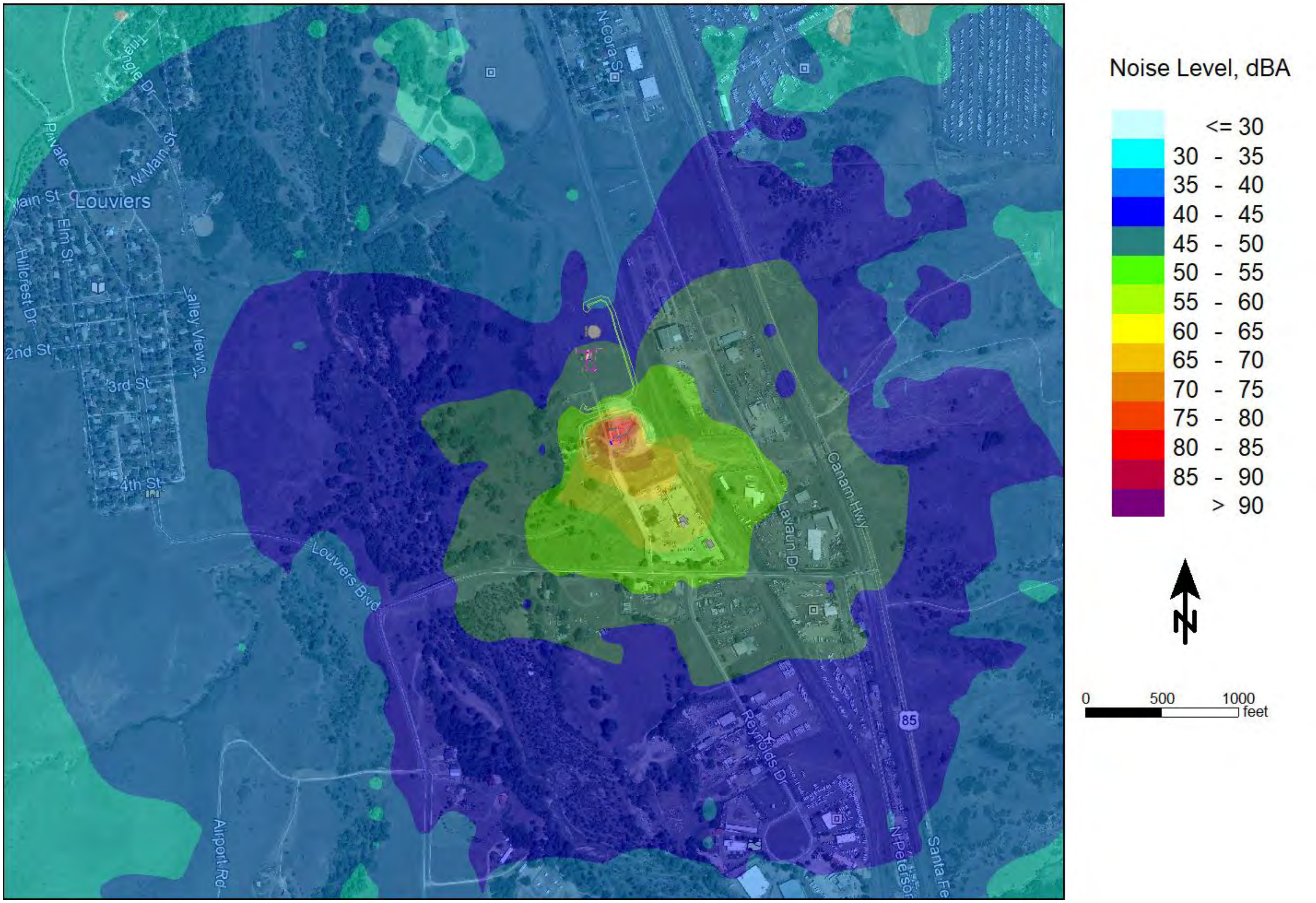

Figure 7-3 Unmitigated Modeling – Existing Sedalia Crushing Operation – Noise Contour Map (dBA)

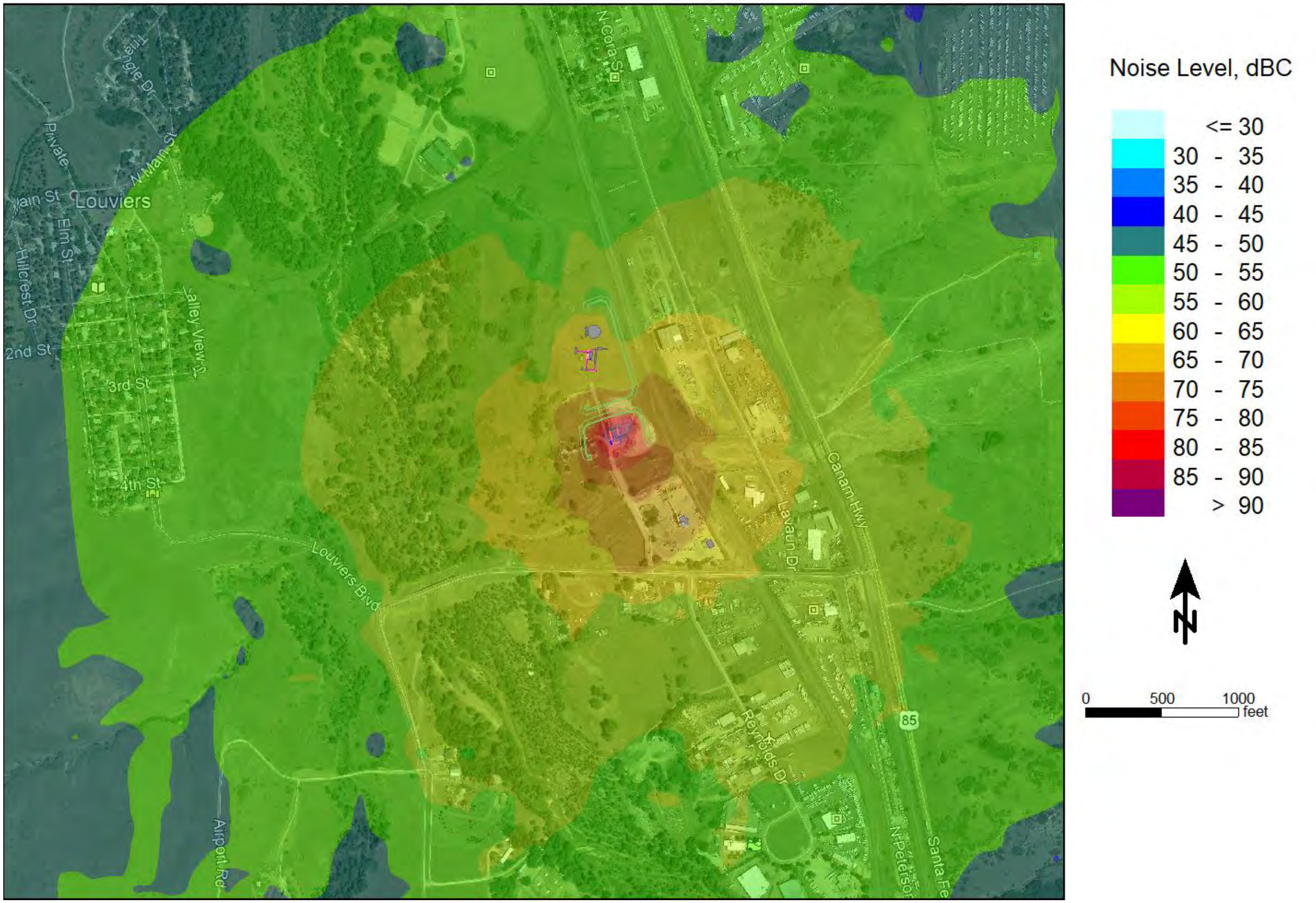

Figure 7-4 Unmitigated Modeling – Existing Sedalia Crushing Operation – Noise Contour Map (dBC)

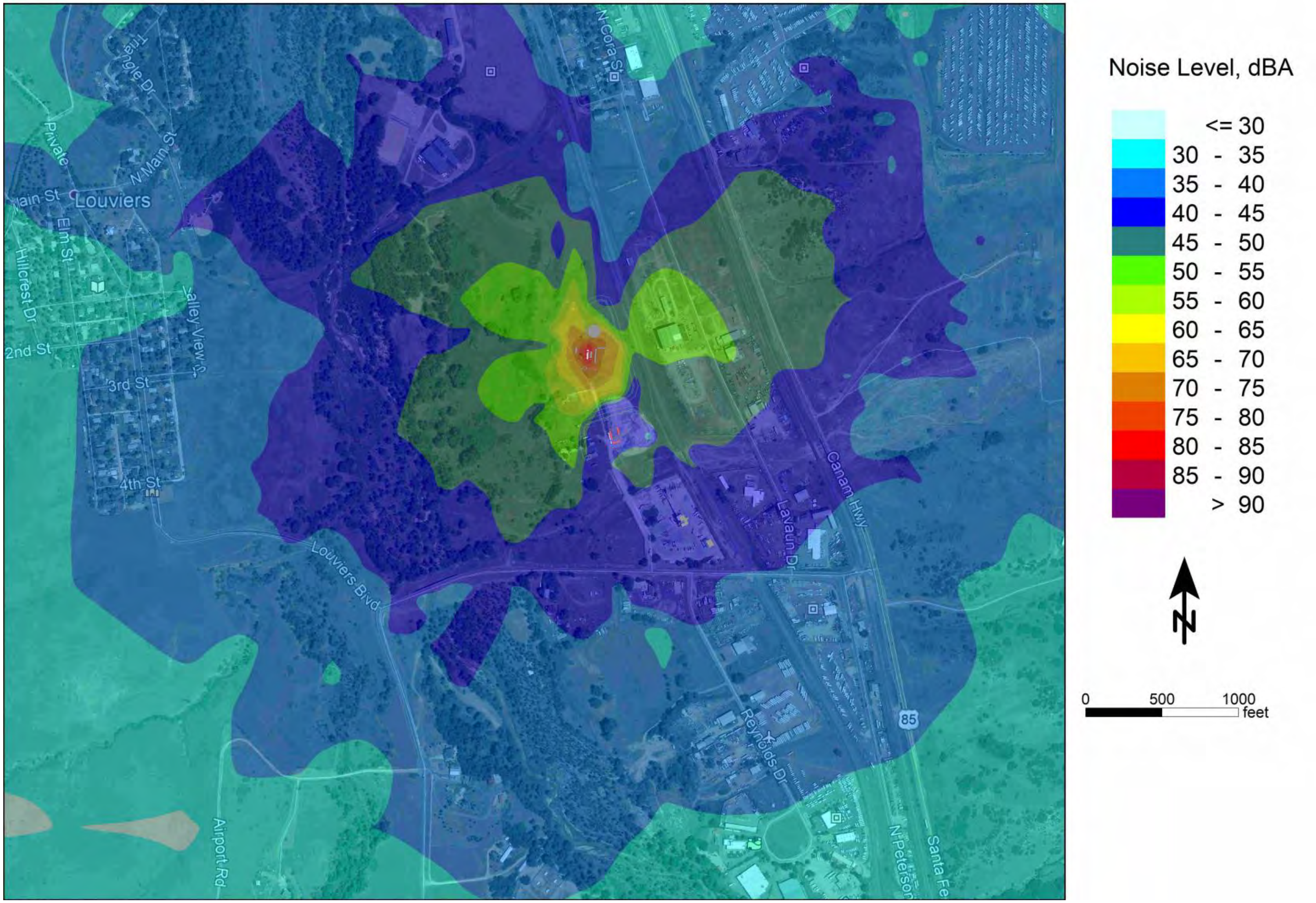

Figure 7-5 Unmitigated Modeling – Proposed Sedalia Asphalt Paving Materials Facility – Noise Contour Map (dBA)

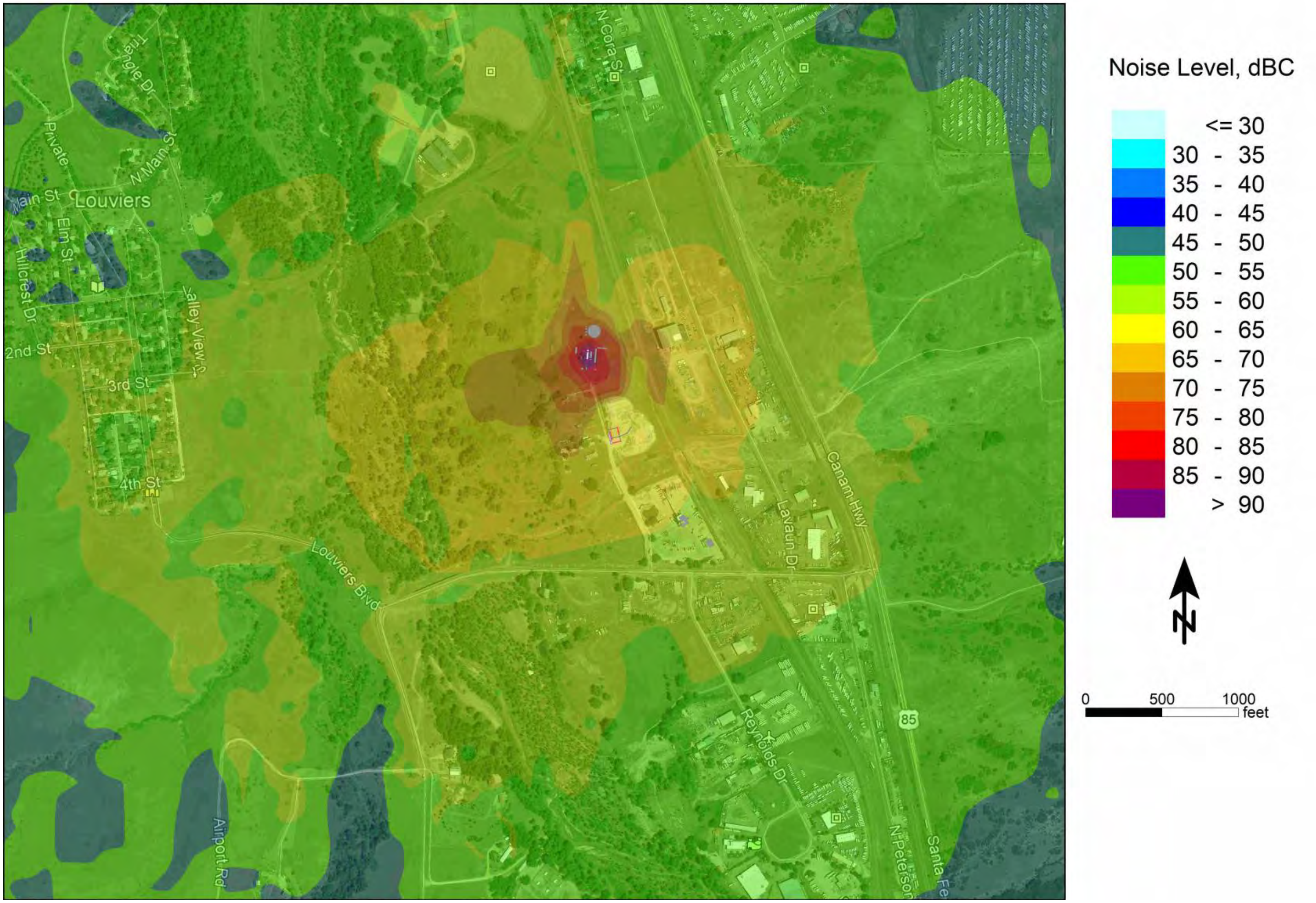

Figure 7-6 Unmitigated Modeling – Proposed Sedalia Asphalt Paving Materials Facility – Noise Contour Map (dBC)

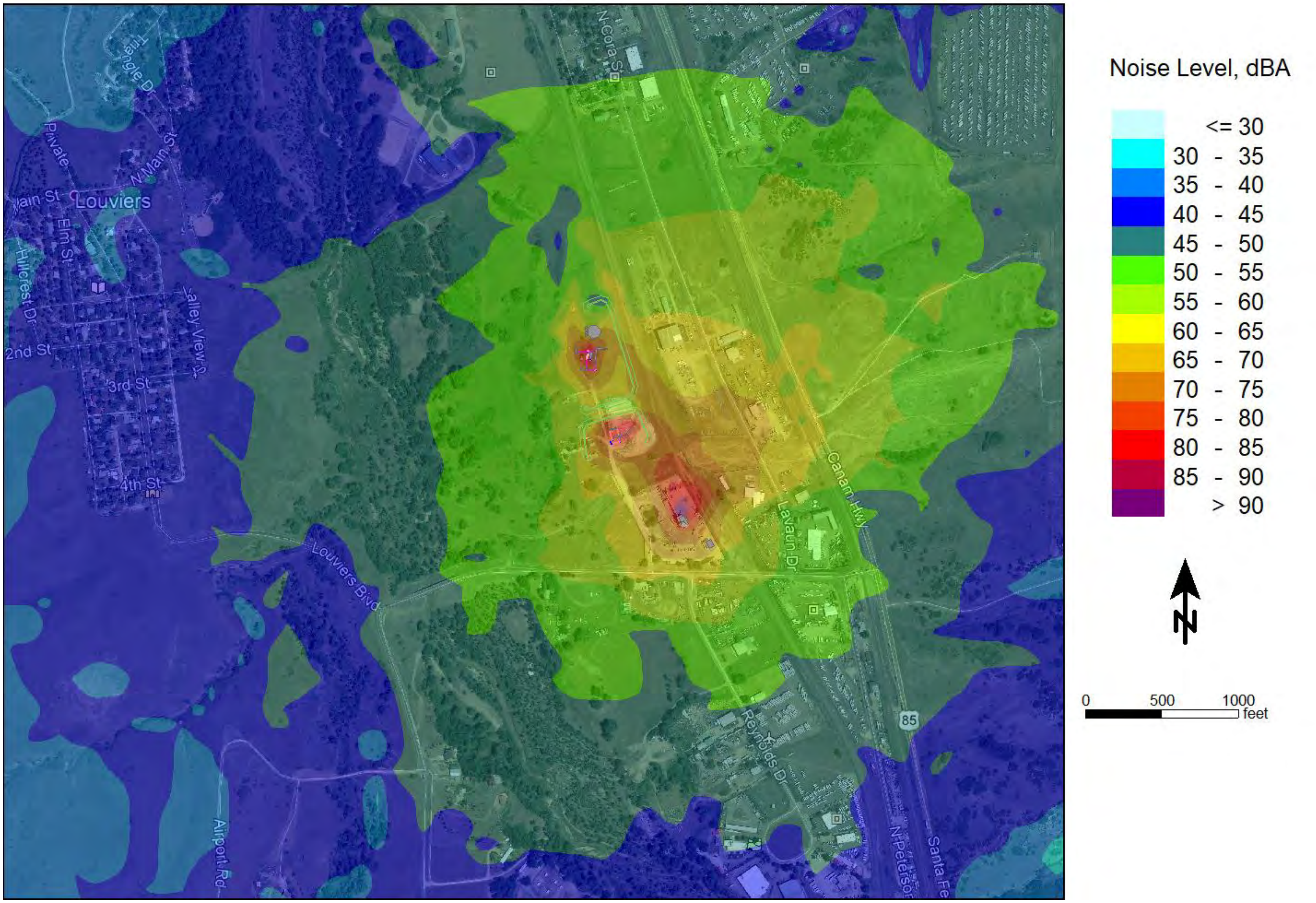

Figure 7-7 Unmitigated Modeling – Combined Operations – Noise Contour Map (dBA)

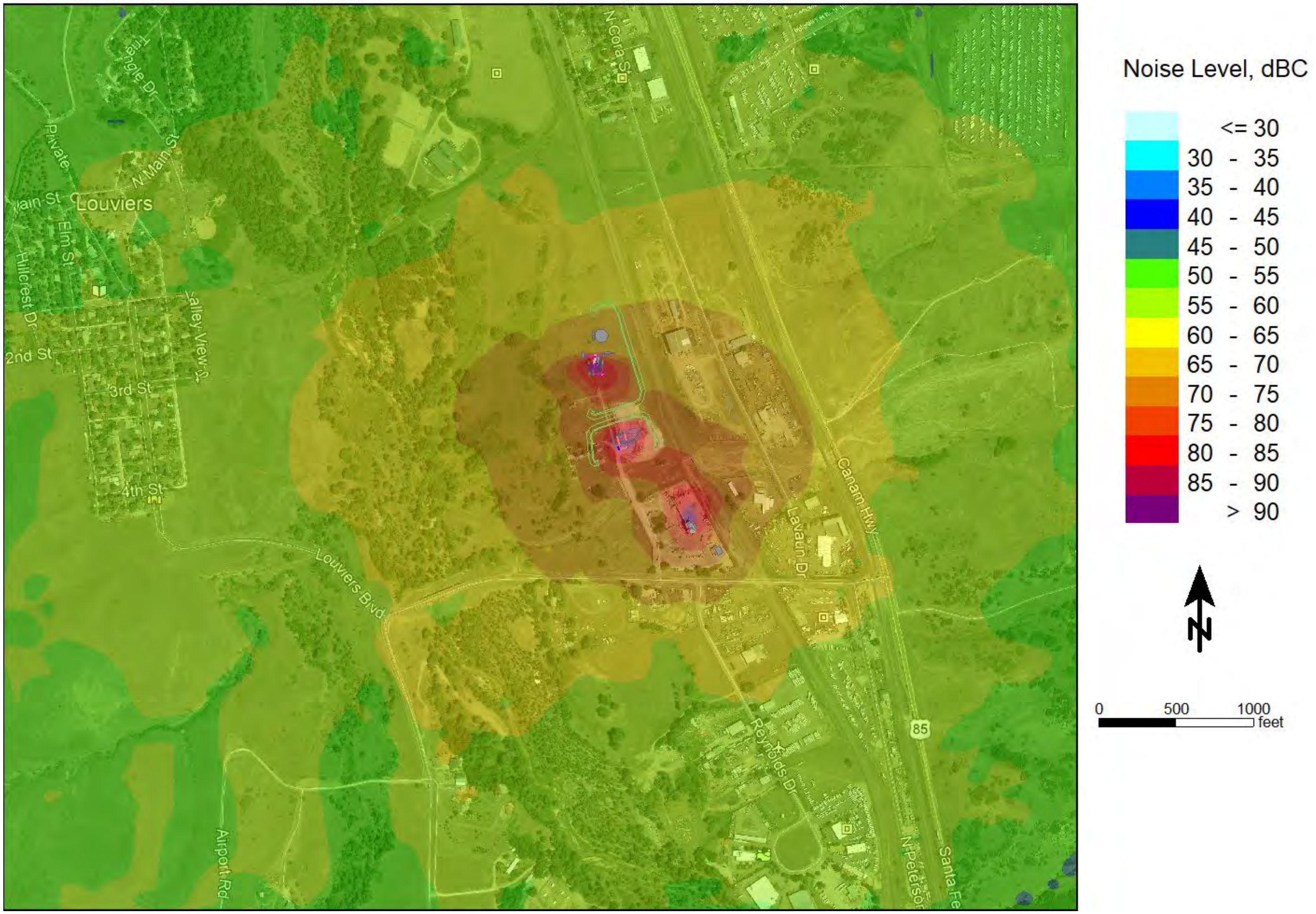

Figure 7-8 Unmitigated Modeling – Combined Operations – Noise Contour Map (dBC)

8. Conclusion

A noise modeling assessment of Brannan's existing Sedalia Ready Mix Plant, then-existing Crushing Operation, and the proposed APM has been performed.

To model the predicted noise levels of the existing operations, an on-site sound level survey was conducted at the existing Sedalia Ready Mix Plant and former Crushing Operation. To model the predicted noise levels of the proposed APM, an on-site sound level survey was conducted at a similar asphalt plant.

Several modeling scenarios were created to investigate Brannan's existing and proposed Sedalia activities. Four different unmitigated scenarios were created that model, first individually, the predicted noise levels produced from the existing Ready Mix Plant and the proposed APM (with the former crushing operation serving as a maximum noise level proxy for accessory crushing), as well as the combined contribution of all three operations simultaneously. In all of these scenarios, the plants and associated equipment are included in their planned operational conditions.

The predicted noise levels represent only the contribution of the project operations and do not include ambient noise (e.g., train horns and highway traffic) or noise from other facilities. Ambient data is not included in the modeling results due to the fact that the ambient data varies by monitoring location and day to day and therefore will have varying levels of contribution to the overall measured field sound levels depending on the time of day and location. Actual field sound level measurements may vary from the modeled noise levels due to other noise sources such as traffic, other facilities, other human activity, or environmental factors.

The results of the unmitigated noise modeling indicate that all modeled receptors are predicted to comply with the A-weighted legal noise limits for all unmitigated scenarios. The unmitigated modeling predicted that the existing Sedalia Ready Mix Plant is the major source of A-weighted (dBA) noise. The unmitigated modeling also predicted that the former Crushing Operation and proposed APM are the major sources of C-weighted (dBC) noise. Mitigation strategies are not being pursued because the existing and proposed facilities are predicted to meet the legal standard without mitigation.

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Appendix A Glossary of Acoustical Terms

Ambient Noise
The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources both near and far.

Average Sound Level
See Equivalent-Continuous Sound Level

A-Weighted Sound Level, dB(A)
The sound level obtained by use of A-weighting. Weighting systems were developed to measure sound in a way that more closely mimics the ear's natural sensitivity relative to frequency so that the instrument is less sensitive to noise at frequencies where the human ear is less sensitive and more sensitive at frequencies where the human ear is more sensitive.

C-Weighted Sound Level, dBC
The sound level obtained by use of C-weighting. Follows the frequency sensitivity of the human ear at very high noise levels. The C-weighting scale is quite flat and therefore includes much more of the low-frequency range of sounds than the A and B scales. In some jurisdictions, C-weighted sound limits are used to limit the low-frequency content of noise sources.

Community Noise Equivalent Level (CNEL)
A 24-hour A-weighted average sound level which takes into account the fact that a given level of noise may be more or less tolerable depending on when it occurs. The CNEL measure of noise exposure weights average hourly noise levels by 5 dB for the evening hours (between 7:00 pm and 10:00 pm), and 10 dB between 10:00 pm and 7:00 am, then combines the results with the daytime levels to produce the final CNEL value. It is measured in decibels, dB.

Day-Night Average Sound Level (Ldn)
A measure of noise exposure level that is similar to CNEL except that there is no weighting applied to the evening hours of 7:00 pm to 10:00 pm. It is measured in decibels, dB.

Daytime Average Sound Level
The time-averaged A-weighted sound level measured between the hours of 7:00 am to 7:00 pm. It is measured in decibels, dB.

Decibel (dB)
The basic unit of measurement for sound level.

Direct Sound
Sound that reaches a given location in a direct line from the source without any reflections.

Divergence
The spreading of sound waves from a source in a free field, resulting in a reduction in sound pressure level with increasing distance from the source.

Energy Basis
This refers to the procedure of summing or averaging sound pressure levels on the basis of their squared pressures. This method involves the conversion of decibels to pressures, then performing the necessary arithmetic calculations, and finally changing the pressure back to decibels.

Equivalent-Continuous Sound Level (Leq)
The average sound level measured over a specified time period. It is a single-number measure of time-varying noise over a specified time period. It is the level of a steady sound that, in a stated time period and at a stated location, has the same A-Weighted sound energy as the time-varying sound. For example, a person who experiences an Leq of 60 dB(A) for a period of 10 minutes standing next to a busy street is exposed to the same amount of sound energy as if he had experienced a constant noise level of 60 dB(A) for 10 minutes rather than the time-varying traffic noise level.

Fast Response
A setting on the sound level meter that determines how sound levels are averaged over time. A fast sound level is always more strongly influenced by recent sounds, and less influenced by sounds occurring in the distant past, than the corresponding slow sound level. For the same non-steady sound, the maximum fast sound level is generally greater than the corresponding maximum slow sound level. Fast response is typically used to measure impact sound levels.

Field Impact Insulation Class (FIIC)
A single number rating similar to the impact insulation class except that the impact sound pressure levels are measured in the field.

Field Sound Transmission Class (FSTC)
A single number rating similar to sound transmission class except that the transmission loss values used to derive this class are measured in the field.

Flanking Sound Transmission
The transmission of sound from a room in which a source is located to an adjacent receiving room by paths other than through the common partition. Also, the diffraction of noise around the ends of a barrier.

Frequency
The number of oscillations per second of a sound wave

Hourly Average Sound Level (HNL)
The equivalent-continuous sound level, Leq, over a 1-hour time period.

Impact Insulation Class (IIC)
A single number rating used to compare the effectiveness of floor/ceiling assemblies in providing reduction of impact-generated sound such as the sound of a person's walking across the upstairs floor.

Impact Noise
The noise that results when two objects collide.

Impulse Noise
Noise of a transient nature due to the sudden impulse of pressure like that created by a gunshot or balloon bursting.

Insertion Loss
The decrease in sound power level measured at the location of the Receptor when an element (e.g., a noise barrier) is inserted in the transmission path between the sound source and the Receptor.

Inverse Square Law
A rule by which the sound intensity varies inversely with the square of the distance from the source. This results in a 6dB decrease in sound pressure level for each doubling of distance from the source.

L_n Sound Level
Time-varying noise environments may be expressed in terms of the noise level that is exceeded for a certain percentage of the total measurement time. These statistical noise levels are denoted L_n, where n is the percent of time. For example, the L_{50} is the noise level exceeded for 50% of the time. For a 1-hour measurement period, the L_{50} would be the noise level exceeded for a cumulative period of 30 minutes in that hour.

Masking
The process by which the threshold of hearing for one sound is raised by the presence of another sound.

Maximum Sound Level (Lmax)
The greatest sound level measured on a sound level meter during a designated time interval or event.

NC Curves (Noise Criterion Curves)
A system for rating the noisiness of an occupied indoor space. An actual octave-band spectrum is compared with a set of standard NC curves to determine the NC level of the space.

Noise Reduction
The difference in sound pressure level between any two points.

Noise Reduction Coefficient (NRC)
A single number rating of the sound absorption properties of a material. It is the average of the sound absorption coefficients at 250, 500, 1000, and 2000 Hz, rounded to the nearest multiple of 0.05.

Octave
The frequency interval between two sounds whose frequency ratio is 2. For example, the frequency interval between 500 Hz and 1,000 Hz is one octave.

Octave-Band Sound Level
For an octave frequency band, the sound pressure level of the sound contained within that band.

One-Third Octave
The frequency interval between two sounds whose frequency ratio is 2^(1/3). For example, the frequency interval between 200 Hz and 250 Hz is one-third octave.

One-Third-Octave-Band Sound Level
For a one-third-octave frequency band, the sound pressure level of the sound contained within that band.

Outdoor-Indoor Transmission Class (OITC)
A single number rating used to compare the sound insulation properties of building façade elements. This rating is designed to correlate with subjective impressions of the ability of façade elements to reduce the overall loudness of ground and air transportation noise.

Peak Sound Level (Lpk)
The maximum instantaneous sound level during a stated time period or event.

Pink Noise
Noise that has approximately equal intensities at each octave or one-third-octave band.

Point Source
A source that radiates sound as if from a single point.

RC Curves (Room Criterion Curves)
A system for rating the noisiness of an occupied indoor space. An actual octave-band spectrum is compared with a set of standard RC curves to determine the RC level of the space.

Real-Time Analyzer (RTA)
An instrument for the determination of a sound spectrum.

Receptor
A person (or persons) or equipment which is affected by noise.

Reflected Sound
Sound that persists in an enclosed space as a result of repeated reflections or scattering. It does not include sound that travels directly from the source without reflections.

Reverberation
The persistence of a sound in an enclosed or partially enclosed space after the source of the sound has stopped, due to the repeated reflection of the sound waves.

Room Absorption
The total absorption within a room due to all objects, surfaces and air absorption within the room. It is measured in Sabins or metric Sabins.

Slow Response
A setting on the sound level meter that determines how measured sound levels are averaged over time. A slow sound level is more influenced by sounds occurring in the distant past that the corresponding fast sound level.

Sound
A physical disturbance in a medium (e.g., air) that is capable of being detected by the human ear.

Sound Absorption Coefficient
A measure of the sound-absorptive property of a material.

Sound Insulation
The capacity of a structure or element to prevent sound from reaching a Receptor room either by absorption or reflection.

Sound Level Meter (SLM)
An instrument used for the measurement of sound level, with a standard frequency-weighting and standard exponentially weighted time averaging.

Sound Power Level
A physical measure of the amount of power a sound source radiates into the surrounding air. It is measured in decibels.

Sound Pressure Level
A physical measure of the magnitude of a sound. It is related to the sound's energy. The terms sound pressure level and sound level are often used interchangeably.

Sound Transmission Class (STC)
A single number rating used to compare the sound insulation properties of walls, floors, ceilings, windows, or doors. This rating is designed to correlate with subjective impressions of the ability of building elements to reduce the overall loudness of speech, radio, television, and similar noise sources in offices and buildings.

Source Room
A room that contains a noise source or sources

Spectrum
The spectrum of a sound wave is a description of its resolution into components, each of different frequency and usually different amplitude.

Tapping Machine
A device used in rating different floor constructions against impacts. It produces a series of impacts on the floor under test, 10 times per second.

Tone
A sound with a distinct pitch

Transmission Loss (TL)
A property of a material or structure describing its ability to reduce the transmission of sound at a particular frequency from one space to another. The higher the TL value the more effective the material or structure is in reducing sound between two spaces. It is measured in decibels.

White Noise
Noise that has approximately equal intensities at all frequencies.

Windscreen
A porous covering for a microphone, designed to reduce the noise generated by the passage of wind over the microphone.

Appendix B Applicant Statement

Applicant Statement – Planning for Noise-Limited Operations at Sedalia APM

Applicant Brannan Sand and Gravel Company, LLC, alongside its subsidiary and property owner Ready Mixed Concrete Company LLC, has refined a concept for the development of 5775 and 5779 Airport Road that accommodates existing and proposed uses with minimal excess noise.

As an operator of manufacturing facilities for both concrete and asphalt paving materials (APM), Brannan's experience is that concrete operations produce overall higher noise levels. Intermittently, certain features of an APM facility, particularly pneumatic load-out doors on the bottom of product silos, can produce louder volumes. New development of an APM facility is an opportunity to incorporate new technology for noise mitigation in the APM process.

Brannan also engaged an independent consultant to assist in the assessment of noise impacts. This study demonstrates the ability of the proposed operation to comply with noise regulations with full deployment of equipment and uses originally envisioned for the site. The applicant has since resolved to address noise concerns raised by community and referral commentators through a variety of equipment changes and mitigation measures, as described below, and the noise footprint of the proposed development will therefore be contained beyond modeling results. The noise study also provides insights on, for example, the prevalence of low frequency noise in the vicinity of the operation (i.e., train trafic, other industrial uses).

Based on both extensive study and experience, the noise containment program at 5775 and 5779 Airport Road includes a variety of physical and procedural interventions. Most importantly, where feasible, measures are taken to select low-noise equipment and dampen noise at its sources. The applicant also reviewed secondary mitigation measures, but found sound walls and similar large-scale design features to be out of step with County aesthetic goals and prone to unintended consequences (i.e., reflection and deflection of noise within sound walls to points outside).

The Sedalia Noise Containment Program includes:

<u>Physical Improvements</u>

- New APM plant equipment for initial build-out
- Enclosure for APM compressor (powering load out doors)
- Muflers on silo door pneumatic mechanism
- Crushing equipment powered by electric motor (diesel engine prohibited)
- Jaw breaker used in lieu of hammer breaker

<u>Operating Procedures</u>

- Daytime crushing only, scheduled on intermittent basis
- Prohibition on engine braking, unnecessary idling
- Use stockpile mass for noise absorption as feasible (shield crusher from external receptors)
- Install white noise backup alarms on all loaders and other dedicated mobile equipment
- Facility designed for forward-only movement of all other trafic

<u>Other Strategies</u>

- Continuous compliance with applicable noise regulations, hours of operation, and USR Management Plan. Regular monitoring, quarterly documentation of noise levels at point(s) of compliance (on property boundary).Notice to community of extended hours of operation or other extraordinary circumstances that may result in noise.

- In the event of noise exceedances, the operator shall identify noise sources causing exceedance and modify processes or equipment to efectuate compliance.

As a final assurance of appropriate noise mitigation, the operator commits to retaining expert sound engineering and noise mitigation assistance in any situation where compliance is not satisfactorily achieved with the above strategies.

ATTACHMENT A

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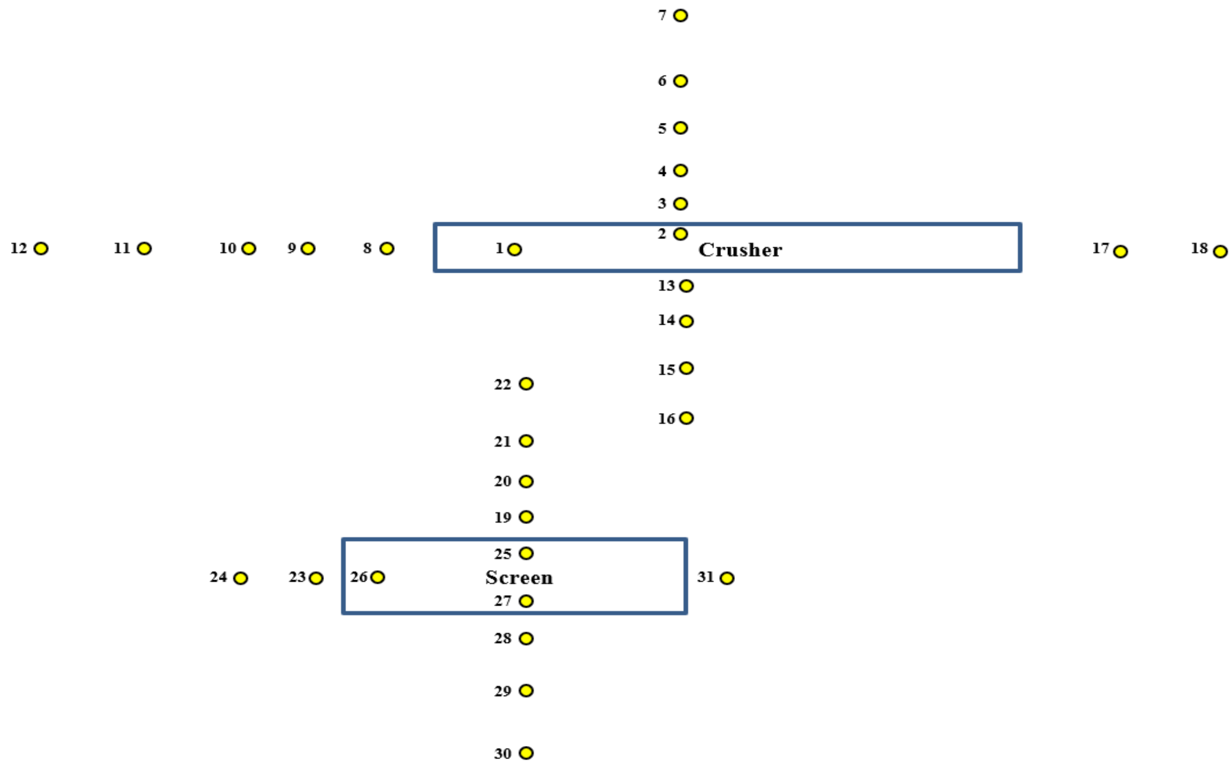
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A	G	45.4	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	501.37	-65	0.2	-19.1	-1.2	0	0	14.7	0	0	0	14.7
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	424.03	-63.5	0.9	-8.6	-3	0	0.6	-7.6	0	0	0	-7.6
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	397.79	-63	0.9	-7.7	-2.9	0	2	-4.7	0	0	0	-4.7
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	389.78	-62.8	0.5	-5	-2.8	0	0.3	-3.8	0	0	0	-3.8
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	488.69	-64.8	0.3	-11.2	-1.2	0	0	29.5	0	0	0	29.5
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	486.9	-64.7	-0.8	-19.1	-0.9	0	0	18.5	0	0	0	18.5
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	496.12	-64.9	0.2	-14	-0.3	0	0	16.9	0	0	0	16.9
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	413.69	-63.3	0.9	-22	-2.3	0	0	5.6	0	0	0	5.6
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	402.34	-63.1	0.2	-4.2	-2.1	0	0	27.1	0	0	0	27.1
			Facade 01	Area	Leq	89	96	5	0	0	3	434.08	-63.7	0.7	-17.8	-1.5	0	0	16.7	0	0	0	16.7
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	409.26	-63.2	1	-16.9	-0.5	0	0	24.3	0	0	0	24.3
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	435.75	-63.8	0.7	-22.3	-2.1	0	0	11.5	0	0	0	11.5
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	404.15	-63.1	0.2	-20	-1.1	0	3.5	15.8	0	0	0	15.8
			Facade 03	Area	Leq	89	96	5	0	0	3	436.02	-63.8	0.7	-23.2	-2.4	0	0	10.3	0	0	0	10.3
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	434.34	-63.7	0.7	-21.8	-1.9	0	0	12.2	0	0	0	12.2
			Front End L	Point	Leq	116	116		0	0	0	482.13	-64.7	0.5	-12	-1.5	0	0	38.4	-4	0	0	34.4
			Front End L	Point	Leq	116	116		0	0	0	489.7	-64.8	0.5	-18.1	-1.4	0	0	32.2	-4	0	0	28.2
			North - Bag	Area	Leq	88.2	100.7	17.6	0	0	3	413.82	-63.3	-0.9	-19.6	-0.9	0	9.7	28.7	0	0	0	28.7
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	396	-62.9	0.7	-21.4	-2.2	0	0	25	0	0	0	25
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	435.08	-63.8	1	-19.2	-1.6	0	0	12.4	0	0	0	12.4
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	413.13	-63.3	-1.2	-3.3	-0.9	0	0	36.2	0	0	0	36.2
			Screen 2 - /	Point	Leq	92.2	92.2		0	0	0	424.66	-63.6	0.6	-20.2	-1.3	0	8.5	16.2	0	0	0	16.2
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	490.27	-64.8	0.2	-4.8	-2.1	0	0	28.1	0	0	0	28.1
			Screen - Nc	Area	Leq	91.1	104.2	20.4	0	0	3	495.65	-64.9	0.8	-7.7	-2.3	0	0	33.2	0	0	0	33.2
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	495.87	-64.9	0.8	-21.8	-2	0	0	20.7	0	0	0	20.7
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	383.55	-62.7	-0.7	-3.5	-1.8	0	0	16.6	0	0	0	16.6
			South - Bag	Area	Leq	85.8	98.3	17.6	0	0	3	412.07	-63.3	-0.3	-7.3	-1.3	0	0	29.1	0	0	0	29.1
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	394.13	-62.9	-0.8	-3.6	-1.6	0	0	34.7	0	0	0	34.7
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	393.57	-62.9	-0.2	-4	-1.8	0	0	42.4	0	0	0	42.4
B	G	44	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	585.68	-66.3	0.2	-18.9	-1.3	0	0	13.5	0	0	0	13.5
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	519.36	-65.3	1	-8.7	-3.3	0	0	-10.4	0	0	0	-10.4
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	488.08	-64.8	1	-19.2	-1.7	0	0.6	-18.1	0	0	0	-18.1
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	487.31	-64.7	0.6	-1.4	-3.8	0	0	-3.4	0	0	0	-3.4
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	578.72	-66.2	0.3	-20.8	-1.5	0	0	18.1	0	0	0	18.1
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	576.22	-66.2	-0.8	-10.4	-0.9	0	0	25.6	0	0	0	25.6
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	585.77	-66.3	0.2	-15.4	-0.3	0	0	14	0	0	0	14
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	507.18	-65.1	1	-19.3	-1.7	0	0	7.2	0	0	0	7.2
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	497.54	-64.9	0.2	-4	-2.5	0	0	25.1	0	0	0	25.1
			Facade 01	Area	Leq	89	96	5	0	0	3	526.96	-65.4	0.7	-18.5	-1.5	0	0	14.3	0	0	0	14.3
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	504.92	-65.1	1	-13.7	-0.4	0	0	25.8	0	0	0	25.8
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	528.18	-65.4	0.7	-22.7	-2.5	0	0	9	0	0	0	9
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	498.22	-64.9	0.2	-20.9	-1.3	0	0	9.5	0	0	0	9.5
			Facade 03	Area	Leq	89	96	5	0	0	3	527.74	-65.4	0.7	-22.8	-2.5	0	0	9	0	0	0	9
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	526.52	-65.4	0.7	-19.3	-1.6	0	0	13.4	0	0	0	13.4
			Front End L	Point	Leq	116	116		0	0	0	573.5	-66.2	0.6	-13.6	-1.6	0	0	35.2	-4	0	0	31.2
			Front End L	Point	Leq	116	116		0	0	0	571.57	-66.1	0.6	-4.4	-2.8	0	0	43.2	-4	0	0	39.2
			North - Bag	Area	Leq	88.2	100.7	17.6	0	0	3	506.63	-65.1	-0.7	-19.1	-0.9	0	0	17.8	0	0	0	17.8
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	488.58	-64.8	0.8	-17.4	-2.1	0	0	27.4	0	0	0	27.4
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	527.37	-65.4	1.1	-17.9	-1.5	0	0	12.2	0	0	0	12.2
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	506.43	-65.1	-1	-3.6	-1	0	0	34.3	0	0	0	34.3
			Screen 2 - /	Point	Leq	92.2	92.2		0	0	0	523.01	-65.4	0.7	-4	-3.5	0	0	20	0	0	0	20
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	574.47	-66.2	0.3	-4	-2.6	0	0	27.1	0	0	0	27.1
			Screen - Nc	Area	Leq	91.1	104.2	20.4	0	0	3	580.36	-66.3	0.9	-20.5	-1.9	0	0	19.4	0	0	0	19.4
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	579.68	-66.3	0.9	-4.4	-3.5	0	0	35.2	0	0	0	35.2
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	485.25	-64.7	-0.7	-0.3	-2.6	0	0	16.9	0	0	0	16.9
			South - Bag	Area	Leq	85.8	98.3	17.6	0	0	3	505.98	-65.1	-0.3	-8.2	-0.9	0	0	26.8	0	0	0	26.8
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	487.91	-64.8	-0.7	-5.9	-1.4	0	0	30.8	0	0	0	30.8
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	486.47	-64.7	-0.1	-7.7	-1.4	0	0	37.2	0	0	0	37.2
C	G	47.6	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	327.07	-61.3	0	-19.2	-0.9	0	0	18.3	0	0	0	18.3
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	267.46	-59.5	0.8	-19.6	-1.2	0	0	-13.6	0	0	0	-13.6
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	235.43	-58.4	0.6	-21.4	-1.2	0	0.7	-13.8	0	0	0	-13.8
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	239.04	-58.6	0.3	-4.6	-2.2	0	0	1.1	0	0	0	1.1
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	322.15	-61.2	0.2	-19.6	-0.9	0	0	24.9	0	0	0	24.9
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	319.42	-61.1	-0.9	-5.6	-0.7	0	0	35.7	0	0	0	35.7
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	328.91	-61.3	0.1	-13.9	-0.2	0	0	20.5	0	0	0	20.5
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	255.11	-59.1	0.6	-21.4	-1.6	0	0	10.9	0	0	0	10.9
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	246.87	-58.8	0	-22	-0.9	0	0	14.6	0	0	0	14.6
			Facade 01	Area	Leq	89	96	5	0	0	3	273.54	-59.7	0.6	-20.5	-1.2	0	0	18.2	0	0	0	18.2
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	254.16	-59.1	0.9	-16.1	-0.3	0	0	29.3	0	0	0	29.3
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	274.48	-59.8	0.6	-22.3	-1.6	0	0	15.9	0	0	0	15.9
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	246.83	-58.8	0	-16.3	-0.5	0	0	20.7	0	0	0	20.7
			Facade 03	Area	Leq	89	96	5	0	0	3	273.72	-59.7	0.6	-22.6	-1.6	0	0	15.6	0	0	0	15.6
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	272.78	-59.7	0.6	-20.4	-1.2	0	0	18.3	0	0	0	18.3
			Front End L	Point	Leq	116	116		0	0	0	317.64	-61	0.4	-7.5	-1.1	0	0	46.7	-4	0	0	42.7
			Front End L	Point	Leq	116	116		0	0	0	312.56	-60.9	0.3	-8.3	-1.1	0	0	46.1	-4	0	0	42.1
			North - Bag	Area	Leq	88.2	100.7	17.6	0	0	3	254.23	-59.1	-1	-21.1	-0.6	0	0	21.8	0	0	0	21.8
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	237.15	-58.5	0.4	-19.7	-1.1	0	1.5	33.4	0	0	0	33.4
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	273.64	-59.7	0.8	-20.1	-1.1	0	0	15.9	0	0	0	15.9
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	254.36	-59.1	-1.4	-12.1	-0.3	0	0	32.1	0	0	0	32.1
			Screen 2 - /	Point	Leq	92.2	92.2		0	0	0	272.69	-59.7	0.4	-15.1	-1.1	0	0	16.8	0	0	0	16.8
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	316.07	-61	0	-6.5	-1	0	0	31.1	0	0	0	31.1
			Screen - Nc	Area	Leq	91.1	104.2	20.4	0	0	3	321.96	-61.1	0.6	-21	-1.3	0	0	24.3	0	0	0	24.3
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	321.03	-61.1	0.6	-7.8	-1.5	0	0	38.7	0	0	0	38.7
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	240.2	-58.6	-0.6	-1.2	-1.8	0	0	22.9	0	0	0	22.9
			South - Bag	Area	Leq	85.8	98.3	17.6	0	0	3	254.19	-59.1	-0.5	-15.8	-0.3	0	0	25.6	0	0	0	25.6
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	237.2	-58.5	-0.9	-21.1	-0.7	0	0	22.3	0	0	0	22.3
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	235.38	-58.4	-0.5	-17	-0.6	0	0	34.7	0	0	0	34.7
D	G	52.7	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	116.82	-52.3	-0.5	-20.1	-0.4	0	0	26.5	0	0	0	26.5
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	98.81	-50.9	0.2	-19	-0.4	0	0.2	-3.9	0	0	0	-3.9
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	82.07	-49.3	0.3	-18.3	-0.3	0	0.9	-0.6	0	0	0	-0.6
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	101.34	-51.1	0.3	-15.4	-0.5	0	2.3	1.7	0	0	0	1.7
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	119.89	-52.6	-0.3	-21.1	-0.5	0	0	31.8	0	0	0	31.8
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	116.82	-52.3	-1.3	-12.1	-0.2	0	0	38	0	0	0	38
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	124.77	-52.9	-0.6	-15.5	-0.1	0	0	26.8	0	0	0	26.8
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	92.02	-50.3	0.4	-22.8	-0.9	0	0.1	18.8	0	0	0	18.8
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	95.23	-50.6	-0.3	-21.5	-0.4	0	3.7	27.3	0	0	0	27.3
			Facade 01	Area	Leq	89	96	5	0	0	3	95.75	-50.6	0.1	-22.6	-0.7	0	0	25.2	0	0	0	25.2
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	97.09	-50.7	0.4	-19.1	-0.2	0	0	34.2	0	0	0	34.2
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	95.11	-50.6	0.1	-22.5	-0.7	0	0	25.3	0	0	0	25.3
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	92.34	-50.3	-0.3	-18.5	-0.2	0	0.5	27.5	0	0	0	27.5
			Facade 03	Area	Leq	89	96	5	0	0	3	93.28	-50.4	0.1	-17.9	-0.3	0	0	30.5	0	0	0	30.5
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	93.89	-50.4	0.1	-17.9	-0.3	0	0	30.5	0	0	0	30.5
			Front End L	Point	Leq	116	116		0	0	0	118.63	-52.5	-0.3	-15.2	-0.3	0	0	47.7	-4	0	0	43.7
			Front End L	Point	Leq	116	116		0	0	0	101.89	-51.2	-0.2	-15.4	-0.3	0	0	49	-4	0	0	45
			North - Bag	Area	Leq	88.2	100.7	17.6	0	0	3	90.23	-50.1	-1.2	-12.9	-0.2	0	0.1	39.4	0	0	0	39.4
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	88.56	-49.9	0.2	-16.7	-0.4	0	0.2	44.3	0	0	0	44.3
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	94.51	-50.5	0.3	-17.8	-0.3	0	0	27.7	0	0	0	27.7
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	91.85	-50.3	-1	-14	-0.1	0	0.6	40.2	0	0	0	40.2
			Screen 2 - /	Point	Leq	92.2	92.2		0	0	0	107.89	-51.7	-0.1	-16.3	-0.3	0	0	23.9	0	0	0	23.9
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	107.56	-51.6	-0.4	-12.7	-0.2	0	0	34.7	0	0	0	34.7
			Screen - Nc	Area	Leq	91.1	104.2	20.4	0	0	3	112.97	-52.1	0.1	-21.9	-0.6	0	0	32.7	0	0	0	32.7
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	111.13	-51.9	0.2	-15.4	-0.4	0	0	41	0	0	0	41
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	114.09	-52.1	-0.5	-8.8	-0.3	0	0	23.5	0	0	0	23.5
			South - Bag	Area	Leq	85.8	98.3	17.6	0	0	3	92.9	-50.4	-0.5	-20.7	-0.2	0	2.3	31.8	0	0	0	31.8
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	91.69	-50.2	-1	-21.2	-0.3	0	5.1	35.9	0	0	0	35.9
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	89.49	-50	-0.5	-13.9	-0.2	0	0	46.6	0	0	0	46.6
E	G	52.2	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	93.07	-50.4	-0.4	-12.8	-0.2	0	0	36.1	0	0	0	36.1
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	169.74	-55.6	0.5	-13.4	-0.6	0	0.2	-2.9	0	0	0	-2.9
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	189.15	-56.5	0.4	-17.6	-0.8	0	0.3	-8.1	0	0	0	-8.1
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	202.12	-57.1	0.3	-7.9	-1.5	0	2	1.8	0	0	0	1.8
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	112.03	-52	-0.3	-20	-0.4	0	0	33.7	0	0	0	33.7
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	112.05	-52	-1.4	-11.8	-0.2	0	0	38.6	0	0	0	38.6
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	106.33	-51.5	-0.5	-9.3	-0.1	0	0	34.4	0	0	0	34.4
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	177.39	-56	0.5	-10.3	-1	0	0	25.6	0	0	0	25.6
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	188.66	-56.5	-0.2	-20.7	-0.6	0	0.1	18.5	0	0	0	18.5
			Facade 01	Area	Leq	89	96	5	0	0	3	159.14	-55	0.4	-21.4	-0.9	0	0	22	0	0	0	22
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	183.21	-56.3	0.6	-8.3	-0.2	0	0	39.8	0	0	0	39.8
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	157.18	-54.9	0.3	-13.7	-0.5	0	0	30.2	0	0	0	30.2
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	186.07	-56.4	-0.2	-14.9	-0.4	0	0	24.5	0	0	0	24.5
			Facade 03	Area	Leq	89	96	5	0	0	3	156.18	-54.9	0.3	-13.7	-0.5	0	0	30.2	0	0	0	30.2
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	158.11	-55	0.3	-21.2	-0.9	0	0	22.4	0	0	0	22.4
			Front End L	Point	Leq	116	116		0	0	0	119.3	-52.5	-0.3	-17.4	-0.4	0	0	45.4	-4	0	0	41.4
			Front End L	Point	Leq	116	116		0	0	0	99.26	-50.9	-0.2	-14.8	-0.3	0	2.2	52	-4	0	0	48.1

			North - Ba	Area	Leq	88.2	100.7	17.6	0	0	3	176.64	-55.9	-1.4	-7.3	-0.4	0	0	38.7	0	0	0	38.7
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	192.32	-56.7	0.3	-11.8	-1	0	0	41.7	0	0	0	41.7
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	157.77	-55	0.4	-13.2	-0.6	0	0	27.7	0	0	0	27.7
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	178.08	-56	-1.3	-7.9	-0.3	0	0	39.5	0	0	0	39.5
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	173.72	-55.8	0.1	-11.6	-0.5	0	0	24.4	0	0	0	24.4
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	101.77	-51.1	-0.4	-18.6	-0.3	0	0	29.2	0	0	0	29.2
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	98.06	-50.8	0.2	-20.9	-0.5	0	0	35.1	0	0	0	35.1
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	96.57	-50.7	0.2	-14.6	-0.3	0	0	43.1	0	0	0	43.1
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	212.75	-57.5	-0.6	-3.6	-1.1	0	0	22.3	0	0	0	22.3
			South - Ba	Area	Leq	85.8	98.3	17.6	0	0	3	179.18	-56.1	-0.5	-19.3	-0.4	0	0.1	25.1	0	0	0	25.1
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	194.93	-56.8	-1.1	-20	-0.5	0	0	25.2	0	0	0	25.2
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	194.77	-56.8	-0.4	-21.2	-0.6	0	0	32.2	0	0	0	32.2
F	G	44.5	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	288.64	-60.2	-0.1	-14.7	-0.7	0	0	24.1	0	0	0	24.1
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	367.39	-62.3	0.9	-9.9	-1.8	0	0.4	-6.7	0	0	0	-6.7
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	391.79	-62.9	0.9	-12.9	-1.9	0	0.6	-10.2	0	0	0	-10.3
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	401.81	-63.1	0.5	-4.5	-3.1	0	1.4	-2.7	0	0	0	-2.7
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	303.15	-60.6	0.2	-20	-0.8	0	0	25	0	0	0	25
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	304.46	-60.7	-0.9	-12.5	-0.5	0	0	29.3	0	0	0	29.3
			Crusher - W	Area	Leq	87.8	92.8	3.2	0	0	3	295.99	-60.4	0.1	-10.8	-0.2	0	0	24.6	0	0	0	24.6
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	377.07	-62.5	0.8	-6.7	-3.1	0	0	20.8	0	0	0	20.8
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	388.44	-62.8	0.2	-20.2	-1	0	0.2	12.7	0	0	0	12.7
			Facade 01	Area	Leq	89	96	5	0	0	3	357.01	-62	0.6	-20.8	-1.6	0	0	15.2	0	0	0	15.2
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	382.06	-62.6	1	-6.7	-0.8	0	0	34.8	0	0	0	34.8
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	355.21	-62	0.6	-12.3	-1.5	0	0	23.9	0	0	0	23.9
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	386.33	-62.7	0.2	-11.5	-1.1	0	0	21.1	0	0	0	21.1
			Facade 03	Area	Leq	89	96	5	0	0	3	354.68	-62	0.6	-12.2	-1.5	0	0	24	0	0	0	24
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	356.48	-62	0.6	-20.9	-1.6	0	0	15.1	0	0	0	15.1
			Front End L	Point	Leq	116	116		0	0	0	310.29	-60.8	0.3	-14.8	-0.9	0	0	39.8	-4	0	0	35.8
			Front End L	Point	Leq	116	116		0	0	0	299.56	-60.5	0.3	-16	-0.9	0	0	38.9	-4	0	0	34.9
			North - Ba	Area	Leq	88.2	100.7	17.6	0	0	3	376.72	-62.5	-1.1	-4.6	-1	0	0	34.5	0	0	0	34.5
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	394.01	-62.9	0.6	-8.8	-2.4	0	0	37.4	0	0	0	37.4
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	355.85	-62	0.9	-10.6	-1.6	0	0	22.7	0	0	0	22.7
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	377.83	-62.5	-1.3	-4.1	-0.8	0	0	36.3	0	0	0	36.3
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	368.74	-62.3	0.6	-8.1	-1.7	0	0	20.7	0	0	0	20.7
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	299.51	-60.5	-0.1	-18.7	-0.7	0	0	19.6	0	0	0	19.6
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	294.3	-60.4	0.5	-21.2	-1.2	0	0	24.9	0	0	0	24.9
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	293.82	-60.4	0.6	-15.2	-1.1	0	0	32.4	0	0	0	32.4
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	410.43	-63.3	-0.7	-0.2	-2.3	0	0	18.8	0	0	0	18.8
			South - Ba	Area	Leq	85.8	98.3	17.6	0	0	3	378.77	-62.6	-0.2	-19.3	-0.7	0	0	18.5	0	0	0	18.5
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	396.15	-62.9	-0.8	-19.6	-0.9	0	0	19.3	0	0	0	19.3
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	396.47	-63	-0.1	-21	-1.2	0	0	26	0	0	0	26
G	G	42.9	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	404.58	-63.1	0.1	-13.7	-0.9	0	0	22	0	0	0	22
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	483.03	-64.7	0.9	-7.6	-2.6	0	0.4	-7.5	0	0	0	-7.5
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	507.94	-65.1	1	-11.2	-2.6	0	0.7	-11.3	0	0	0	-11.4
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	517.57	-65.3	0.7	-3.9	-3.9	0	1.4	-4.9	0	0	0	-4.9
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	418.54	-63.4	0.2	-19.8	-1	0	0	22.3	0	0	0	22.3
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	419.99	-63.5	-0.9	-11.6	-0.7	0	0	27.3	0	0	0	27.3
			Crusher - W	Area	Leq	87.8	92.8	3.2	0	0	3	411.31	-63.3	0.2	-10.2	-0.2	0	0	22.3	0	0	0	22.3
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	492.92	-64.8	0.9	-5.2	-4.2	0	0	19	0	0	0	19
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	504.26	-65	0.2	-19.2	-1.1	0	0.1	11.3	0	0	0	11.3
			Facade 01	Area	Leq	89	96	5	0	0	3	472.73	-64.5	0.7	-20.3	-1.9	0	0	13.1	0	0	0	13.1
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	497.78	-64.9	1	-5	-1.5	0	0	33.5	0	0	0	33.5
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	470.95	-64.5	0.7	-9	-2.2	0	0	24.1	0	0	0	24.1
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	502.23	-65	0.2	-9.6	-1.7	0	0	20.3	0	0	0	20.3
			Facade 03	Area	Leq	89	96	5	0	0	3	470.49	-64.4	0.7	-9	-2.2	0	0	24.1	0	0	0	24.1
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	472.26	-64.5	0.7	-20.4	-1.8	0	0	13	0	0	0	13
			Front End L	Point	Leq	116	116		0	0	0	425.57	-63.6	0.5	-13.6	-1.3	0	0	38	-4	0	0	34
			Front End L	Point	Leq	116	116		0	0	0	415.79	-63.4	0.5	-14.8	-1.2	0	0	37.1	-4	0	0	33.1
			North - Ba	Area	Leq	88.2	100.7	17.6	0	0	3	492.62	-64.8	-0.9	-3.7	-1.5	0	0	32.8	0	0	0	32.8
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	510.06	-65.1	0.7	-8	-2.9	0	0	35.5	0	0	0	35.5
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	471.85	-64.5	1	-7.1	-2.5	0	0	23	0	0	0	23
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	493.67	-64.9	-1	-2.9	-1	0	0	35.1	0	0	0	35.1
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	484.01	-64.7	0.6	-6.1	-2.5	0	0	19.5	0	0	0	19.5
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	415.54	-63.4	0.1	-18.5	-0.9	0	0	16.9	0	0	0	16.9
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	410.25	-63.3	0.7	-21.1	-1.5	0	0	22.1	0	0	0	22.1
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	409.87	-63.2	0.8	-13.7	-1.6	0	0	30.8	0	0	0	30.8
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	525.83	-65.4	-0.7	-0.1	-2.7	0	0	16.3	0	0	0	16.3
			South - Ba	Area	Leq	85.8	98.3	17.6	0	0	3	494.61	-64.9	-0.2	-15.7	-0.7	0	0	19.8	0	0	0	19.8
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	512.14	-65.2	-0.6	-19.4	-1.1	0	0	17.2	0	0	0	17.2
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	512.52	-65.2	0	-20.7	-1.4	0	0	24	0	0	0	24
H	G	43.8	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	340.81	-61.6	0	-13.8	-0.7	0	0	23.6	0	0	0	23.6
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	408.9	-63.2	0.9	-8.8	-2.1	0	1	-6.2	0	0	0	-6.2
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	439.39	-63.8	0.9	-11.8	-2.1	0	2.6	-8.2	0	0	0	-8.3
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	443.04	-63.9	0.6	-3.6	-3.4	0	0.2	-4.1	0	0	0	-4.1
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	347.52	-61.8	0.2	-14.8	-0.7	0	0	29.2	0	0	0	29.2
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	349.95	-61.9	-0.9	-18.2	-0.6	0	0	22.3	0	0	0	22.3
			Crusher - W	Area	Leq	87.8	92.8	3.2	0	0	3	340.54	-61.6	0.1	-10.7	-0.2	0	0	23.4	0	0	0	23.4
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	420.92	-63.5	0.9	-5.7	-3.7	0	0	20.3	0	0	0	20.3
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	431.13	-63.7	0.2	-18.7	-1	0	0.3	13.4	0	0	0	13.4
			Facade 01	Area	Leq	89	96	5	0	0	3	400.54	-63	0.7	-20.7	-1.6	0	0	14.3	0	0	0	14.3
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	423.96	-63.5	1	-5.3	-1.2	0	0	34.9	0	0	0	34.9
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	399.18	-63	0.7	-10.6	-1.7	0	0	24.3	0	0	0	24.3
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	430.05	-63.7	0.2	-7.4	-1.6	0	0	23.8	0	0	0	23.8
			Facade 03	Area	Leq	89	96	5	0	0	3	399.42	-63	0.7	-10.6	-1.7	0	0.7	25	0	0	0	25
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	400.79	-63.1	0.7	-20.7	-1.7	0	4.3	18.6	0	0	0	18.6
			Front End L	Point	Leq	116	116		0	0	0	353.13	-62	0.4	-14.8	-1	0	0	38.6	-4	0	0	34.7
			Front End L	Point	Leq	116	116		0	0	0	355.15	-62	0.4	-15	-1.1	0	0	38.3	-4	0	0	34.3
			North - Ba	Area	Leq	88.2	100.7	17.6	0	0	3	421.25	-63.5	-1	-4	-1.2	0	0	34	0	0	0	34
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	439.52	-63.9	0.6	-10.7	-2.1	0	0.2	35	0	0	0	35
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	400.06	-63	1	-8.7	-1.9	0	0	23.3	0	0	0	23.3
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	421.88	-63.5	-1.2	-3.2	-1	0	0	36.1	0	0	0	36.1
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	406.78	-63.2	0.6	-6.7	-2.1	0	0.7	21.4	0	0	0	21.4
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	351.95	-61.9	0	-18.4	-0.8	0	0	18.6	0	0	0	18.6
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	345.97	-61.8	0.6	-13.8	-1.2	0	0	31.1	0	0	0	31.1
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	346.76	-61.8	0.7	-21.7	-1.5	0	0	24.2	0	0	0	24.2
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	447.99	-64	-0.7	-1.6	-1.7	0	0	17.2	0	0	0	17.2
			South - Ba	Area	Leq	85.8	98.3	17.6	0	0	3	422.28	-63.5	-0.2	-15.7	-0.6	0	0	21.2	0	0	0	21.2
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	440.62	-63.9	-0.6	-16.6	-0.8	0	0	21.7	0	0	0	21.7
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	441.78	-63.9	0	-20.2	-1.1	0	0	26	0	0	0	26
I	G	44.9	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	369.67	-62.3	0	-13.7	-0.8	0	0	22.9	0	0	0	22.9
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	402.51	-63.1	0.9	-3.6	-3.4	0	0.7	-2.5	0	0	0	-2.5
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	434.32	-63.7	0.9	-7.6	-2.4	0	2	-4.7	0	0	0	-4.7
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	428.28	-63.6	0.6	-2	-3.9	0	0.1	-2.9	0	0	0	-2.9
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	363.77	-62.2	0.2	-14.6	-0.8	0	0	28.9	0	0	0	28.9
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	366.82	-62.3	-0.9	-18.6	-0.7	0	2.3	23.8	0	0	0	23.8
			Crusher - W	Area	Leq	87.8	92.8	3.2	0	0	3	359.4	-62.1	0.1	-11	-0.2	0	0	22.7	0	0	0	22.7
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	415.04	-63.4	0.8	-2.5	-5.4	0	0	22	0	0	0	22
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	421.17	-63.5	0.3	-4.6	-2.2	0	0	26.4	0	0	0	26.4
			Facade 01	Area	Leq	89	96	5	0	0	3	399.39	-63	0.6	-4	-3.4	0	0	29.3	0	0	0	29.2
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	414.56	-63.3	1.1	-3.5	-2.3	0	0	35.8	0	0	0	35.8
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	399	-63	0.8	-4.1	-3.2	0	0	29.5	0	0	0	29.5
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	421.73	-63.5	0.2	-9.8	-1.2	0	0.1	22.1	0	0	0	22.1
			Facade 03	Area	Leq	89	96	5	0	0	3	400.26	-63	0.6	-15.5	-1.5	0	0.2	19.8	0	0	0	19.8
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	400.65	-63	0.7	-16.1	-1.3	0	5.4	24.5	0	0	0	24.5
			Front End L	Point	Leq	116	116		0	0	0	365.33	-62.2	0.4	-13.7	-1.1	0	2	41.4	-4	0	0	37.4
			Front End L	Point	Leq	116	116		0	0	0	383.76	-62.7	0.4	-18.5	-1.1	0	0	34.1	-4	0	0	30.1
			North - Ba	Area	Leq	88.2	100.7	17.6	0	0	3	416.24	-63.4	-0.8	-7.9	-1.2	0	0	30.5	0	0	0	30.5
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	431.59	-63.7	0.7	-11.5	-2.2	0	0.7	34.9	0	0	0	34.9
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	399.9	-63	1	-4.4	-3	0	0.6	27.3	0	0	0	27.3
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	416.11	-63.4	-1.2	-2.6	-0.9	0	0	36.9	0	0	0	36.9
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	396.29	-63	0.6	-3	-3.7	0	0	23.1	0	0	0	23.1
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	377.44	-62.5	0.1	-18.7	-0.9	0	0	17.6	0	0	0	17.6
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	372.44	-62.4	0.7	-13.9	-1.3	0	0	30.3	0	0	0	30.3
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	374.63	-62.5	0.7	-22	-1.7	0	0	23.1	0	0	0	23.1
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	427.17	-63.6	-0.7	-0.7	-2.5	0	0	17.7	0	0	0	17.7
			South - Ba	Area	Leq	85.8	98.3	17.6	0	0	3	415.58	-63.4	-0.3	-3	-2	0	0	32.6	0	0	0	32.6
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	430.97	-63.7	-0.7	-5.1	-1.2	0	0	32.8	0	0	0	32.8
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	433.07	-63.7	0	-15.9	-1.1	0	0	30.5	0	0	0	30.5
J	G	54.9	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	155.87	-54.8	-0.5	-11.9	-0.3	0	0	32.2	0	0	0	32.2
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	169.49	-55.6	0.5	-1.7	-1.9	0	0.3	7.7	0	0	0	7.7
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	200.42	-57	0.5	-9.3	-1.2	0	4.3	3.2	0	0	0	3.2
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	193.68	-56.7	0.3	-0.3	-1.9	0	0	7.4	0	0	0	7.4
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	143.2	-54.1	-0.2	-12.5	-0.3	0	0.1	39.3	0	0	0	39.3

			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	146.06	-54.3	-1.3	-18.4	-0.3	0	4.1	33.8	0	0	0	33.8
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	141.31	-54	-0.5	-8.5	-0.1	0	0	32.7	0	0	0	32.7
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	181.59	-56.2	0.5	-0.8	-2.7	0	0	33	0	0	0	33
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	186.86	-56.4	-0.1	-6.1	-0.8	0	0	32.9	0	0	0	32.9
			Facade 01	Area	Leq	89	96	5	0	0	3	167.62	-55.5	0.4	-3.5	-2	0	0	38.5	0	0	0	38.5
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	180.53	-56.1	0.6	-2	-1.4	0	0	45	0	0	0	45
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	167.52	-55.5	0.4	-3.6	-1.9	0	0	38.4	0	0	0	38.4
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	187.65	-56.5	-0.1	-11.3	-0.6	0	0.6	28.5	0	0	0	28.5
			Facade 03	Area	Leq	89	96	5	0	0	3	168.99	-55.5	0.3	-15.2	-0.9	0	0.4	28.1	0	0	0	28.1
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	169.08	-55.6	0.4	-16.3	-0.7	0	2.6	29.4	0	0	0	29.4
			Front End L	Point	Leq	116	116		0	0	0	142.31	-54.1	-0.2	-12.2	-0.4	0	2.1	51.3	-4	0	0	47.3
			Front End L	Point	Leq	116	116		0	0	0	167.05	-55.4	0	-19.7	-0.6	0	0	40.2	-4	0	0	36.2
			North - Bag	Area	Leq	88.2	100.7	17.6	0	0	3	182.91	-56.2	-1.2	-5.9	-0.6	0	0	39.8	0	0	0	39.8
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	197.43	-56.9	0.3	-16	-1	0	12.2	49.4	0	0	0	49.4
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	168.45	-55.5	0.5	-4.3	-1.5	0	0.1	35.3	0	0	0	35.3
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	182.7	-56.2	-1.3	-2.6	-0.4	0	0	44.4	0	0	0	44.4
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	162.59	-55.2	0.1	-0.1	-1.9	0	0	35	0	0	0	35
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	159.97	-55.1	-0.5	-18.5	-0.4	0	0	25.2	0	0	0	25.2
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	156.52	-54.9	0.1	-13.5	-0.5	0	0	38.5	0	0	0	38.5
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	159.17	-55	0.1	-21.8	-0.9	0	0	30.9	0	0	0	30.9
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	192.75	-56.7	-0.6	-2.5	-1.6	0	0	23.7	0	0	0	23.7
			South - Bag	Area	Leq	85.8	98.3	17.6	0	0	3	181.97	-56.2	-0.6	-0.9	-1	0	0	42.6	0	0	0	42.6
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	196.62	-56.9	-1.1	-2.8	-1.1	0	0	41.7	0	0	0	41.7
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	198.79	-57	-0.4	-13.8	-0.6	0	0	39.5	0	0	0	39.5
K	G	51.9	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	146.75	-54.3	-0.5	-20.3	-0.5	0	0	24.1	0	0	0	24.1
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	77.1	-48.7	0.3	-18.2	-0.3	0	0.3	-0.7	0	0	0	-0.7
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	82.96	-49.4	0.3	-23.4	-0.7	0	2	-5.1	0	0	0	-5.1
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	66.5	-47.4	0.4	-18.5	-0.4	0	1.3	1.4	0	0	0	1.4
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	127.57	-53.1	-0.3	-15	-0.3	0	0	37.6	0	0	0	37.6
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	127.4	-53.1	-1.4	-19.5	-0.3	0	0	29.7	0	0	0	29.7
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	134.05	-53.5	-0.6	-15.4	-0.1	0	0	26.2	0	0	0	26.2
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	78.31	-48.9	0.4	-15	-0.4	0	0	28.6	0	0	0	28.6
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	71.72	-48.1	-0.2	-13.9	-0.2	0	0.1	34	0	0	0	34
			Facade 01	Area	Leq	89	96	5	0	0	3	86.95	-49.8	0.1	-18.4	-0.4	0	0	30.5	0	0	0	30.5
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	71.68	-48.1	0.4	-11.6	-0.1	0	0.1	44.7	0	0	0	44.7
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	88.74	-50	0.1	-21.8	-0.6	0	0	26.8	0	0	0	26.8
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	74.76	-48.5	-0.2	-21.2	-0.3	0	1.8	27.9	0	0	0	27.9
			Facade 03	Area	Leq	89	96	5	0	0	3	90.43	-50.1	0.1	-22.1	-0.6	0	0	26.3	0	0	0	26.2
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	88.58	-49.9	0.1	-18.5	-0.4	0	0	30.2	0	0	0	30.2
			Front End L	Point	Leq	116	116		0	0	0	120.53	-52.6	-0.3	-16	-0.4	0	0	46.8	-4	0	0	42.8
			Front End L	Point	Leq	116	116		0	0	0	142.46	-54.1	-0.2	-17.4	-0.5	0	0	43.9	-4	0	0	39.9
			North - Bag	Area	Leq	88.2	100.7	17.6	0	0	3	80.02	-49.1	-1	-21.3	-0.2	0	2.1	34.2	0	0	0	34.2
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	78.03	-48.8	0.2	-23.5	-0.7	0	2.6	40.6	0	0	0	40.6
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	88.96	-50	0.3	-18.3	-0.4	0	0	27.7	0	0	0	27.7
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	79.47	-49	-0.9	-12.1	-0.1	0	0	42.8	0	0	0	42.8
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	70.68	-48	0.1	-24.1	-0.8	0	0	19.3	0	0	0	19.3
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	138.81	-53.8	-0.5	-14.8	-0.3	0	0	30.2	0	0	0	30.2
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	141.81	-54	0.1	-16.9	-0.5	0	0	35.9	0	0	0	35.9
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	143.51	-54.1	0.1	-22.8	-0.9	0	0	30.8	0	0	0	30.8
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	59.84	-46.5	-0.1	-4.1	-0.4	0	0	34	0	0	0	34
			South - Bag	Area	Leq	85.8	98.3	17.6	0	0	3	76.95	-48.7	-0.4	-10.8	-0.1	0	0	41.2	0	0	0	41.2
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	74.96	-48.5	-0.9	-11.4	-0.2	0	0	42.6	0	0	0	42.6
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	77.15	-48.7	-0.4	-22.5	-0.3	0	0	39.3	0	0	0	39.3
L	G	49.3	Area sourc	Area	Leq	89.4	96.7	5.5	0	0	3	343.26	-61.7	0	-19.8	-0.9	0	0	17.3	0	0	0	17.3
			Conveyor 1	Line	Leq	49.2	66	48	0	0	0	266.29	-59.5	0.8	-8.7	-1.8	0	0.3	-2.9	0	0	0	-2.9
			Conveyor 2	Line	Leq	53.1	66	19.5	0	0	0	239.84	-58.6	0.6	-9.6	-1.5	0	1.8	-1.2	0	0	0	-1.2
			Conveyor 3	Line	Leq	52.1	66	24.7	0	0	0	232.57	-58.3	0.3	-3	-2.1	0	0.1	3.1	0	0	0	3.1
			Crusher - N	Area	Leq	87.2	103.3	41	0	0	3	330.8	-61.4	0.2	-15.4	-0.7	0	0	28.9	0	0	0	28.9
			Crusher - S	Area	Leq	84.9	100.9	40.6	0	0	3	328.95	-61.3	-0.9	-20	-0.7	0	0	21	0	0	0	21
			Crusher - V	Area	Leq	87.8	92.8	3.2	0	0	3	338.26	-61.6	0.1	-15.7	-0.2	0	0	18.4	0	0	0	18.4
			East - Bagh	Area	Leq	74.4	89.3	31.3	0	0	3	255.95	-59.2	0.6	-21.6	-1.6	0	0	10.5	0	0	0	10.5
			Facade 01	Area	Leq	74	93.3	85.2	0	0	3	244.56	-58.8	0	-5.3	-1.2	0	0	31.1	0	0	0	31.1
			Facade 01	Area	Leq	89	96	5	0	0	3	276.21	-59.8	0.6	-19.7	-1.1	0	0	18.9	0	0	0	18.9
			Facade 02	Area	Leq	88.1	100.9	19.2	0	0	3	251.61	-59	0.8	-17.4	-0.4	0	0	28	0	0	0	28
			Facade 02	Area	Leq	85.8	96	10.5	0	0	3	277.86	-59.9	0.6	-23.1	-1.7	0	0	14.9	0	0	0	14.9
			Facade 03	Area	Leq	74	93.3	85.2	0	0	3	246.31	-58.8	0	-20	-0.7	0	3.4	20.1	0	0	0	20.1
			Facade 03	Area	Leq	89	96	5	0	0	3	278.08	-59.9	0.6	-23.3	-1.8	0	0	14.6	0	0	0	14.6
			Facade 04	Area	Leq	85.8	96	10.5	0	0	3	276.42	-59.8	0.6	-22.6	-1.5	0	0	15.6	0	0	0	15.6
			Front End L	Point	Leq	116	116		0	0	0	324.35	-61.2	0.4	-13.7	-1	0	0	40.4	-4	0	0	36.4
			Front End L	Point	Leq	116	116		0	0	0	331.5	-61.4	0.4	-16.8	-0.8	0	0	37.4	-4	0	0	33.4
			North - Bag	Area	Leq	88.2	100.7	17.6	0	0	3	256.03	-59.2	-1.1	-19.3	-0.5	0	7.5	31.1	0	0	0	31.1
			North - Dru	Area	Leq	92.3	107.9	36.1	0	0	3	238.16	-58.5	0.4	-20	-1.2	0	0	31.6	0	0	0	31.6
			Roof 01	Area	Leq	88.3	96	5.9	0	0	0	277.23	-59.8	0.8	-21.6	-1.3	0	0	14.1	0	0	0	14.1
			Roof 01 - B	Area	Leq	97.5	105	5.5	0	0	0	255.61	-59.1	-1.4	-3.3	-0.6	0	0	40.5	0	0	0	40.5
			Screen 2 -	Point	Leq	92.2	92.2		0	0	0	267.41	-59.5	0.4	-20.7	-1	0	6.6	18	0	0	0	18
			Screen - Ea	Area	Leq	89.8	96.6	4.8	0	0	3	332.16	-61.4	0	-9.9	-0.9	0	0	27.4	0	0	0	27.4
			Screen - No	Area	Leq	91.1	104.2	20.4	0	0	3	337.53	-61.6	0.6	-12	-1.2	0	0	33	0	0	0	33
			Screen - So	Area	Leq	93.2	105.5	17	0	0	3	337.73	-61.6	0.7	-22.3	-1.6	0	0	23.7	0	0	0	23.7
			Silo Convey	Point	Leq	85.2	85.2		0	0	0	227.45	-58.1	-0.6	-0.6	-1.6	0	0	24.3	0	0	0	24.3
			South - Bag	Area	Leq	85.8	98.3	17.6	0	0	3	254.37	-59.1	-0.5	-7.6	-0.8	0	0	33.3	0	0	0	33.3
			South - Dru	Area	Leq	85	100.6	36.1	0	0	3	236.36	-58.5	-1	-3.8	-0.9	0	0	39.3	0	0	0	39.3
			West - Dru	Area	Leq	93	108.3	33.2	0	0	3	235.75	-58.4	-0.5	-4.5	-1	0	0	46.8	0	0	0	46.8

D. L. ADAMS ASSOCIATES
acoustics | performing arts | technology

1536 Ogden Street
Denver, CO 80218
www.dlaa.com
303.455.1900

June 3, 2024

Heather Scott, Principal Planner
Douglas County Department of Community Development
100 Third Street
Castle Rock, Colorado 80104

Re: Brannan Sand and Gravel - Noise Modeling Review (DLAA #15-211-U)

Ms. Scott,

We have reviewed the revised noise study you provided regarding the proposed expansion of the Brannan Sand and Gravel Sedalia Ready Mix Plant and Crushing Operation. The application information you provided includes the *Brannan Sand and Gravel Proposed Sedalia Asphalt Pavement Materials Facility Noise Modeling Report*, dated January 5, 2024 and prepared by Behrens and Associates, and the *Owens Industrial Park Filing 1, 1st Amendment, Lot 1A and Metes and Bounds Parcel, 3rd Amendment Douglas County APM*, dated April 5, 2024 and prepared by Civil Resources, LLC.

This is the second noise report related to this project that DLAA has reviewed. Comments related to the previous Behrens report, dated October 7th, 2022, were outlined in a DLAA memo dated December 6th, 2022.

In communications with representatives of Douglas County, we understand the primary purpose of the Behrens Noise Modeling Report to be:

1. Deliver a clear and comprehensive report that informs the local community of existing and future noise impacts from the Sedalia Ready Mix Plant on nearby residences, and

2. Allow for expert consultants in employment of Douglas County (DLAA) to validate the analysis and results of the noise study and/or predictive modeling.

Our comments on the following pages are broken out into these two categories.

DLAA Summary

While the approach and methods to this noise study appear to be appropriate, we find that the noise study is missing information and data which would allow us to independently check and verify the modeling predictions. Without more information specifically related to the measurements conducted at the APM facility in Commerce City or a more informative site survey, we cannot verify that the modeled levels at the future Douglas County APM are accurate or reasonable. Additionally, the community would benefit from additional context, detail, and subjective descriptions of the equipment measured and modelled.

1. DLAA Comments Related to Informing Local Community

a. DLAA recommends that an executive summary be included at the beginning of the report. This summary should outline the results of the analysis clearly and concisely to briefly inform the community.

b. DLAA recommends that the report include information related to hours of operations, duration of activities, and a proposed management plan. If this is to be included in a separate document issued by representatives of the facility, it should be referenced within the noise report. This will be addressed by Brannan in a attached appendix and was addressed in the revised noise management plan and a note was added in the report saying this information is found in Attachment A.

c. DLAA recommends that the report contain more detail related to ambient noise sources that affected the on-site noise survey and contributed to a relatively loud ambient environment. Additional details were added to the revised noise modeling report.

d. DLAA recommends that the report include details of how noise levels are logarithmically summed. Adding 50 dBA of equipment noise to a 50 dBA ambient level would potentially result in an overall level of 53 dBA, for example. Additional details were added to the revised noise modeling report. Decibel Addition was added (Section 3.1) to section 3

e. DLAA recommends that modeled noise levels be compared and analyzed alongside typical ambient levels to provide context. For example, though modeled or measured noise levels meet code, will the noise be audible? Potentially disturbing? Barely perceptible? Additional details were added to the revised noise modeling report. Relative loudness of environmental noise added (Section 3.2) to section 3 and a comparison against modeling and ambient levels were made.

f. The 2024 Behrens Report includes C-weighted modeling results and indicates that the combined operations may result in higher C-weighted noise levels than the measured nighttime dBC levels recorded at Survey Location 1 (Receptor Locations 9 & 10 in noise model). Furthermore, the report does not include any subjective descriptions, audibility, or tactile thresholds for dBC sound pressure levels. While 67 dBC is a relatively low noise level, the report does not provide the reader with any additional references to better understand what the data is conveying with regards to low frequency transmission. While the glossary includes a definition of C-weighted sound level, we recommend that if the report is to include C-weighted analysis, it should also provide additional context to help frame the C-weighted analysis and better inform the community. Additional details were added to the revised noise modeling report. C-weighted Decibel Scale was added (Section 3.3) to section 3. Additionally, a study was cited to give context to dBC noise levels. Additional analysis was added to dBC results.

g. The 2024 Behrens report added 12 new residential receptors which were not included in the 2022 report. However, there is little to no explanation as to why they were added or discussion as to why they're important. DLAA recommends adding context around these data sets to better inform the community. ? Additional details were added to the revised noise modeling report. Language was added to the Noise Sensitive Receptor Location (Section 6.2).

2. DLAA Comments Related to Data and Analysis Validation

a. The distances between source and receiver measurements used in Calibrated Source Sound Power Levels listed in Tables 5-1, 5-2 & 5-3 are not reported. DLAA has no way to validate the accuracy of input data used in noise modeling. This information was previously requested in the DLAA 12/6/22 Memo. Behrens supplied this data based on the 2022 comments however it doesn't seem to have made it to DL Adams. It is being supplied again as requested.

b. Often, an environmental noise model is calibrated by onsite measurements and at various distances and locations relative to the source. In this case, the only available method in assessing the validity of the Behrens noise modeling results (Table 6-1) is to compare the modeled noise levels of existing activities to the measured noise levels in the Sound Level Survey (Table 3-2). A comparison of the 2024 Existing Modeled Noise Levels and the 2022 Measured Existing Noise Levels are shown below in Figure 1. Note that the 2024 Model is showing levels up to 17 dB below the 2022 measured levels, which is a significant (Column F in Figure 1).

	A	B	C	D	E	F
1						
2		2024 Table 6-1			2022 Table 7-1	
3	Noise Receptor Location	Sedalis Ready Mix Plant	Seadlia Crushing Operation	2024 Log Sum (Mix + Crushing)	Measured Operational Leq Data	Level Difference
4	A	42.6	34	43.2	55.3	**-12.1**
5	B	50.1	36	50.3	55.3	**-5.0**
6	C	54.9	38.2	55.0	70.4	**-15.4**
7	D	64.5	43.5	64.5	70.4	**-5.9**
8	E	70.8	52.6	70.9	70.4	**0.5**
9	F	71.4	55.9	71.5	70.4	**1.1**
10	G	56.2	52	57.6	70.4	**-12.8**
11	H	62.1	53.7	62.7	70.4	**-7.7**
12	I	51.8	49.7	53.9	55.2	**-1.3**
13	J	51.1	50.1	53.6	61.8	**-8.2**
14	K	40.3	41.5	44.0	61.8	**-17.8**
15	L	44.2	36.7	44.9	61.8	**-16.9**

Figure 1. Comparing 2024 Modeled Levels to 2022 Measured Levels

The difference between the modeled and measured noise levels could indicate that the site survey was dominated by ambient noise levels and unrelated noise events. The site survey *may* accurately quantify a loud and noisy local environment. And if so, the survey does not provide enough clear data to calibrate the modeled data. To properly calibrate the model, additional measurements of the existing operations must be conducted in closer proximity to the operations, and at various locations, where the measurements will be less influenced by the ambient environment. The 2024 Behrens model *could* be within a reasonable predictive range, however DLAA does not have adequate information to accurately validate the Behrens modeling results. The environmental model was calibrated using on-site noise measurements at various up-close distances and locations relative to the major sources found on site. The noise model was calibrated based on the locations, noise levels, and frequency spectra of the noise sources, and the geometry and reflective properties of the local terrain. Again, this data will be supplied to DL Adams.

c. On Page 9, the 2024 Behrens Report states:

Table 5-1 lists the modeled equipment list and associated source sound power levels for the Sedalia Ready Mix Plant. This data was calibrated from an on-site equipment sound level survey that was conducted by BAENC on October 22nd, 2019 at the Ready Mix Plant located at 5775 Airport Road in Sedalia, CO.

In our opinion, this is a misuse of the word "calibrated" ("calibrated" is misused again in the following paragraph related to Table 5-1). Behrens and Associates measured sound pressure levels and *converted* them to sound power levels in order to appropriately use them in their model. While this is correct procedure for obtaining data to input into an environmental noise model, this is not equivalent to calibration. To calibrate an environmental noise model, one would need to adjust the input data, directionality of sources, and the effects of the topography within the model to produce results that most closely resemble acoustical measurements taken at specific and representative locations, if applicable. To our knowledge, Behrens and Associates have not calibrated their noise model in any such way. We disagree with the characterization of our modeling methodology. The environmental model was calibrated using on-site noise measurements at various distances and locations relative to the major sources found on site. The noise model was calibrated based on the locations, noise levels, and frequency spectra of the noise sources, and the geometry (topography) and reflective (absorptive) properties of the local terrain. Due to complex nature of several noise sources located in close proximity, sound levels measured at different distances was relied upon resulting in numerous modeling iterations used to iteratively arrive upon equipment sound power levels that results in sound pressure levels that matched measured field data. Behrens believes this consistent with "a calibration." No changes were made to the noise modeling report based on this comment.

d. The modeled contributions of the proposed APM Expansion were reported in both the 2022 Behrens Report and in the 2024 Behrens Report. However, the predicted levels of the future expansion in the 2024 Behrens Report are lower than what was reported in the 2022 Report. See Figure 2 below.

G	H	I	J
Noise Receptor Location	2024 Table 6-1 APM Exansion Model	2022 Table 7-1 APM Expansion Model	Level Difference
A	44.2	45.4	-1.2
B	40.5	44	-3.5
C	39.5	47.6	-8.1
D	50.6	52.7	-2.1
E	46.9	52.2	-5.3
F	42.5	44.5	-2.0
G	41.0	42.9	-1.9
H	41.8	43.8	-2.0
I	42.9	44.9	-2.0
J	53.6	54.9	-1.3
K	50.6	51.9	-1.3
L	48.6	49.3	-0.7

Figure 2. Comparing Modeled APM Expansion Contributions in 2024 & 2022 Reports

It was noted that certain equipment (Crusher, Screen, CAT 990H in 2022 Table 6- 2) that was included in the 2022 report was subsequently removed from the 2024 report. This may explain the difference in predicted levels. However, there is no language in the report that explains why these data sets were removed from the analysis. It is our understanding that both reports will be included in the submittal to Douglas County, and as such, this discrepancy should be discussed. Equipment lists are provided by Brannan. Brannan should be able to answer any questions pertaining to equipment lists. After confirmation from Brannan a comment may be added to the report.

e. The results reported in Table 6-1 indicate that combined operations will result in noise levels at or above, the ambient nighttime levels measured in the site survey. This is particularly true at Locations I-L (Locations 1 & 2 in the site survey) where noise levels are predicted, and ambient levels were measured, within the range of 50-56 dBA. Based on this information, we would expect sounds from the Brennan Sedalia facility to be noticeably audible, and potentially disturbing, at these locations. For a sound to be perceived as inaudible, it typically needs to be approximately 10 dB below the ambient or background level. This would be informative for the local community and should be stated within the report. Additional details were added to the revised noise modeling report. Behrens added perceptibility classifications to the noise modeling results.

f. The noise mapping of levels from existing operations, shown as Figure 6-1 and 6- 2 in the 2024 Behrens report, show higher levels at a greater distance to the north and east of the plant. The noise mapping of A-weighted Crushing Operations in Figure 6-3 show lower levels of noise transmission to the north. The noise map of A-weighted levels from the proposed APM expansion in Figure 6-5 contains differently shaped contours than either of those maps previously mentioned. Noise levels found in the noise contour maps are predicted based on the locations, noise levels, and frequency spectra of the noise sources, and the geometry and reflective properties of the local terrain, as well as building and barriers found on site. The Ready-Mix Plant (Figure 6-1) and the Crushing Operations (Figure 6-3) are different (sources/orientation/geometry of buildings/barriers) than the operations found in the APM Expansion. Each operation was modeled individually.

g. The report does not indicate if the differences in contour shape is due to topography, barriers, structures, frequency content, directionality of noise sources, or something else entirely. There are no discussions of the noise mapping results that provide context or explanation. This should be addressed, both for community understanding and for purposes of peer review. There is an explanation of all of this in the noise modeling methodology section (Section 6.1) of the noise modeling report. The noise model does take all the concerns mentioned above int account. Furthermore, Behrens does try to add a little more explanation in specific sections of the noise modeling report to address these comments and to help the community better understand what is being taken into account with the noise modeling.

h. The proposed strategies and related analysis for mitigation scenarios outlined in Section 6.2 of the 2024 report all appear reasonable. Our only comment is to clarify the term "acoustical blanket" used throughout the Section. Is there a Noise Reduction Class (NRC) requirement for acoustical blankets or does any massive blanket that achieves STC-25 satisfy the requirement? We suspect that the blankets in the model may include an acoustical absorption component, which would help reduce the effect of acoustical reflections off the barrier blankets and local equipment/structures. If this is true, the report should include both minimum STC and minimum NRC ratings for appropriate specifications. Brannan will not be implementing the recommended mitigation found in the noise modeling report. Therefore, the revised noise modeling report will exclude those results and recommendations.

Please let us know if you have any questions or concerns.

Sincerely,

Ted Pitney
Senior Consultant

Dust Control Plan for 5775-5779 Airport Rd, Sedalia CO

November 2023

DUST CONTROL PLAN

Methods to prevent, minimize, and mitigate point source and fugitive dust emissions associated with the Asphalt Paving Materials & Concrete Batch Facilities in Douglas County, Colorado

Brannan Sand and Gravel Company

Table of Contents

Attachment A: Foothills Environmental Summary Letter

Introduction

Brannan Sand and Gravel Company (BSG) is proposing an asphalt paving materials facility located at 5779 Airport Rd. Sedalia, CO. This facility will share a site with Ready Mixed Concrete Company's (RMCC) already operating concrete batch plant currently located at 5775 Airport Rd. Sedalia, CO. The purpose of this document is to provide a plan to assist in the control of significant dust emissions attributed to operations for both facilities to minimize the potential for generation of fugitive dust and offsite dust impacts.

The facilities will operate in accordance with this Dust Control Plan and associated air permits. This plan details practices and methods to mitigate dust emissions, however these practices and methods will be used at various times and degrees, as conditions warrant.

The sources of dust at this operation are:

- Fugitive dust from haul roads, trucking, and heavy equipment operation;
- Fugitive dust from construction debris crushing operation;
- Fugitive dust from material stockpiles; and
- Point source dust from plant operation.

A supervisor and other operations staff shall oversee and ensure compliance with this plan at all times. Onsite supervisors will be trained on this program. The Environmental manager will document and ensure that supervisors are trained. A copy of this plan will be kept onsite at all times.

Best Management Practices for Dust Control

Fugitive dust from haul roads, trucking, and equipment operation

Fugitive dust can be emitted into the air by heavy equipment operation, heavy truck, and light duty truck traffic. Dust will be managed through the following Best Management Practices:

- Truck trips shall be limited per the APM Management Plan.
- The surface of all haul roads on the site are paved with asphalt or concrete, this will minimize the transport of fugitive dust.
- Paved roads at the facility shall be cleaned with a mechanical street sweeper at least twice per week. The plant entrance and exits will be swept concurrently, along with roads as identified in the APM management plan.
- Heavy equipment operation at the plant is needed to deliver aggregates from stockpiles to the appropriate bins. The loader is trained to keep the drop heights at the minimum level needed for operation and obey the speed limit.
- Water spray with water truck will be used on haul roads and all unpaved roads within the plant area. Water will be sprayed on dry operational days and shall be applied throughout the day as needed, which is typically 2 times per day. Additional trips will be administered as necessary to ensure compliance with air permits.
- The speed limit is set at 5 miles per hour on all roads at the site to limit fugitive dust emitted during vehicle movement.

Dust from construction debris crushing operations

Construction debris material crushing and material stockpiles are used in the asphalt process and can emit fugitive dust during the crushing process, movement, or windy conditions. To mitigate the potential for this to occur, the following shall be performed:

- Application of water spray to crushers and screens during processing.
- Front end loader material drop heights during loading of trucks or crushing equipment shall be kept to the minimum necessary.
- The drop height of material from the aggregate stacker to the stockpile shall be kept to the minimum necessary. Equipment operators are trained to minimize creation of fugitive dust during material pickup by enforcing speed limits and limit shovel interaction with unpaved surfaces.

Fugitive dust from stockpiles

Material stockpiles can emit fugitive dust during windy conditions. To mitigate the potential for this to occur, the following shall be performed:

- Material stockpiles will be limited to a height of no more than 20 feet to limit the potential for fugitive dust to occur. An instrument capable of measuring the height of stockpiles shall be on site at all times. Drone stockpile surveys shall be used to confirm that stockpiles are kept at or below 20 feet. Drone surveys are typically performed quarterly.
- Water sprays will be applied to material stockpiles as needed, to add residual moisture. The bases of the material stockpiles will be watered as needed using a water truck.
- Aggregate stacker drop heights shall be kept at the minimum needed for operation.

Point source dust from asphalt plant operation

Point source dust can be emitted from plant operation. The plant will have at least one EPA Method 9 certified employee on-site to identify opacity during operational hours. Point source dust will be managed by:

- A filter baghouse installed on the plant reduces 99.9% of particulate emissions.
- Filter baghouse inspection and maintenance will be documented in accordance with the air permit.
- A vent filter will control emissions from lime filling.
- Fully enclosed conveyors to final product loading silos will minimize fugitive emissions.
- Opacity measurements will be performed and logged regularly in accordance with air permitting protocols.
- If dust is observed above permitted opacity limits during plant operation the plant will be shut down to determine the source and maintenance activities will be completed before the plant is restarted.

Point source dust from concrete plant operation

Point source dust can be emitted from plant operation. This is one of the most easily controllable sources. The plant will have at least one EPA Method 9 certified employee on-site to identify opacity during operational hours. Point source dust will be managed by:

- A filter baghouse installed on the plant reduces 99.9% of particulate emissions.
- Filter baghouse inspection and maintenance will be documented in accordance with the air permit.
- Opacity measurements will be performed and logged regularly in accordance with air permitting protocols.
- If dust is observed above permitted opacity limits during plant operation the plant will be shut down to determine the source and maintenance activities will be completed before the plant is restarted.

If dust control measures described above fail to maintain the site's compliance with the air quality permit, the Operator shall implement additional dust control measures, which may include additional watering and sweeping, and use of magnesium chloride or other dust palliative. The Corrective Action Matrix (below) shall be consulted as corrective actions that are appropriate for this site are listed.

Corrective Action Matrix

Dust Exceedance Source	Corrective Actions
Haul roads	Limit speed, sweep paved haul roads, apply water to roads with water truck
Heavy equipment operation	Limit speed, apply water to operation area with water truck, limit material drop height from the loader bucket, apply RAP to equipment operation area, use magnesium chloride or other dust palliative, cease operation during windy conditions
Trucking	Limit speed
Stockpiles	Water stockpiles, limit material drop height from loader, apply water to base of stockpiles
Plant operation	Plant shutdown if dust is visible past permitted opacity limits, check the filters in the baghouse, preform any required maintenance on the baghouse
Crushing or screening	Spray bars on equipment, cease operation during windy conditions, manage loading drop heights

Monitoring Plan

A dust control log shall be kept at each onsite at each facility that tracks water truck use, site sweeping activities, compliance with air permits, and compliance with this dust control plan. Foothills Environmental will perform quarterly monitoring for PM10 at the facility as described in attached letter.

Attachment A

Foothills Environmental Summary Letter

Foothills Environmental, Inc.

Industrial Hygiene, Safety & Environmental Services

October 12, 2023

Mr. Scott Legg
Environmental Manager
Brannan Companies
5775 Airport Road
Sedalia, CO 80135

**RE: Revision 2 - Perimeter PM10 Dust Monitoring Protocol
Brannan Companies - Sedalia Plant
Sedalia, Colorado**

Executive Summary

Foothills Environmental, Inc. (FEI) has prepared this summary letter report on behalf of Brannan Companies for proposed protocol for Particulate Matter 10 (PM10) monitoring for the Sedalia Plant, located in Sedalia, Colorado.

After several conversations with Brannan representatives, it is our understanding that no concrete or recycled asphalt paving (RAP) material processing will be conducted at the Sedalia plant until after the USR has been approved. Therefore, FEI proposes to perform the PM10 monitoring at the Sedalia plant within fourteen (14) days of start-up of site concrete and/or RAP processing. Furthermore, according to Brannan representatives, concrete and RAP processing cannot occur at the same time. The equipment at the Sedalia plant is set up to process one or the other, but not both concurrently. In addition, Brannan representatives have stated that the concrete processing is the dustier of the two operations (RAP verse concrete). Historically FEI had performed PM10 monitoring during concrete crushing operations at the Sedalia Plant in the 2nd and 3rd quarters of 2019 where results revealed that PM10 levels were below the National Ambient Air Quality Standard (NAAQS) for Particle Pollution (PM10) at 150 micrograms per cubic meter ($\mu g/m^3$).

It is FEI's understanding that Douglas County Health Department requires PM10 monitoring during concrete crushing, RAP crushing, and Asphalt Plant operations. Therefore, FEI will coordinate with Brannan representatives to perform separate PM10 monitoring events to capture the concrete crushing, RAP crushing, and Asphalt Plant operations listed above.

Methodology

During each operation, concrete crushing, RAP crushing, Asphalt Plant operations, and Concrete plant operations, FEI will perform perimeter dust monitoring for PM10 at four locations around the perimeter of the Brannan Sedalia Plant site. Air monitoring would be conducted during a representative day for approximately eight hours with a TSI Dust Trak II 8530 Dust/Aerosol Monitor. Four representative locations along the east, west, south and north side of the perimeter of the Sedalia site will be selected for PM10 dust monitoring. A Davis Weather Station will also be used on site to monitor for general weather conditions such as wind speed, direction, relative humidity, etc. FEI will coordinate with Brannan to perform the PM10 air monitoring during work operations with the highest potential for dust levels. The PM10 dust levels will be compared to the National Ambient Air Quality Standard (NAAQS) for Particle Pollution (PM10) at 150 micrograms per cubic meter ($\mu g/m^3$).

Please do not hesitate to contact FEI at (303) 232-2660 if you have any questions regarding this report.

Sincerely,

Ronald Crandall

Ronald Crandall, CIH, CHMM
Senior Industrial Hygienist/Project Manager
Foothills Environmental, Inc.

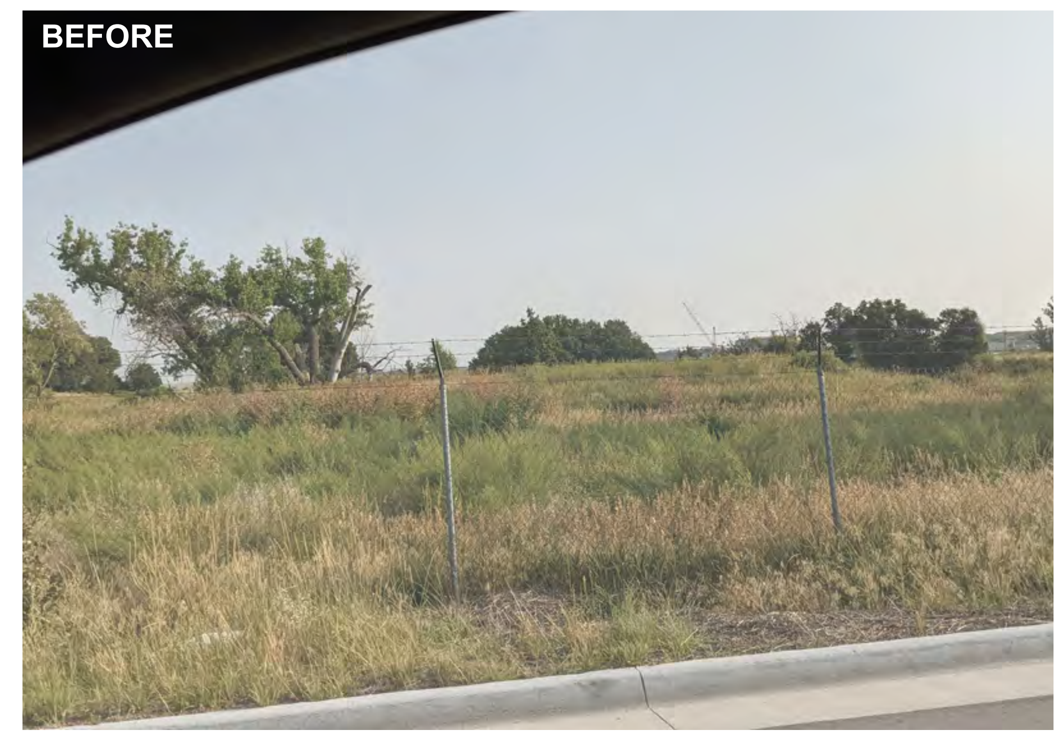
REVISED VISUAL ASSESSMENT

VIEW 1

VIEW 2

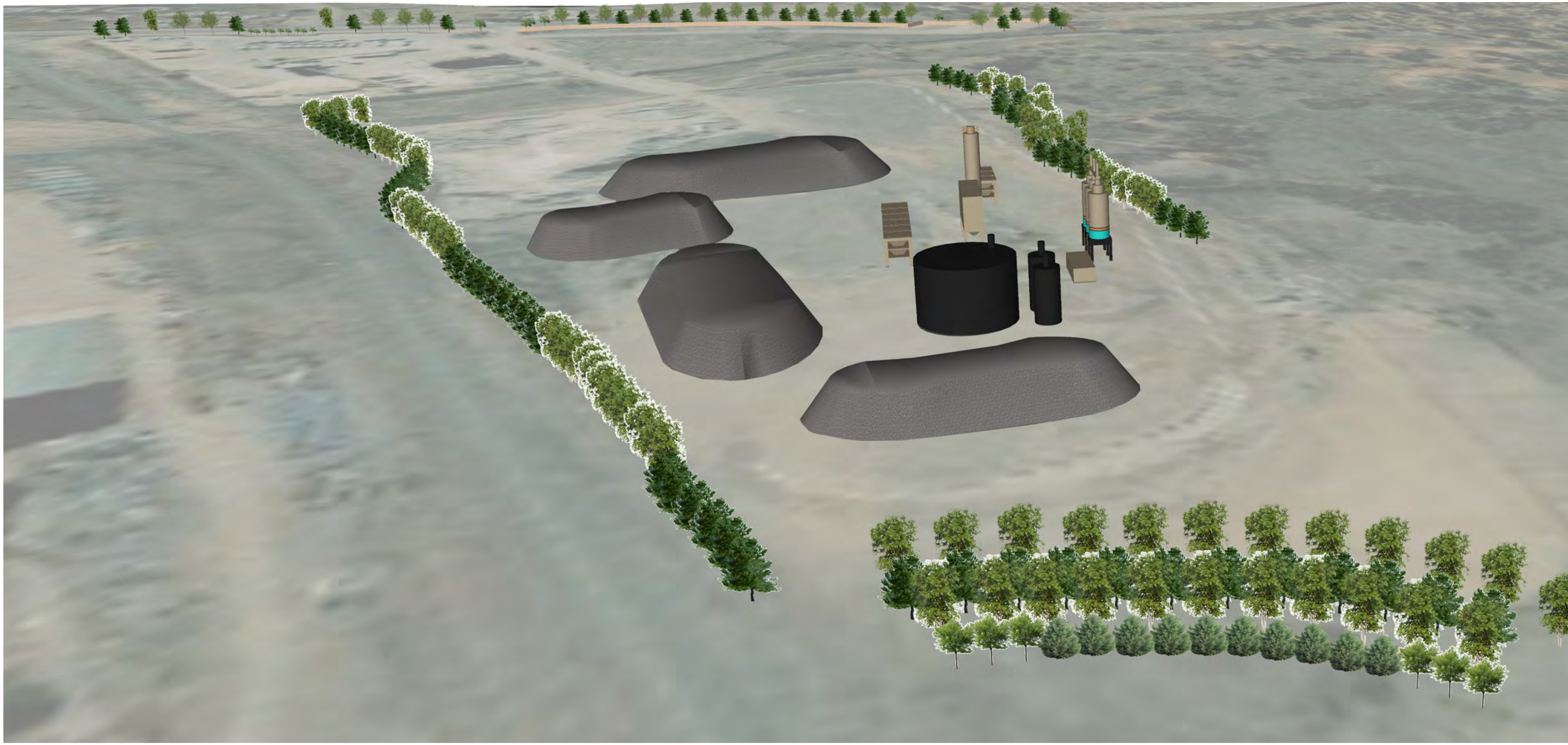
VIEW 3

VIEW 4



MODEL VIEW 1

MODEL VIEW 2



MODEL VIEW 3

EES
Entitlement and Engineering
Solutions, Inc

September 21, 2023

Douglas County Planning Division
10 Third Street
Castle Rock, CO 80104

Re: 5779 Airport Road, Sedalia, CO 80135 - Commitment Letter

To Whom It May Concern:

On behalf of Sedalia Water and Sanitation District (District), I am writing to inform you that Pursuant to Section 1808A.01 of the Douglas County Zoning Resolution, the Sedalia Water and Sanitation District (the "District") acknowledges its willingness and ability to serve the property proposed for the Asphalt Production Facility Use by Special Review (US2021-002). The applicant is included within the District under the "Order Approving Sedalia Water and Sanitation District's Motion for Order for Inclusion" dated October 23, 2006, and recorded on January 16, 2007 at Reception number 2007004713.

The proposed improvements, which include the addition of an asphalt plant, result in an increase in water usage. The proposed increase in usage is under the allowed amount per the Well Permit and thus the District will continue to serve the property as it currently does which is further outlined below. This Agreement will be contingent on approval of the US2021-002 Use by Special Review by the Board.

Commitment to Serve 5779 Airport Road, Sedalia, CO 80135:

The District commits to provide service to the proposed development with the following conditions:

1. The District is committed to serving the property located at 5779 Airport Road, Sedalia, CO as an existing customer whose property lies within the district boundary.

2. Service will be provided in accordance with previously approved agreements between the District and the owner of that property.

Water Demand:

The maximum estimated annual water demand for the addition of this asphalt plant is 5.0 acre-feet; which assumes that the onsite well is used exclusively for these operations. In reality, the project is supplemented with imported water, hauled by a water truck as part of the applicant's routine operations. For purposes of this letter, it is assumed that no water will be supplemented by imported water and the onsite well will be used exclusively; providing the maximum annual water demand.

The maximum estimated annual water demand, as provided by the asphalt production facility, for the composite of all facilities located on the site is 50.0 acre-feet; 43.2 acre-feet for concrete operations, 5.0 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations. The low-water annual water estimated demand is estimated at 25.1 acre-feet; 20.1 acre-feet for concrete operations, 3.2 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations.

Historically, recent annual water usage at the facility varies between 21.8 acre-feet and 39.6 acre-feet; with the data for the last two years being 27.73 AF and 27.44 AF. This annual information was provided by the asphalt production facility. The fluctuation is a function of seasonal shut-downs, construction deviations, and imported water usage.

Water Supply:

Per the existing well permit, Well Permit Number 63898, filed with the Office of the State Engineer-Colorado Division of Water Resources, the average annual amount of ground water to be appropriated shall not exceed 50.32 acre-feet.

The permit states "The use of ground water from this well is limited to commercial and industrial use in a concrete production facility and sanitary facility for onsite staff". The asphalt production facility falls under commercial and industrial use.

Feasibility of Supply:

The well and associated infrastructure connecting to the 5779 Airport Road property make it physically and economically feasible for the District to continue service to the proposed development.

Please see the attached Water Summary Report for additional details on the amount of water available to the District to serve the proposed Use by Special Review, US2021-002.

Please contact me with any questions or concerns you may have. You can reach me at 303-656-3208.

Respectfully Submitted,

ENTITLEMENT AND ENGINEERING SOLUTIONS, INC.

Mary Kasal, P.E.
Entitlement and Engineering Solutions
Sedalia Water and Sanitation District Engineer

Attachments:
Water Supply Report

EES
Entitlement and Engineering
Solutions, Inc

September 21, 2023

5779 Airport Road, Sedalia, CO 80135- Water Summary Report

The following report shall be used in conjunction with the "5779 Airport Road- Commitment Letter" dated September 21, 2023.

Per the existing well permit, Well Permit Number 63898, filed with the Office of the State Engineer- Colorado Division of Water Resources, the average annual amount of ground water to be appropriated shall not exceed 50.32 acre-feet. The well permit is attached for reference.

The maximum estimated annual water demand, as provided by the asphalt production facility, for the composite of all facilities located on the site is 50.0 acre-feet; 43.2 acre-feet for concrete operations, 5.0 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations. The low-water annual estimated water demand is estimated at 25.1 acre-feet; 20.1 acre-feet for concrete operations, 3.2 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations.

Historically, recent annual water usage at the facility varies between 21.8 acre-feet and 39.6 acre-feet; with the data for the last two years being 27.73 AF and 27.44 AF. This annual information was provided by the asphalt production facility. The fluctuation is a function of seasonal shut-downs, construction deviations, and imported water usage.

The maximum estimated water demand for the 5779 Airport Road site of 50.0 acre-feet per year falls below the permitted allocation of 50.32 acre-feet per year. Therefore, the existing well is capable of serving the subject property for the water demands they request. All other conditions within the existing well permit must be abided by.

No new water rights shall be conveyed. The proposed water increase for the proposed improvements is below the existing allotment from the well permits.

This report relates to the well that serves the Asphalt Production Facility parcels that are subject of this Land Use Application (US2021-002).

EES, Inc Phone: 303-572-7997 3801 E. Florida Ave. Suite 425 Denver, CO 80210

October 17, 2018

VIA ELECTRONIC MAIL ONLY

Alex Schatz
Brannan Sand and Gravel Company, L.L.C.
2500 Brannan Way
Denver, Colorado 80229

Re: Water Supply Permission for Brannan Asphalt Plant – 5775 Airport Road, Sedalia, Colorado

Dear Alex:

Per the terms of a "Real Property Inclusion Agreement," dated September 26, 2006, as amended September 29, 2008, between Ready Mixed Concrete Company ("RMCC") and the Sedalia Water and Sanitation District ("SWSD"), RMCC is entitled to pump and use ground water from a nontributary Arapahoe Formation well subject to Well Permit No. 63898-F (formerly Owens Brothers Arapahoe Well AD-7609). The well is located at 5775 Airport Road, Sedalia, Colorado. The permit authorizes the appropriation of an average amount of nontributary ground water in the amount of 50.32 acre feet per year at a maximum pumping rate of 120 gallons per minute. The well was decreed in Case No. 87CW095 for all beneficial purposes, including, but not limited to, commercial industrial, municipal and augmentation purposes. This letter confirms that RMCC agrees to provide Brannan Sand and Gravel water RMCC is entitled to pump and use under the terms of Well Permit No. 63898-F for Brannan's use at its planned asphalt batch plant and associated operations.

Thank you.

Sincerely yours,

Robert P. Kepford
General Manager

Ready Mixed Concrete Company Address: 5775 Franklin St. Denver, CO 80216 Office Phone: (303) 383-6446

Water Supply Analysis and Water Plan

Changes in water demand associated with this USR amendment are anticipated to be relatively minimal.

Discounting drinking water, which is imported in bottles, actual metered water usage at another asphalt production facility of similar scale operated by the applicant is 1.33 acre-feet (434,000 gallons) per year. This metered water supply is supplemented with imported water, hauled by a water truck as a part of the applicant's routine operations. Water trucks are deployed to the applicant's asphalt pavement facilities primarily to control dust generated in unpaved yard space. The present application incorporates paved surfaces for the bulk of vehicular trips within the site, though routine use of a water truck at some frequency is planned. In the event that the water truck were to rely exclusively on the on-site well to refill, this would add 3.68 acre-feet (3 daily cycles * 2,000 gallons/truckload * 200 working days requiring water application). The maximum water demand generated by new USR features is calculated as 5.01 acre-feet.

Recent water usage at the USR facility varies between 21.8 acre-feet and 39.6 acre-feet annually. This fluctuation in demand is a function of seasonal shut-downs (e.g., too cold to cure concrete, delivery problems due to weather, planned and unplanned maintenance) and overall construction economics.

Recycling operations on the site (for concrete rubble, etc.) were recently expanded and reconfigured by an administrative USR amendment. It is estimated that water application on a scale similar to the applicant's water truck operation would be appropriate for this use; however, about this impact of approximately 1.8 acre-feet is accounted for in the base USR existing prior to the administrative amendment (see attached Sedalia Water and Sanitation District correspondence from 2015).

The maximum annual water demand for the composite of all USR facilities on the site is 50.0 acre-feet, consisting of:

- 43.2 acre-feet for concrete operations (not counting recycling operations, allowing for growth in concrete production over time)
- 5.0 acre-feet for asphalt operations
- 1.8 acre-feet for recycling operations (accounting for pre-existing and expanded operations)

A low-water usage scenario is budgeted at 25.1 acre-feet annually, as follows:

- 20.1 acre-feet for concrete operations (curtailing concrete production to account for supply shortage)
- 3.2 acre-feet for asphalt operations (relying on water trucks to import no less than 1.8 acre-feet annually)
- 1.8 acre-feet for recycling operations

All low-water usage amounts are subject to supplementation by imported water. This produces an operational water budget that varies between 25.1 acre-feet and 50.32 acre-feet depending on overall availability of on-site and off-site water supplies.

On-site water supply is provided by a nontributary groundwater well. Well AD-7609 (State permit # 63898-F) is a Denver Basin deep well accessing the Arapahoe aquifer. This well is decreed for annual withdrawal of 50.32 acre-feet, most recently adjudicated in Division One Water Court case 2010CW261 (attached). While the well has been dedicated to the Sedalia Water and Sanitation District as part of an inclusion agreement, day-to-day operation of the well is conducted by Ready Mixed Concrete Company. The inclusion agreement provides for Ready Mixed Concrete Company to use the full amount of water rights (see Paragraph 6(b)(i) of the attached decree, holding that it does not modify or diminish the inclusion agreement). Concrete production under the amended USR has been and will be at all time the primary water use at the site. Allocating water to ancillary water demands at the same facility is assumed to be consistent with permit and inclusion requirements.

Also attached for reference is a copy of the agreement between the applicant and Ready Mixed Concrete Company by which the well is made available for all uses on the site, including those that are newly incorporated by this USR amendment. Currently, well water is pumped directly to a cistern at the concrete plant. As proposed, a water tank in the asphalt production and recycling area will serve as a distribution point to uses in the USR amendment area, including fire flows as may be required.

The applicant is also investigating other wells and off-site sources of water to enhance the reliability and resilience of supply.

The subject Property resides in the Margin B Water Supply Zone of Douglas County. The anticipated demand does not cause water usage to exceed any already-established appropriation from the Denver Basin aquifers underlying the property. The anticipated new demand is also a fraction of the amount of water in all Denver Basin aquifers underlying the site subject to annual appropriation. On this basis, the proposed land use does not cause water usage to exceed the 50 percent of appropriable supply according to Douglas County standards.

The subject Property is also in the Douglas County Interim Water and Sanitation Overlay District. As provided in the Douglas County Zoning Resolution, where a property is zoned for General Industrial use in the overlay district, "The type and scale of the proposed use and the water and sewer demand of the proposed use shall be used to determine if the use of individual wells and on-site wastewater treatment systems is suitable. It is anticipated that the need for the overlay district will diminish or cease when central facilities become available."

At present, the subject Property does not fall within the boundaries of any central water or sanitation system. While the site will be included in the Sedalia Water and Sanitation District by virtue of the relevant inclusion agreement, there are no present plans for expansion of services in the area. Nor does the property reside within 400 feet of any existing central water line. The nearest existing central water and sanitary sewer services are those of the Sedalia District. At its nearest reach, the Sedalia district's central water lines are over two miles distant to the south.

Water use was addressed at the time of prior land use development proposals for the Property. For example, the Sedalia inclusion agreement is the result of a 2005 application for a site improvement plan (SIP) similar to – in fact, more intense in scope and scale than – the present application. The applicant does not propose subdivision or rezoning that will fundamentally change water demand on the Property.

According to DCZR criteria (DCZR 1803A), the water supply for the USR amendment is adequate:

1. The decree for Well AD-7609 water rights includes industrial uses.
2. The amended USR does not rely on renewable water.
3. Withdrawals of water from Well AD-7609 do not experience variations based on the hydrologic cycle.
4. The maximum water budget is 50.32 acre-feet annually. Of this amount, 50.0 acre-feet are dedicated to the concrete, asphalt and recycling operations. This leaves 0.32 acre-feet, more than capable of absorbing any incidental use, such as the 500 square-foot planned control room space (requires 0.056 acre-feet according to DCZR 1805A.02.4). The total water budget can be reduced by half in a low-water usage scenario.

The Applicant is in communication with the Sedalia Water and Sanitation District. A letter similar to the attached 2015 correspondence is sought to establish compliance with DCZR 1806A.02.4 or any other applicable standard.

Attachments:

Commitment Letter from Sedalia Water and Sanitation District by EES, Inc., dated February 27, 2015
Groundwater Well Permit 63898-F
Inclusion Agreement, recorded 2007
Amendment to Inclusion Agreement, recorded 2008
Decree in Division One Water Court case 2010CW261

Form No. GWS-25

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3581

EXST

WELL PERMIT NUMBER 63898 -F -
DIV. 1 WD 8 DES. BASIN MD

APPLICANT

READY MIXED CONCRETE CO
4395 WASHINGTON ST
DENVER, CO 80216-

(303) 292-1771

APPROVED WELL LOCATION
DOUGLAS COUNTY
SW 1/4 NW 1/4 Section 3
Township 7 S Range 68 W Sixth P.M.

DISTANCES FROM SECTION LINES
1400 Ft. from North Section Line
850 Ft. from West Section Line

UTM COORDINATES (Meters,Zone:13,NAD83)
Easting: Northing:

CHANGE/EXPANSION OF USE OF AN EXISTING WELL

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
3) Approved pursuant to CRS 37-90-137(4) and the decree granted for the Owens Brothers Arapahoe Well no. 25769-F in case no. 87CW095 Division 1 Water Court. The operation of this well is subject to the terms and conditions of said decree.
4) Approved for the use of an existing well constructed under permit no. 25769-F.
5) The use of ground water from this well is limited to commercial and industrial use in a concrete production facility and sanitary facility for onsite staff.
6) The pumping rate of this well shall not exceed 120 GPM.
7) The average annual amount of ground water to be appropriated shall not exceed 50.32 acre-feet.
8) Production is limited to the Arapahoe aquifer.
9) The entire length of the hole shall be geophysically logged as required by Rule 9 of the Statewide Nontributary Ground Water Rules prior to installing casing.
10) The owner shall mark the well in a conspicuous place with well permit number(s), name of the aquifer, and court case number(s) as appropriate. The owner shall take necessary means and precautions to preserve these markings.
11) A totalizing flow meter must be installed on this well and maintained in good working order. Permanent records of all diversions must be maintained by the well owner (recorded at least annually) and submitted to the Division Engineer upon request.
12) This well shall be not more than 200 feet from the location specified on this permit.
13) This well shall be at least 600 feet from any existing well, completed in the same aquifer, that is not owned by the applicant.
14) Pursuant to CRS 37-90-137(9)(b) and the Denver Basin Rules, no more than 98% of the nontributary ground water withdrawn annually shall be consumed and the well owner shall demonstrate to the reasonable satisfaction of the State Engineer that no more than 98% of the water withdrawn will be consumed.
15) This well is subject to administration by the Division Engineer in accordance with applicable decrees, statutes, rules, and regulations.

NOTE: The ability of this well to withdraw its authorized amount of water from this non-renewable aquifer may be less than the 100 years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.

JMW 2/13/06

APPROVED
JMW

Hal D. Simpson
State Engineer

Joanna Williams
By

Receipt No. 0547626 DATE ISSUED 02-13-2006 EXPIRATION DATE N/A

Summary of Water Supply for Douglas County APM

- Brannan Sand & Gravel Company's water needs include industrial (for both its existing concrete facility and the proposed APM), sanitary, dust control, filling the fire suppression cisterns, and irrigation for the APM's landscaping to meet County standards.

- Brannan will pump non-tributary water from the Arapahoe aquifer as allowed through the already-permitted onsite well #63898-F. See Attachment A below.

- In Decree 2010CW261 (July 1, 2015), the District Court/Water Division No. 1 affirmed that the water from this well is available for "all beneficial purposes, including but not limited to commercial, industrial, municipal, and augmentation purposes" (emphasis added; water use subject to the annual pumping limit of 50.32 acre-feet and other decree requirements). See Attachment B below.

- The well is included within the boundaries of the Sedalia Water and Sanitation District ("District")—which has provided a commitment letter (Sept. 21.2023) to serve Brannan's water needs. See Attachment C below.

- In an email on April 3, 2024, Mary Kasal, District Engineer, confirmed that the District "has no problem with you [Brannan] using a portion of the allocated water for irrigation. Essentially, what you use the water for is up to you, it just can't exceed the usage values that have been determined." See Attachment D below.

- Brannan commits to keeping its water use at or below its legal maximum of 50.32 acre-feet per year.

ATTACHMENT A

Form No. GWS-25

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3581

EXST

WELL PERMIT NUMBER 63898 -F -
DIV. 1 WD 8 DES. BASIN MD

APPLICANT

READY MIXED CONCRETE CO
4395 WASHINGTON ST
DENVER, CO 80216-

(303) 292-1771

APPROVED WELL LOCATION
DOUGLAS COUNTY
SW 1/4 NW 1/4 Section 3
Township 7 S Range 68 W Sixth P.M.

DISTANCES FROM SECTION LINES
1400 Ft. from North Section Line
850 Ft. from West Section Line

UTM COORDINATES (Meters,Zone:13,NAD83)
Easting: Northing:

CHANGE/EXPANSION OF USE OF AN EXISTING WELL

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
3) Approved pursuant to CRS 37-90-137(4) and the decree granted for the Owens Brothers Arapahoe Well no. 25769-F in case no. 87CW095 Division 1 Water Court. The operation of this well is subject to the terms and conditions of said decree.
4) Approved for the use of an existing well constructed under permit no. 25769-F.
5) The use of ground water from this well is limited to commercial and industrial use in a concrete production facility and sanitary facility for onsite staff.
6) The pumping rate of this well shall not exceed 120 GPM.
7) The average annual amount of ground water to be appropriated shall not exceed 50.32 acre-feet.
8) Production is limited to the Arapahoe aquifer.
9) The entire length of the hole shall be geophysically logged as required by Rule 9 of the Statewide Nontributary Ground Water Rules prior to installing casing.
10) The owner shall mark the well in a conspicuous place with well permit number(s), name of the aquifer, and court case number(s) as appropriate. The owner shall take necessary means and precautions to preserve these markings.
11) A totalizing flow meter must be installed on this well and maintained in good working order. Permanent records of all diversions must be maintained by the well owner (recorded at least annually) and submitted to the Division Engineer upon request.
12) This well shall be not more than 200 feet from the location specified on this permit.
13) This well shall be at least 600 feet from any existing well, completed in the same aquifer, that is not owned by the applicant.
14) Pursuant to CRS 37-90-137(9)(b) and the Denver Basin Rules, no more than 98% of the nontributary ground water withdrawn annually shall be consumed and the well owner shall demonstrate to the reasonable satisfaction of the State Engineer that no more than 98% of the water withdrawn will be consumed.
15) This well is subject to administration by the Division Engineer in accordance with applicable decrees, statutes, rules, and regulations.

NOTE: The ability of this well to withdraw its authorized amount of water from this non-renewable aquifer may be less than the 100 years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.

JMW 2/13/06

APPROVED
JMW

Hal D. Simpson
State Engineer

Joanna Williams
By

Receipt No. 0547626 DATE ISSUED 02-13-2006 EXPIRATION DATE N/A

DATE FILED: July 1, 2015 7:31 AM
CASE NUMBER: 2010CW261

DISTRICT COURT, WATER DIVISION NO. 1, STATE OF COLORADO P.O. Box 2038 Greeley, Colorado 80632	▲ COURT USE ONLY ▲ Case Number: 2010CW261
CONCERNING THE APPLICATION FOR WATER RIGHTS OF SEDALIA WATER AND SANITATION DISTRICT IN DOUGLAS COUNTY.	

AMENDED FINDINGS OF FACT, CONCLUSIONS OF LAW, JUDGMENT AND DECREE OF THE COURT

The application in this case was filed on October 29, 2010 (hereinafter "Application"), with the Clerk of the Water Court, Water Division 1, and the Court having reviewed the pleadings and having received evidence regarding the Application, does hereby enter the following Findings of Fact, Conclusions of Law, Judgment and Decree of the Water Court. The Court has revised the language proposed by the Applicant in Paragraph 11(d) of this decree.

FINDINGS OF FACT

1. **The name, address, and telephone number of the Applicant are as follows**:

   Sedalia Water and Sanitation District
   c/o James A. Price, President
   P.O. Box 222
   Sedalia, Colorado 80135
   (303) 688-0341

2. **Notice and Jurisdiction**. The Application was published in the resume for Water Division No. 1 and in the appropriate newspaper in Douglas County in conformance with the requirements of Section 37-92-302(3), C.R.S. All notices required by law for the filing of this Application have been fulfilled and the Court has jurisdiction over the subject matter of this Application.

3. **Statements of Opposition**. The time for filing Statements of Opposition has expired. The following parties filed timely Statements of Opposition:

   a. Castle Pines Metropolitan District
   b. Castle Pines North Metropolitan District

c. Centennial Water and Sanitation District
d. Ready Mixed Concrete Company
e. State Engineer and Division Engineer for Water Division 1
f. Thunderbird Water and Sanitation District
g. Town of Castle Rock
h. United Water and Sanitation District

Thunderbird Water and Sanitation District withdrew its Statement of Opposition on December 27, 2012.

4. **Stipulations**. Stipulations between Applicant and the following Objectors were filed with the court:

   a. Castle Pines Metropolitan District dated February 24, 2013.
   b. Castle Pines North Metropolitan District dated February 6, 2013.
   c. Centennial Water and Sanitation District dated October 8, 2013.
   d. Ready Mixed Concrete Company dated May 26, 2013.
   e. State Engineer and Division Engineer for Water Division 1 dated November 7, 2013 (limited stipulation).
   f. Town of Castle Rock dated February 6, 2013.
   g. United Water and Sanitation District dated June 2, 2013.
   h. State Engineer and Division Engineer for Water Division 1 dated May 28, 2015 (full stipulation).

5. **Case proceedings**. The Water Court for Water Division No. 1 initially entered its Findings of Fact, Conclusions of Law, Judgment and Decree in this case on December 10, 2013. The Supreme Court affirmed the Water Court's judgment in part and reversed in part in *Wolf v. Sedalia Water and Sanitation Dist.*, 2015 CO 8, 14SA12, and remanded the case to the Water Court for further proceedings. After the Supreme Court issued its opinion, the General Assembly enacted Senate Bill 15-183, which was signed into law on May 4, 2015. The effect of SB 15-183 is discussed below in Paragraph 11.d.

6. **General Description of the Application**:

   a. Sedalia Water and Sanitation District (the "District") is a Water and Sanitation District organized under the laws of the State of Colorado. The District supplies water for irrigation, municipal, residential, commercial and industrial purposes. Water is supplied by the District, in part, through Sedalia Well Nos. 1 and 2, the water rights for which were confirmed in the Findings of Fact, Conclusions of Law, Ruling of the Referee, and Decree of the Court entered on October 24, 2001, in Case No. 93CW182, by the District Court in and for Water Division No. 1, State of Colorado ("93CW182 Decree"). Sedalia Well Nos. 1 and 2 divert from the alluvium of East Plum Creek. The out-of-priority depletions to East Plum Creek associated with the operation of Sedalia Well Nos. 1 and 2 are currently augmented pursuant to the plan of augmentation approved in the 93CW182 Decree. See Exhibits A-1 and A-2, General Location Maps. The current sources of replacement water approved for replacement of depletions pursuant to the 93CW182 Decree include Denver Basin ground water rights adjudicated to the District in Case No. 93CW181, by the District Court in and for Water Division No. 1, on October 12, 1995 ("93CW181 Decree"). The previously adjudicated Denver Basin ground water that is described in Paragraphs 7, 8, and 9 of this decree has been conveyed to the District by the owners of the overlying land in conjunction with the inclusion of land within the boundaries and service area of the District. In addition, the District obtained a decree dated May 13, 2013 in Case No. 2010CW260, an Application for Determination of Water Rights in the Denver Basin Aquifers, adjudicating the right to water in the Denver Basin Aquifers as described in said decree.

b. By this Application, the District seeks the following determinations: (1) to change the previously adjudicated Denver Basin ground water conveyed to the District so that the water associated with those water rights may be withdrawn by wells on various parcels of land as described below, and use the water within the District's water supply systems; (2) to change the previously changed Stephen Sump/Ball Ditch water rights now owned by the District, as described below, for use as a replacement source in the plan of augmentation approved in the 93CW182 Decree; and (3) judicial approval of the additional sources of water described herein as augmentation supplies for the Sedalia Well Nos. 1 and 2, and any additional alluvial wells constructed by the District and added to the 93CW182 augmentation plan that divert water tributary to Plum Creek and the South Platte River pursuant to the terms and conditions set forth in the 93CW182 Decree and this decree.

i. Applicant and Ready Mix Concrete Company entered into that certain real property inclusion agreement between Applicant and Ready Mix Concrete Company, dated September 26, 2006, and recorded in the real property records of Douglas County, Colorado, at Reception No. 2007004714, and that certain Amendment to Real Property Inclusion Agreement, dated September 29, 2008 and recorded in the real property records of Douglas County, Colorado, at Reception No. 2008066280 (collectively, the RMCC Inclusion Agreements). Pursuant to the RMCC Inclusion Agreements, the water rights described in Case No. 87CW94 and Case No. 87CW95, as well as the Stephen Sump No. 1/Ball Ditch water right, were conveyed to Applicant, subject to terms more particularly set forth therein. Nothing in this decree shall amend, supersede or waive any of the parties' respective rights and obligations under the RMCC Inclusion Agreements.

CHANGE OF DENVER BASIN WATER RIGHTS

7. **The Denver Basin Ground Water Rights Decreed in Case No. 87CW94.**

a. Decreed name of structure for which change is sought, type of structures: *See* Paragraph 7.b.iii, below.

b. From Previous Decree:

i. Date of Original Decree; Case No.; Court: The original decree for these water rights was entered on July 31, 1989, in Case No. 87CW94 by the District Court, Water Division No. 1, Colorado ("87CW94 Decree").

ii. Type of Water Right: Not nontributary Denver Aquifer ground water and nontributary Laramie-Fox Hills ground water.

iii. Legal Description of Decreed Points of Diversion:

a) Well OBDEN-1: Structure to be located in the NW1/4 of the NW1/4 of Section 3, Township 7 South, Range 68 West of the 6th P.M., Douglas County, Colorado, at a point approximately 1,200 feet from the North section line and 850 feet from the West section line of said Section 3.

b) Well OBLFH-1: Structure to be located in the SW1/4 of the NW1/4 of Section 3, Township 7 South, Range 68 West of the 6th P.M., Douglas County, Colorado, at a point approximately 1,600 feet from the North section line and 850 feet from the West section line of said Section 3.

c) Any well that is constructed pursuant to the 87CW94 Decree within 200 feet of the above described locations is deemed to have been drilled at the given location and does not require the approval of the Water Court or the State Engineer.

d) In addition to the wells described above, the 87CW94 Decree permits the construction of such additional wells as are required to recover the entire amount of Denver Basin ground water decreed therein. As such additional wells are planned, permit applications are to be filed with the State Engineer.

iv. Source and Amount of Water Previously Decreed:

Aquifer	Status	Acreage of Overlying Land	Saturated Thickness of the Aquifer(ft)	Specific Yield of the Aquifer	Allowed Average Annual Amount of Withdrawal (af)	Well Name
Denver	NNT *	80	185	0.17	25.16	Well OBDEN-1
Laramie-Fox Hills	NT**	80	170	0.15	20.4	Well OBLFH-1

*NNT stands for "not nontributary."

**NT stands for "nontributary."

v. Appropriation Date: Not applicable. Pursuant to Sections 37-90-102(2) and 37-92-305(11), C.R.S., the Denver Basin ground water rights adjudicated by the 87CW94 Decree were allocated based on ownership of the overlying land and are not subject to the doctrine of prior appropriation.

vi. Decreed Uses: Municipal, domestic, industrial, commercial, irrigation, recreation, fire protection, exchange, replacement, residential, livestock, agricultural, augmentation, and all other beneficial purposes. In addition, the owner of the ground water right is entitled to the right to recapture, the right of reuse and successive use, and after use the right to lease, sell, or otherwise dispose of such water. The ground water may be produced for immediate application to beneficial use and/or for storage and subsequent application to beneficial use. Use of the ground water for augmentation purposes cannot be made until a court approved plan for augmentation is obtained or the State Engineer has approved a substitute supply plan or exchange.

c. Historical Use: Pursuant to Sections 37-90-102(2) and 37-92-305(11), C.R.S., the Denver Basin ground water rights adjudicated by the 87CW94 Decree are not subject to the doctrine of prior appropriation and are not subject to historical use limitations.

d. Change of Water Right – Denver Aquifer: The District requests the right, pursuant to 2 CCR 402-7, Rules 11 and 14, to withdraw the total allowed annual amount of ground water available in the not nontributary Denver aquifer pursuant to the 87CW94 Decree from:

i. Well OBDEN-1 and any additional Denver aquifer wells located on the overlying land identified as "Applicant's Property" in Paragraph 4 of the 87CW94 Decree ("87CW94 Overlying Land");

ii. A well or wells constructed solely in the Denver aquifer located on any contiguous parcels for which the District has the decreed right to withdraw ground water in the not nontributary Denver aquifer underlying those contiguous parcels, provided each such parcel meets the definition of "Contiguous Parcel" at 2 CCR 402-7 Rule 4.A.6, and provided further that Applicant obtains a permit or permits from the State Engineer's Office allowing such withdrawal from the contiguous parcel(s); and

iii. A well or wells constructed solely in the Denver aquifer located on any non-contiguous parcels for which the District has the right to withdraw ground water in the not nontributary Denver aquifer underlying those non-contiguous parcels provided that the well or wells on the non-contiguous parcels are located so that the cylinder or cylinders of appropriation, as defined and determined pursuant to 2 CCR 402-7, Rule 4.A.7, for the well or wells overlap, at least in part, with the 87CW94 Overlying Land.

The approximate location of said 87CW94 Overlying Land and contiguous and non-contiguous parcels from which the not nontributary Denver aquifer water decreed in Case No. 87CW94 may be withdrawn, subject to the terms and conditions of this decree, are shown on Exhibit B. Exhibit B also shows cylinders of appropriation based on hypothetical well locations. Actual well locations and the cylinders of appropriation therefor will be determined pursuant to the terms and conditions of this decree, other applicable decrees, and applicable rules and regulations of the State Engineer including, but not necessarily limited to, 2 CCR 402-7, Rule 4.A.7. To the extent that more than one well is completed by the District to withdraw not nontributary ground water from the Denver Aquifer pursuant to the 87CW94 Decree in compliance with the terms and conditions of this decree, such wells shall comprise a well field pursuant to Rule 4.A.13 and Rule 14 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7. No water may be withdrawn from the not nontributary Denver aquifer until such time as the Court has approved a plan for augmentation pertaining to such water. The District shall obtain a proper permit from the State Engineer as a prerequisite to withdrawal of the total allowed annual amount of ground water available in the not nontributary Denver aquifer pursuant to the 87CW94 Decree from a well or wells identified herein.

e. Change of Water Right – Laramie Fox-Hills Aquifer: The District requests the right, pursuant to 2 CCR 402-7, Rules 11 and 14, to withdraw the total allowed annual amount of ground water available in the nontributary Laramie-Fox Hills aquifer pursuant to the 87CW94 Decree from:

   i. Well OBLFH-1 and any additional wells located on the 87CW94 Overlying Land;

   ii. A well or wells constructed solely in the Laramie-Fox Hills aquifer located on any contiguous parcels for which the District has the decreed right to withdraw ground water in the nontributary Laramie-Fox Hills aquifer underlying those contiguous parcels, provided that each such parcel meets the definition of "Contiguous Parcel" at 2 CCR 402-7 Rule 4.A.6, and provided further that Applicant obtains a permit or permits from the State Engineer's Office allowing such withdrawal from the contiguous parcel(s); and

   iii. A well or wells constructed solely in the Laramie-Fox Hills aquifer located on any non-contiguous parcels for which the District has the right to withdraw ground water in the nontributary Laramie-Fox Hills aquifer underlying those non-contiguous parcels provided that the well or wells on the non-contiguous parcels are located so that the cylinder or cylinders of appropriation, as defined and determined pursuant to 2 CCR 402-7, Rule 4.A.7, for the well or wells overlap, at least in part, with the 87CW94 Overlying Land.

The approximate location of said 87CW94 Overlying Land and contiguous and non-contiguous parcels from which the nontributary Laramie-Fox Hills aquifer water decreed in Case No. 87CW94 may be withdrawn, subject to the terms and conditions of this decree, are shown on Exhibit B. To the extent that more than one well is completed by the District to withdraw nontributary ground water from the Laramie-Fox Hills Aquifer pursuant to the 87CW94 Decree in compliance with the terms and conditions of this decree, such wells shall comprise a well field pursuant to Rule 4.A.13 and Rule 14 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7. The District shall obtain a proper permit from the State Engineer as a prerequisite to withdrawal of the total allowed annual amount ground water available in the nontributary Laramie-Fox Hills aquifer pursuant to the 87CW94 Decree from a well or wells identified herein.

8. **<u>The Denver Basin Ground Water Rights Decreed in Case No. 87CW95</u>.**

a. <u>Decreed name of structure for which change is sought; type of structure</u>: *See* Paragraph 8.b.iii, below.

b. <u>From Previous Decree</u>:

i. Date of Original Decree; Case No.; Court: The original decree for these water rights was entered on August 15, 1989, in Case No. 87CW95 by the District Court, Water Division No. 1, Colorado ("87CW95 Decree").

ii. Type of Water Right: Nontributary Arapahoe Aquifer ground water.

iii. Legal Description of Decreed Point of Diversion:

a) Owens Brothers Arapahoe Well AD-7609, Well Permit No. 63898-F. The well is located in the SW1/4 of the NW1/4 of Section 3, Township 7 South, Range 68 West of the 6th P.M., Douglas County, Colorado, at a point approximately 1,400 feet from the North section line and 850 feet from the West section line of said Section 3. Any well constructed within 200 feet of the location described above is considered to have been constructed at the decreed location and does not require court approval of an application for a change in point of diversion.

b) Pursuant to the 87CW95 Decree, if the District needs to construct such additional wells as are required to recover the entire amount of ground water that the District is entitled to as decreed therein, the District shall file permit applications with the State Engineer. The State Engineer shall issue a permit in accordance with Section 37-90-137(10), C.R.S., and the terms of the 87CW95 Decree. Without being required to reopen the 87CW95 Decree, the District shall be allowed to withdraw some or the entire average annual amount of withdrawal decreed in the 87CW95 Decree from any such additional wells.

iv. Source and Amount of Water Previously Decreed:

Aquifer	Status	Acreage of Overlying Land	Saturated Thickness of the Aquifer(ft)	Specific Yield of the Aquifer	Allowed Average Annual Amount of Withdrawal (af)	Well Name
Arapahoe	NT*	80	370	0.17	50.32	AD-7609**

*NT stands for "nontributary."

**This water right was used as a replacement source in the Plan for Augmentation decreed in Case No. 83CW364

v. Appropriation Date: Not applicable. Pursuant to Sections 37-90-102(2) and 37-92-305(11), C.R.S., the Denver Basin ground water rights that are the subject of this Application were allocated based on ownership of the overlying land and are not subject to the doctrine of prior appropriation. Therefore, the District need not include a date of initiation of the withdrawal project.

vi. Decreed Uses: All beneficial purposes, including but not limited to commercial, industrial, municipal, and augmentation purposes. The ground water may be produced for immediate application to beneficial use and/or for storage and subsequent application to beneficial use. In addition, the owner of the ground water right is entitled to the right to make any reuse, successive use, or disposition of the ground water free from any limitations, restrictions, or requirements as to the place of use, amount of discharge, or location of discharge after such reuse, successive use, or disposition, subject only to the requirement that no more than 98% of the water withdrawn annually shall be consumed.

c. Historical Use: Pursuant to Sections 37-90-102(2) and 37-92-305(11), C.R.S., the Denver Basin ground water rights adjudicated by the 87CW95 Decree are not subject to the doctrine of prior appropriation and are not subject to historical use limitations.

d. Change of Water Right – Arapahoe Aquifer: The District requests the right, pursuant to 2 CCR 402-7, Rules 11 and 14, to withdraw the total allowed annual amount of ground water available in the nontributary Arapahoe aquifer pursuant to the 87CW95 Decree from:

i. The Owens Brothers Arapahoe Well AD-7609 and any additional wells located on the overlying land identified in Paragraph 4 of the 87CW95 Decree ("87CW95 Overlying Land");

ii. A well or wells constructed solely in the Arapahoe aquifer located on any contiguous parcels for which the District has the decreed right to withdraw ground water in the nontributary Arapahoe aquifer underlying those contiguous parcels, provided that each such parcel meets the definition of "Contiguous Parcel" at 2 CCR 402-7 Rule 4.A.6, and provided further that Applicant obtains a permit or permits from the State Engineer's Office allowing such withdrawal from the contiguous parcel(s); and

iii. A well or wells constructed solely in the Arapahoe aquifer located on any non-contiguous parcels for which the District has the right to withdraw ground water in the nontributary Arapahoe aquifer underlying those non-contiguous parcels provided that the well or wells on the non-contiguous parcels are located so that the cylinder or cylinders of appropriation, as defined and determined pursuant to 2 CCR 402-7, Rule 4.A.7, for the well or wells overlap, at least in part, with the 87CW95 Overlying Land.

The approximate location of said 87CW95 Overlying Land and contiguous and non-contiguous parcels from which the nontributary Arapahoe aquifer water decreed in Case No. 87CW95 may be withdrawn, subject to the terms and conditions of this decree, are shown on Exhibit B. To the extent that more than one well is completed by the District to withdraw nontributary ground water from the Arapahoe Aquifer pursuant to the 87CW95 Decree in compliance with the terms and conditions of this decree, such wells shall comprise a well field pursuant to Rule 4.A.13 and Rule 14 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7. The District shall obtain a proper permit from the State Engineer as a prerequisite to withdrawal of the total allowed annual amount of ground water available in the nontributary Arapahoe aquifer pursuant to the 87CW95 Decree from a well or wells identified herein.

9. **The Denver Basin Ground Water Rights Decreed in Case Nos. 85CW322 and 94CW228.** Pursuant to a Special Warranty Deed, dated September 29, 2009, Sedalia Land Company, a Colorado Corporation, conveyed to the District a divided right, title and interest in and to fifty (50) acre-feet per year of ground water from the Denver Aquifer and fifty (50) acre-feet per year of ground water from the Arapahoe Aquifer, on or underlying certain real property, which are subject to the decrees adjudicated by the District Court, Water Division No. 1, State of Colorado, in Case No. 85CW322, entered

December 28, 1988 ("85CW322 Decree"), and Case No. 94CW228, entered June 30, 1995 ("94CW228 Decree").

a. Decreed name of structure for which change is sought; type of structure: *See* Paragraph 9.b.iii, below.

b. From Previous Decree:

i. Date of Original Decree; Case No.; Court:

a) The decree entered on December 28, 1988, in Case No. 85CW322 by the District Court, Water Division No. 1, Colorado.

b) The decree entered on June 30, 1995, in Case No. 94CW228 by the District Court, Water Division No. 1, Colorado.

ii. Type of Water Right: Not Nontributary Denver Aquifer ground water and Nontributary Arapahoe Aquifer ground water.

iii. Legal Description of Decreed Points of Diversion:

a) Decreed Points of Diversion in Case No. 85CW322.

1) Well DEN-1: To be located in the SE1/4 of the SE1/4 of Section 11, Township 7 South, Range 68 West of the 6th P.M., Douglas County, Colorado, at a point approximately 200 feet from the South section line and 1,250 feet from the East section line.

2) Well A-1: To be located in the SE1/4 of the SE1/4 of Section 11, Township 7 South, Range 68 West of the 6th P.M., 180 feet from the South section line and 1,250 feet from the east section line of said section 11 in Douglas County, Colorado.

3) Pursuant to the decree entered in Case No. 85CW322, the District may construct additional wells, as defined by the Statewide Nontributary Ground Water Rules, 2 CCR 402-7, as alternate points of diversion, to maintain water production levels and to recover the entire amount of Denver Basin ground water decreed therein. An additional well has been constructed as Well Permit No. 62607-F. In

considering applications for permits for additional wells to withdraw the subject ground water, the State Engineer is bound by the decree entered in Case No. 85CW322 and shall issue permits in accordance with the provisions of Section 37-90-137(10), C.R.S.

b) Decreed Points of Diversion in Case No. 94CW228.

1) Sedalia DEN-2: To be located in the SE1/4 of the NW1/4, Section 14, Township 7 South, Range 68 West, 6th P.M., approximately 1,800 feet from the west section line and 1,950 feet from the north section line of said Section 14.

2) Sedalia A-2: To be located in the SE1/4 of the NW1/4, Section 14, Township 7 South, Range 68 West, 6th P.M., approximately 1,800 feet from the west section line and 1,940 feet from the north section line of said Section 14.

3) Pursuant to the decree entered in Case No. 94CW228, the District may construct additional wells, as defined by the Statewide Nontributary Ground Water Rules, 2 CCR 402-7, as alternate points of diversion, to maintain water production levels and to recover the entire amount of Denver Basin ground water decreed therein. In considering applications for permits for additional wells to withdraw the subject ground water, the State Engineer is bound by the decree entered in Case No. 94CW228 and shall issue permits in accordance with the provisions of Section 37-90-137(10), C.R.S.

iv. Source and Amount of Water Previously Decreed:

a) Case No. 85CW322.

Aquifer	Status	Acreage of Overlying Land	Saturated Thickness of the Aquifer (ft)	Specific Yield of Aquifer	Estimated Total Amount (af)	Allowed Average Annual Amount of Withdrawal (af))	Well Name
Denver	NNT*	160	275	0.17	7480	74.8	Well DEN-1
Arapahoe	NT**	160	290	0.17	7888	78.88	Well A-1

*NNT stands for "not nontributary."

**NT stands for "nontributary."

b) Case No. 94CW228.

Aquifer	Status	Acreage of Overlying Land	Saturated Thickness of the Aquifer(ft)	Specific Yield of Aquifer	Estimated Total Amount (af)	Allowed Average Annual Amount of Withdrawal (af)	Well Name
Denver	NNT*	8.36	273	0.17	387.99	3.88	Sedalia DEN-2
Arapahoe	NT**	8.36	308	0.17	437.73	4.38	Sedalia A-2

*NNT stands for "not nontributary."
**NT stands for "nontributary."

v. Appropriation Date: Not applicable. Pursuant to Sections 37-90-102(2) and 37-92-305(11), C.R.S., the Denver Basin ground water rights adjudicated in Case Nos. 85CW322 and 94CW228 were allocated based on ownership of the overlying land and are not subject to the doctrine of prior appropriation.

vi. Decreed Uses:

a) Case No. 85CW322: All municipal purposes, including domestic, agricultural, industrial, commercial, irrigation, stock watering, recreation, fish and wildlife, and fire protection uses. Water may be produced for immediate application to beneficial use, for storage and subsequent application to beneficial use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, for relinquishment to the stream pursuant to C.R.S. § 37-90-137(9) and for all other augmentation purposes including the augmentation of not nontributary ground water diversion. Nontributary ground water produced from the Arapahoe aquifer is developed water with respect to any surface stream system or alluvial aquifer into which it might be introduced, and the rights approved and decreed pursuant to the decree in Case No. 85CW322 include the right of reuse, successive use and disposition by sale, exchange or otherwise, to extinction, of all such water, in accordance with Section 37-82-106(2), C.R.S.

b) Case No. 94CW228. All municipal purposes, including domestic, agricultural, industrial, commercial, irrigation, stock watering, recreation, fish and wildlife, and fire protection uses. Water may be produced for immediate application to beneficial use, for storage and subsequent application to beneficial use, for exchange purposes, for replacement of depletions resulting from the use of water from other sources, for relinquishment to the stream pursuant to C.R.S. § 37-90-137(9) and for all other augmentation purposes including augmentation of not nontributary ground water diversions. Nontributary ground water produced from the Arapahoe aquifer pursuant to the 94CW228 Decree is developed water with respect to any surface stream system or alluvial aquifer into which it might be introduced, and the rights approved and decreed in the 94CW228 Decree include the right of reuse, successive use and disposition by sale, exchange or otherwise, to extinction, all of such nontributary ground water in accordance with § 37-82-106(2), C.R.S., subject to the requirement that the owner shall relinquish the right to consume by such uses two percent (2%) of the amount of such ground water withdrawn.

c. Historical Use: Pursuant to Sections 37-90-102(2) and 37-92-305(11), C.R.S., the Denver Basin ground water rights adjudicated in Case Nos. 85CW322 and 94CW228 are not subject to the doctrine of prior appropriation and are not subject to historical use limitations.

d. Combined Allowed Average Amount of Withdrawal:

i. Pursuant to the 94CW228 Decree, the total allowed appropriation of the water rights decreed in the 85CW322 Decree and the 94CW228 Decree may be withdrawn through wells described in either case, and that all such wells comprise a well field pursuant to Rule 11.B of the Statewide Nontributary Ground Water Rules. Therefore the total estimated average amount of withdrawal from each well is as follows:

Wells	Aquifer	Allowed Average Annual Amount of Withdrawal (af)
Well DEN-1 and/or Sedalia DEN-2	Denver	78.7
Well A-1 and/or Sedalia A-2	Arapahoe	83.3

ii. Pursuant to the Statewide Nontributary Ground Water Rules, 2 CCR 402-7, Rule 8.A., and Paragraphs 11 and 13, respectively of the 85CW322 and 94CW228 Decrees, the "allowed annual amount of withdrawal" of the

Districts' Denver Basin ground water rights may exceed the "allowed average annual amount of withdrawal" as long as the total volume of water withdrawn from the wells does not exceed the product of the number of years since the date or dates of issuance of the well permit or permits or the date or dates of determination or determinations of right to ground water by the Water Court, whichever comes first, times the allowed average annual amount of withdrawal. "Allowed Annual Amount of Withdrawal" is defined in The Statewide Nontributary Ground Water Rules, Rule 4.1.2, as "the maximum amount of water in acre-feet that a permittee may withdraw from a well in a calendar year." The portion of the Denver Basin ground water rights conveyed to the District (50 acre-feet per year of adjudicated water from the Denver Aquifer of the 78.7 acre-feet per year as decreed in the 85CW322 and 94CW228 Decrees, and 50 acre-feet per year of adjudicated water from the Arapahoe Aquifer of the 83.3 acre-feet per year as decreed in the 85CW322 and 94CW228 Decrees) is the property of the District and therefore the District has the right to "bank" the Denver Basin ground water pursuant to Paragraphs 11 and 13, respectively, of the decrees entered in the 85CW322 and 94CW228 Decrees. The District intends to use the "banked" water and the additional annual allocations of Denver Basin ground water as a replacement source in the plan for augmentation decreed in the 93CW182 Decree or any other plans for augmentation operated by the District to the extent that it is available to the water rights decreed in the 85CW322 and 94CW228 Decrees. To implement this "banking" provision, the District shall account for the water decreed in the 85CW322 and 94CW228 Decrees that it does not own – in addition to the water decreed in 85CW322 and 94CW228 Decrees that the District does own – in order not to exceed the allowed annual amount of withdrawal associated with all the water decreed in the 85CW322 and 94CW228 Decrees.

e. Change of Water Right – Denver Aquifer: The District requests the right, pursuant to 2 CCR 402-7, Rules 11 and 14, to withdraw up to fifty (50) acre-feet of ground water per year from the not nontributary Denver aquifer, plus such amounts as have been "banked" as described above, pursuant to the 85CW322 and 94CW228 Decrees, from:

i. The wells decreed in the 85CW322 and 94CW228 Decrees and any additional wells located on the overlying land identified in Paragraph 6 of the 85CW322 Decree and Paragraph 3 of the 94CW228 Decree ("85CW322/94CW228 Overlying Land");

ii. A well or wells constructed solely in the Denver aquifer located on any contiguous parcels for which the District has the decreed right to withdraw ground water in the not nontributary Denver aquifer underlying those contiguous parcels, provided that each such parcel meets the definition of "Contiguous Parcel" at 2 CCR 402-7 Rule 4.A.6, and provided further that Applicant obtains a permit or permits from the State Engineer's Office allowing such withdrawal from the contiguous parcel(s); and

iii. A well or wells constructed solely in the Denver aquifer located on any non-contiguous parcels for which the District has the right to withdraw ground water in the not nontributary Denver aquifer underlying those non-contiguous parcels provided that the well or wells on the non-contiguous parcels are located so that the cylinder or cylinders of appropriation, as defined and determined pursuant to 2 CCR 402-7, Rule 4.A.7, for the well or wells overlap, at least in part, with the 85CW322/94CW228 Overlying Land.

The approximate location of said 85CW322/94CW228 Overlying Land and non-contiguous parcels from which the not nontributary Denver aquifer water decreed in the 85CW322 and 94CW228 Decrees may be withdrawn, subject to the terms and conditions of this decree, are shown on Exhibit B. To the extent that more than one well is completed by the District to withdraw not nontributary ground water from the Denver aquifer pursuant to the 85CW322 and 94CW228 Decrees in compliance with the terms and conditions of this decree, such wells shall comprise a well field pursuant to Rule 4.A.13 and Rule 14 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7. No water may be withdrawn from the not nontributary Denver aquifer until such time as the Court has approved a plan for augmentation pertaining to such water. The District shall obtain a proper permit from the State Engineer as a prerequisite to withdrawal of the total allowed annual amount of ground water available in the not nontributary Denver aquifer pursuant to the 85CW322 and 94CW228 Decrees from a well or wells identified herein.

f. <u>Change of Water Right – Arapahoe Aquifer</u>: Pursuant to 2 CCR 402-7, Rules 11 and 14, the District may withdraw up to fifty (50) acre-feet of ground water per year from the nontributary Arapahoe aquifer, plus such amounts as have been "banked" as described above, pursuant to the 85CW322 and 94CW228 Decrees from:

i. The wells decreed in the 85CW322 and 94CW228 Decrees and any additional wells located on the 85CW322/94CW228 Overlying Land;

ii. A well or wells constructed solely in the Arapahoe aquifer located on any contiguous parcels for which the District has the decreed right to withdraw ground water in the nontributary Arapahoe aquifer underlying those contiguous parcels, provided that each such parcel meets the definition of "Contiguous Parcel" at 2 CCR 402-7 Rule 4.A.6, and provided further that Applicant obtains a permit or permits from the State Engineer's Office allowing such withdrawal from the contiguous parcel(s); and

iii. A well or wells constructed solely in the Arapahoe aquifer located on any non-contiguous parcels for which the District has the right to withdraw ground water in the nontributary Arapahoe aquifer underlying those non-contiguous parcels provided that the well or wells on the non-contiguous parcels are located so that the cylinder or cylinders of appropriation, as defined and determined pursuant to 2 CCR 402-7, Rule 4.A.7, for the well or wells overlap, at least in part, with the 85CW322/94CW228 Overlying Land.

The approximate location of said 85CW322/94CW228 Overlying Land and non-contiguous parcels from which the nontributary Arapahoe aquifer water decreed in the 85CW322 and 94CW228 Decrees may be withdrawn, subject to the terms and conditions of this decree, are shown on Exhibit B. To the extent that more than one well is completed by the District to withdraw nontributary ground water from the Arapahoe aquifer pursuant to the 85CW322 and 94CW228 Decrees in compliance with the terms and conditions of this decree, such wells shall comprise a well field pursuant to Rule 4.A.13 and Rule 14 of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7. The District shall obtain a proper permit from the State Engineer as a prerequisite to withdrawal of the total allowed annual amount of ground water available in the nontributary Arapahoe aquifer pursuant to the 85CW322 and 94CW228 Decrees from a well or wells identified herein.

g. Withdrawal Through Existing Well Owned by the District: The District owns the well currently operating pursuant to Well Permit No. 77379-F (previously under Well Permit No. 64000-F) located in the NW1/4 of the NW1/4 of Section 14, Township 7 South, Range 68 West of the 6th P.M. ("District Arapahoe Well No. 2"). The District has the right to withdraw all water from the nontributary Arapahoe aquifer underlying 35.52 acres located in the NW1/4 of the NW1/4 of Section 14, the W1/2 of the SW1/4 of Section 11, and the E1/2 of the SE1/4 of Section 10, Township 7 South, Range 68 West of the 6th P.M., in Douglas County, Colorado ("Parcel C") upon which the District Arapahoe Well No. 2 is constructed, pursuant to the decree entered by the Water Court in and for Water Division No. 1 in Case No. 2010CW260, the approximate location of which is shown on Exhibit B. The Denver Basin ground water rights adjudicated in the 85CW322 and 94CW228 Decrees were allocated based on ownership of the overlying land which consists of 160 acres lying in the S1/2 of the SE1/4 of Section 11 and the N1/2 of the NE1/4 of Section 14, and 8.359 acres located in the W1/2 of Section 14, all in Township 7 South, Range 68 West of the 6th P.M., ("Sedalia Land Company Parcels"). The District Arapahoe Well No. 2 is located so that the calculated cylinder of appropriation for the District Arapahoe Well No. 2 overlaps, in all or in part, both of the Sedalia Land Company Parcels. Therefore, the District may withdraw through the District Arapahoe Well No. 2, and any replacement well or wells: (1) the allowed annual amount of withdrawal from the Arapahoe Aquifer underlying Parcel C plus any amounts banked pursuant to Rule 8.A of the Statewide Nontributary Ground Water Rules, 2 CCR 402-7, subject to the terms and conditions of the decree entered in Case No. 2010CW260, and (2) the fifty (50) acre-feet of ground water per year from the nontributary Arapahoe Aquifer, plus such amounts as have been "banked" as described above, pursuant to the 85CW322 and 94CW228 Decrees. Such additional water may be withdrawn by the District through the District Arapahoe Well No. 2 after filing of a well permit application and issuance of a well permit by the State Engineer in conformance with this decree.

10. **Terms and Conditions for the Change of Denver Basin Water Rights**

a. Well Permits. The State Engineer shall act upon an application for a well permit within 45 days of the date the District files the well permit application with the State Engineer. The State Engineer shall issue such well permits in accordance with the terms and conditions of this decree. In issuing well permits to wells under this decree, the State Engineer shall apply the Statewide Nontributary Ground Water Rules except to the extent that they conflict with this decree.

b. Notice of Location of Wells and Return Flows. As of the entry of this decree, wells have been constructed pursuant to Well Permit Nos. 77379-F, 63898-F and 62607-F. With respect to the future construction of wells, the District must notify the Division Engineer once any other wells withdrawing the Denver Basin Water Rights described above are constructed. Return flows will be provided by pumping the water into the District's water delivery system. The District may also directly release water withdrawn pursuant to such Denver Basin Water Rights to either East Plum Creek or Plum Creek, subject to the terms and conditions specified in Paragraph 14.b. Before the District implements such a discharge directly into the stream, the District must first notify the Division Engineer and Centennial Water and Sanitation District of the exact location where the water will be discharged to the stream.

c. Additional and Replacement Wells. The District may construct additional or replacement wells pursuant to C.R.S. §§37-90-103(13), 37-90-137(10), and successor or other relevant statutes, and the decrees entered in Case Nos. 87CW94, 87CW95, 85CW322 and 94CW228 in order to, *inter alia*, maintain levels of production, meet water demands, and recover the entire amount of recoverable ground water the District has a right to withdraw from the Arapahoe, Denver, and Laramie-Fox Hills Aquifers.

d. Denver Basin Rules. Pursuant to C.R.S. 37-90-137(9)(b) and the Denver Basin Rules, no more than 98% of the nontributary ground water withdrawn annually shall be consumed.

e. Accounting. The applicant maintains accounting for the withdrawal of nontributary ground water and diversion of water pursuant to the plan for augmentation described in the 93CW182 Decree. The accounting forms have been revised or will be revised to include the water rights described in this decree. The accounting forms are not included in this decree because they may be revised any time. Any revisions to the accounting forms shall be approved by the Division Engineer and copies of such proposed accounting forms shall be served on all objectors.

f. Flow Meters Required. A totalizing flow meter shall be installed on any well completed pursuant to this decree prior to withdrawing any not nontributary or nontributary Denver Basin ground water from the well. The District shall keep records of all withdrawals made through the well and submit such records to the State Engineer upon request. The District may submit such records in electronic format.

g. Geophysical Log Required. For each well completed pursuant to this decree, the entire length of the open bore hole shall be geophysically surveyed prior to casing and copies of the geophysical log submitted to the State Engineer. The District may provide a geophysical log from an adjacent well or test hole which fully penetrates the subject aquifer, pursuant to Rule 9 of the Statewide Nontributary Ground Water Rules.

h. Production Limited to Single Aquifer. For each well completed pursuant to this decree, ground water production shall be limited to a single aquifer. Plain, un-perforated casing shall be installed and properly grouted to prevent withdrawal from or intermingling of ground water from those aquifers other than those for which the well is intended.

i. Well Identification. Each well completed pursuant to this decree shall be permanently identified by its permit number, Case No. 10CW261, and the name of the producing aquifer on the above-ground portion of well casing or by a sign in a clearly visible location.

j. No Material Injury. If operated in accordance with the terms and conditions of this decree, the requested change of not nontributary and nontributary Denver Basin ground water rights will not result in material injury to water rights and rights to withdraw ground water.

k. No Other Changes. Other than the changes to the not nontributary and nontributary Denver Basin ground water rights expressly approved herein, the not nontributary and nontributary Denver Basin ground water rights adjudicated in the decrees entered in Case Nos. 87CW94, 87CW95, 85CW322, and 94CW228 are not affected by this decree and said decrees shall continue in full force and effect.

l. Approval of Requested Change of Denver Basin Ground Water Rights. The Court hereby approves the requested change of the subject not nontributary and nontributary Denver Basin ground water rights set forth above pursuant to the terms and conditions of this decree.

CHANGE OF SURFACE WATER RIGHT

11. **Change of 27.1 Percent of the Stephen Sump No. 1/Ball Ditch Water Right**. The District was conveyed 0.116 cfs, or 27.1 percent, of the Stephen Sump No. 1/Ball Ditch Water Right by Ready Mixed Concrete Company, a Colorado corporation. The portion of the Stephen Sump No. 1/Ball Ditch Water Right conveyed to the District was previously changed from irrigation to domestic, commercial, industrial, municipal, irrigation, augmentation, and exchange purposes for the benefit of a concrete batch plant operation in Case No. 83CW364. The District requests the right to change the fully consumable portion of the Stephen Sump No. 1/Ball Ditch Water Right for use as an additional source of replacement of depletions associated with the operation of the decree entered in Case No. 93CW182.

a. From previous decrees:

i. Date entered, Case No., and Court: The water right in the amount of 3.0 cfs for diversion out of West Plum Creek at the Ball Ditch, Priority No. 59, was originally decreed in the District Court of the Fourth Judicial District for the County of Douglas, with an appropriation date of April 19, 1872, and a decree date of December 10, 1883. The original point of diversion is described below. An alternate point of diversion at Stephen

Sump No. 1 for 0.4286 cfs of the Ball Ditch, Priority No. 59, water right, now owned in part by the District was decreed on November 3, 1976 in Case No. W-2127 by the Water Court in and for Water Division No. 1, State of Colorado, which authorized the diversion of the portion of the Ball Ditch, Priority No. 59 water right as described below. (Although the decree in Case No. W-2127 refers to Priority No. 50, the decree herein clarifies that the priority of the subject Ball Ditch water right is Priority No. 59). The point of diversion, type of use, and place of use of that portion of the Stephen Sump No.1/Ball Ditch water right now owned by the District was changed in Case No. 83CW364, by a decree entered December 3, 1986, by the District Court, in and for Water Division No. 1, State of Colorado ("83CW364 Decree").

ii. Decreed point of diversion: The original decreed point of diversion was the headgate of the Ball Ditch located on West Plum Creek in the NW 1/4 of the NW1/4 of Section 26, Township 8 South, Range 68 West of the 6th P.M., Douglas County, Colorado. The Stephen Sump No. 1 is an alternate point of diversion for 0.4286 cubic feet per second of time ("cfs") of the Ball Ditch, Priority No. 59, water right. The decreed alternate point of diversion at the Stephen Sump No. 1 is located 335 feet South and 75 feet West of the Northeast Corner of the NW 1/4 of the SW 1/4 of Section 23, Township 8 South, Range 68 West of the 6th P.M., Douglas County, Colorado. The point of diversion of the portion of the Stephen Sump No. 1/Ball Ditch water right, now owned by the District, was changed in the 83CW364 Decree, so that the water available to the portion of the Stephen Sump No. 1/Ball Ditch water right now owned by the District was left in West Plum Creek as a source of replacement water pursuant to a plan for augmentation decreed in that case.

iii. Source: The headgate for the Ball Ditch, priority No. 59, diverted water from West Plum Creek, a tributary to Plum Creek and the South Platte River. Pursuant to the decree entered on November 3, 1976 in Case No. W-2127 by the Water Court in and for Water Division No. 1, State of Colorado, 0.4286 cfs of the Ball Ditch, priority No. 59, water right was changed to allow diversion at the Stephen Sump No. 1, as an alternate point of diversion, the source for which is ground water from the alluvium of and tributary to West Plum Creek, a tributary to the South Platte River. In the 83CW364 Decree, 0.116 cfs, or 27.1 percent of the Stephen Sump No. 1/Ball Ditch water right was changed to include augmentation use, whereby 0.116 cfs of the water available to the Stephen Sump No.1/Ball Ditch water right decreed in Case No. W-2127 would be left in West Plum Creek as a source of replacement water pursuant to the augmentation plan decreed in that case, with the decreed source now being water from West Plum Creek, a tributary to Plum Creek and the South Platte River.

iv. Appropriation date: April 19, 1872.

v. Pursuant to the 83CW364 Decree, water attributable to 27.1 percent of the Stephen Sump No. 1/Ball Ditch water right was included as a replacement source for the out-of-priority depletions to Plum Creek from the Owens SP Well No. 1, located in the SW1/4 of the NW 1/4 of Section 3, Township 7 South, Range 68 West, of the 6th P.M., Douglas County, Colorado, at a point approximately 1,400 feet from the North section line and 650 feet from the West section line of said Section 3. Well Permit No. 31750-F was issued on May 18, 1987 for the Owens SP Well No. 1, pursuant to §37-90-137(2), C.R.S., the 83CW364 Decree and the decree entered by the District Court in and for Water Division No. 1 in Case No. 83CW365 on December 3, 1986. The expiration date for Well Permit No. 31750-FP was May 18, 1988. On April 21, 1993, Owens Brothers Concrete Company submitted evidence to the Colorado State Engineers Office that water from the well had not been placed to beneficial use prior to the well permit expiration date. By an Order of the State Engineer issued June 3, 1993, Well Permit No. 31750-F was determined to be expired and of no further force or effect. A well had been constructed pursuant to Well Permit No. 31750-F, but the tested well production was much lower than anticipated and no pump was installed. The structure was thereafter re-permitted as a monitoring well pursuant to Well Permit No. 170344, issued on June 3, 1993. There are no continuing depletions associated with this structure and Well Permit No. 31750-F is no longer in effect.

vi. The Stephen Sump No. 1 structure is not, as of the date of this decree, operable, and shall not be used to divert water under this decree. The District shall not rehabilitate the Stephen Sump No. 1 until and unless the District has obtained a well permit for the structure and obtained a substitute water supply plan approved pursuant to C.R.S. §37-92-308(4) or successor statutes, or a decreed plan for augmentation, to replace out of priority evaporation resulting from exposed ground water, and out of priority ground water withdrawals.

b. <u>Prior Quantification of Historical use</u>:

i. Water attributable to 27.1 percent of the Stephen Sump No. 1/Ball Ditch water right historically irrigated approximately 8.1 acres of land located in the NW1/4 of the SW1/4 of Section 23, Township 8 South, Range 68

West, of the 6th P.M., Douglas County, Colorado, the approximate location of which is show on Exhibit A-1. Pursuant to the 83CW364 Decree, the use of 27.1 percent of the Stephen Sump No. 1/Ball Ditch water right was changed from irrigation to domestic, commercial, industrial, municipal, irrigation, augmentation, and exchange purposes for the benefit of a concrete batch plant operation pursuant to the plan of augmentation adjudicated in the 83CW364 Decree. The average historical consumptive use attributable to 27.1 percent of the Stephen Sump No. 1/Ball Ditch water right was quantified in the 83CW364 Decree as 13.0 acre-feet per year.

ii. Paragraph 21(b) of the 83CW364 Decree specifically limits the availability of replacement water attributable to the 27.1 percent of the Stephen Sump No. 1/Ball Ditch water right during the period when the flow in Plum Creek at the Louviers stream gauge (now known as the Plum Creek at Titan Road near Louviers, CO gage) is less than 4.0 cfs and the Mission Viejo Company (or its successor and assigns) is entitled to divert and is diverting on its Lower Plum Creek Ditch priority pursuant to the decree entered on April 17, 1980 in Case No. W-6072, Water Division No. 1, Colorado. The Louviers stream gauge is located in the SE1/4 of Section 33, Township 6 South, Range 68 West of the 6th P.M., Douglas County, Colorado at point approximately 2,800 feet from the north section line and 900 feet from the east section line of said Section 33 ("Louviers stream gauge"). The foregoing limitation specified in the 83CW364 Decree is expressly incorporated herein as a term and condition for the change of use of the District's 27.1 percent interest in the Stephen Sump No. 1/Ball Ditch water right and is specified below.

iii. The maximum monthly augmentation credits available to the 27.1 percent of the Stephen Sump No. 1/Ball Ditch water right for the replacement of out-of-priority stream depletions, are as shown in the following table. The District shall only be entitled to that portion of such augmentation credits as is determined to be available pursuant to the terms and conditions of this decree. Such portion is referred to herein as "Replacement Water Credits."

Month	**Replacement Water Credits**
April	0.5 acre-feet
May	1.1 acre-feet
June	2.1 acre-feet

July	2.1 acre-feet
August	1.5 acre-feet
September	1.5 acre-feet
October	1.1 acre-feet
November	1.1 acre-feet
December	0.7 acre-feet
January	0.7 acre-feet
February	0.6 acre feet

c. Change of Water Right: The District requests the right to change the decreed location of use of the 27.1 percent of the Stephen Sump No. 1/Ball Ditch Water Right. The District will use the Replacement Water Credits for the replacement of out-of-priority depletions to East Plum Creek and Plum Creek from withdrawals of water through Sedalia Well Nos. 1 and 2, and any replacement wells, pursuant to the plan for augmentation decreed in Case No. 93CW182, and from any additional wells lawfully added to the plan for augmentation decreed in Case No. 93CW182. The District also seeks the right to use Replacement Water Credits in any future plans for augmentation seeking to replace out-of-priority depletions to Plum Creek from alluvial wells owned or operated by the District, provided the Replacement Water Credits are properly included as a replacement source in the decrees for those augmentation plans or in an approved substitute water supply plan pursuant to Section 37-92-308(4), C.R.S.

d. Senate Bill 15-183. SB 15-183 revises C.R.S. § 37-92-305(3) to state that "If an application is for a change of that portion of a water right for which a previous change of water right has been judicially approved and for which the historical consumptive use was previously quantified, the water judge shall not reconsider or requantify the historical consumptive use," which provision "applies to applications pending before the water judges or referees or filed on or after the effective date of this act." 2015 Colo. Sess. Laws 469-70. As discussed above, the historical consumptive use of the Stephen Sump No. 1/Ball Ditch Water Right was previously changed, and its historical consumptive use previously quantified, in Case No. 83CW364. The application in this case was pending before the water judge on May 4, 2015, the effective date of SB 15-183. The ruling entered in the present case regarding the effect of SB 15-183 is unopposed by the parties in this action, as reflected in the Applicant's unopposed motion for entry of summary judgment; however, the Court recognizes the provisions of SB 15-183 affects many cases pending in Water Division One and by entering this decree the Court is not establishing legal precedent for use in any other Division One water case.

e. Terms and Conditions for Approval of the Change of Water Right.

i. No Replacement Water Credits shall be available to the District during those periods of the irrigation season (April 1 through October 31) when the flow in Plum Creek at the Louviers stream gauge is less than 4.0 cfs., and Centennial Water and Sanitation District (or its successors or assigns) is entitled to divert and is diverting on its Lower Plum Creek Ditch priority pursuant to the decree entered on April 17, 1980 in Case No. W-6072, Water Division No. 1, Colorado.

ii. The District's 27.1 percent interest in the Stephen Sump No. 1/Ball Ditch Water Right shall be left in West Plum Creek to generate replacement water credits. It shall not be diverted through the Ball Ditch original point of diversion or the Stephen Sump No. 1 alternate point of diversion decreed in Case No. W-2127 unless a subsequent water court case is filed to allow such diversion.

iii. The acreage historically irrigated by District's 27.1 percent interest in the Stephen Sump No. 1/Ball Ditch Water Right, as depicted in Exhibit A-1, has been dried-up. Upon entry of this decree, the Division Engineer shall confirm the lands removed from irrigation have been dried up. The District shall not resume irrigation of those lands.

iv. The District's 27.1 percent interest in the Stephen Sump No. 1/Ball Ditch Water Right shall be administered at (1) the USGS Glen Grove Gage (also known as the West Plum Creek near Perry Park, CO gage, USGS Station ID number 06708600), located in the NE1/4 of the NW1/4 of Section 24, Township 9 South, Range 68 West of the 6th P.M., or (2) a gage installed by the District at the Ball Ditch headgate location decreed in Case No. W-2127, located in the NW1/4 of the NW1/4 of Section 26, Township 8 South, Range 68 West of the 6th P.M. ("Ball Ditch gage"). The Ball Ditch gage has not been constructed as of the date of this decree. This decree does not obligate the District to construct the Ball Ditch gage. References in this sub-paragraph to the "subject gage" mean either the USGS Glen Grove Gage or the Ball Ditch gage, whichever one is actually being used to administer the District's 27.1 percent interest in the Stephen Sump No. 1/Ball Ditch Water Right. The District shall measure the stream flow at the subject gage daily and shall be entitled to Replacement Water Credits when water is legally and physically available to the Ball Ditch water right (Priority No. 59, appropriation date of April 19, 1872) at the subject gage. Based on its percentage ownership of the total Ball Ditch water right

(0.116 cfs divided by 3.0 cfs, or 3.9 percent), the District shall be limited to its pro-rata portion of the water legally and physically available to the Ball Ditch water right at the subject gage which shall not exceed 0.116 cfs. In determining water availability for the District's Replacement Water Credits at the subject gage, the District shall not be entitled to water, including bypass flows, measured at the USGS Glen Grove gage that is allocated to water rights that are senior to the Ball Ditch water right and that are lawfully using or calling for water. Nothing in this decree shall be construed to affect the "West Plum Creek Administration Procedure" decreed in Case Nos. 87CW309, 89CW225, and 09CW166. To the extent that Replacement Water Credits are available to the District on a given day, the available amount of Replacement Water Credits for that day shall not exceed the maximum amount of Replacement Water Credits for the particular month (as shown in the table in section 11.b.iii above) divided by the number of days in that month.

v. The District shall only claim Replacement Water Credits from the Stephen Sump No. 1/Ball Ditch Water Right when there is a continuous live stream between the historical head gate of the Ball Ditch, the location of which is described (as the originally decreed point of diversion) in Paragraph 11.a.ii above, down West Plum Creek to the confluence with East Plum Creek and when such water can be transported in the stream to said confluence.

f. The District's 27.1 percent of the Stephen Sump No.1/Ball Ditch Water Right and the Replacement Water Credits attributable thereto shall not be used as a source of replacement water in the plan for augmentation decreed in Case No. 83CW364.

APPROVAL OF ADDITIONAL SOURCES OF REPLACEMENT WATER IN PLAN FOR AUGMENTATION

12. **<u>Structures to be Augmented</u>**: All structures augmented pursuant to the terms of the Findings of Fact, Conclusions of Law, Ruling of the Referee, and Decree of the Court entered by the District Court in and for Water Division No. 1 on November 16, 2001 in Case No. 93CW182 ("93CW182 Decree") are proposed to be augmented with the additional sources of replacement water described in this decree. Pursuant to the 93CW182 Decree, the out-of-priority depletions of these structures are currently augmented and will continue to be augmented with fully consumable Denver Basin ground water decreed to the District in Case No. 93CW181, by the District Court in and for Water Division No. 1, on October 12, 1995 and other sources identified in the 93CW182 Decree. The current structures used by the District include the following:

a. Name of Structure: Sedalia Well No. 1

i. Date of Original Decree and all relevant subsequent decrees; Case No.; Court. Findings of Fact, Conclusions of Law, Ruling of the Referee, and Decree of the Court entered on October 24, 2001, in Case No. 93CW182, by the District Court in and for Water Division No. 1, State of Colorado.

ii. Type of water right: Underground water right.

iii. Legal description of structure: The Southeast Quarter (SE1/4) of the Southwest Quarter (SW1/4) of Section 13, Township 7 North, Range 68 West of the 6th P.M., Douglas County, Colorado at a point 600 feet from the South section line and 2000 feet from the West section line of Section 13.

iv. Decreed source: The alluvium of East Plum Creek.

v. Appropriation date: August 31, 1888.

vi. Total amount decreed to structure: 150 gallons per minute.

vii. Decreed use or uses: Municipal, domestic, industrial, commercial, irrigation, and livestock purposes within the District. Water is used for immediate application to beneficial uses; for storage and subsequent application to beneficial uses; for substitution and exchange; and for replacement of depletions.

b. Name of Structure: Sedalia Well No. 2

i. Date of Original Decree and all relevant subsequent decrees; Case No.; Court. Findings of Fact, Conclusions of Law, Ruling of the Referee, and Decree of the Court entered on October 24, 2001, in Case No. 93CW182, by the District Court in and for Water Division No. 1, State of Colorado.

ii. Type of water right: Underground water right.

iii. Legal description of structure: The Southeast Quarter (SE1/4) of the Southwest Quarter (SW1/4) of Section 13, Township 7 South, Range 68 West of the 6th P.M., Douglas County, Colorado at a point 200 feet from the South section line and 1600 feet from the West section line of said Section 13.

iv. Decreed source: The alluvium of East Plum Creek.

v. Appropriation date: July 1, 1991.

vi. Total amount decreed to structure: 126 gallons per minute.

vii. Decreed use or uses: Municipal, domestic, industrial, commercial, irrigation, and livestock purposes within the District. Water is used for immediate application to beneficial uses; for storage and subsequent application to beneficial uses; for substitution and exchange; and for replacement of depletions.

c. The additional sources of replacement water described in Paragraph 13 below and approved herein will also replace the depletions associated with any replacement well, as defined by Section 37-90-103(13), C.R.S., and constructed in connection with any of the wells augmented pursuant to the 93CW182 Decree.

13. **Additional Water Rights to be Used for Augmentation**: In addition to the sources of replacement water described in the 93CW182 Decree, the District proposes to augment out-of-priority depletions to East Plum Creek and Plum Creek occurring as a result of withdrawals of water through Sedalia Well Nos. 1 and 2, or any additional wells lawfully added to the plan of augmentation decreed in Case No. 93CW182, with the fully consumable water from the following water rights:

a. New Denver Basin Water Rights. The water rights to be used for augmentation include the following water rights decreed in Case No. 2010CW260 ("New Denver Basin Water Rights"):

i. Denver Aquifer not nontributary ground water: Approximately 26.7 acre-feet per year.

ii. Arapahoe Aquifer nontributary ground water: Approximately 31 acre-feet per year.

iii. Laramie-Fox Hills Aquifer nontributary ground water: Approximately 19.6 acre-feet per year.

iv. The precise quantity of water available from each aquifer will be determined pursuant to the decree in Case No. 10CW260. The Decree in Case No. 10CW260 allows use of the Denver Basin ground water adjudicated therein for the following uses: municipal, domestic, commercial, industrial, irrigation, stock watering, recreation, fish and wildlife uses, augmentation, replacement, and exchange, including reuse and successive uses until such water has been entirely consumed. The water may be used though immediate application to beneficial uses, for storage and subsequent application to beneficial uses, for exchange purposes, for replacement of depletions and for augmentation purposes.

b. The Denver Basin ground water rights decreed in Case No. 87CW94, described in Paragraph 7 of this decree.

c. The Denver Basin ground water rights decreed in Case No. 87CW95, described in Paragraph 8 of this decree.

d. The Denver Basin ground water rights decreed in Case Nos. 85CW322 and 94CW228, described in Paragraph 9 of this decree.

e. Stephen Sump No. 1/Ball Ditch (27.1 percent, or 0.116 cfs) water right, described in Paragraph 11 of this decree.

f. The District shall continue to claim as augmentation sources septic return flows that originate within the District's boundaries as identified in the 93CW182 decree, the approximate location of which is shown on Exhibit A-2. The District may also use as augmentation sources return flows that originate within the Stoltz, Bains, Mitchell or Murphy properties, the approximate locations of which are shown on Exhibit A-2, provided that such return flows are calculated pursuant to the augmentation plan decreed in Case No. 93CW182 and are accounted for in compliance with said decree and this decree. With regard to other inclusions into the District's boundaries, the District shall not rely on septic return flows from such included lands as a source of substitute supply for this plan for augmentation without first obtaining water court approval after proper notice. The four parcels named above and depicted on Exhibit A-2 are described in more detail in the following documents:

   i. The Stoltz property is described in the Real Property Inclusion Agreement, recorded November 2, 2007 at the Douglas County Clerk and Recorder's Office, Recording #2007085746. A copy of the legal description of the Stoltz property from the Real Property Inclusion Agreement is attached hereto as Exhibit C.

   ii. The Bains property is described in the Real Property Inclusion Agreement, recorded November 2, 2007 at the Douglas County Clerk and Recorder's Office, Recording #2007085743. A copy of the legal description of the

Bains property from the Real Property Inclusion Agreement is attached hereto as Exhibit D.

iii. The Mitchell property is described in the Real Property Inclusion Agreement, recorded November 2, 2007 at the Douglas County Clerk and Recorder's Office, Recording #2007085744. A copy of the legal description of the Mitchell property from the Real Property Inclusion Agreement is attached hereto as Exhibit E.

iv. The Murphy property is described in the Real Property Inclusion Agreement, recorded November 2, 2007 at the Douglas County Clerk and Recorder's Office, Recording #2007085745. A copy of the legal description of the Murphy property from the Real Property Inclusion Agreement is attached hereto as Exhibit F.

14. **The District's Use of Additional Water Sources Under Existing Plan of Augmentation**: The additional replacement sources described in Paragraph 13 of this decree will be utilized pursuant to the 93CW182 Decree and pursuant to the terms and conditions of this decree. However, the District has not claimed an appropriative right of exchange with respect to such additional replacement sources and they will not be subject to the exchange described in Paragraph 12 of the 93CW182 Decree. The Denver Basin ground water rights decreed in Case No. 93CW181, by the District Court in and for Water Division No. 1, on October 12, 1995, shall continue to be used to replace the out-of-priority depletions of the Sedalia Well Nos. 1 and 2 pursuant to the terms of the 93CW182 Decree. The District shall continue the operation of its plan of augmentation on the same terms and conditions adjudicated in the 93CW182 Decree, subject further to the terms and conditions in this decree.

a. Out-of-priority depletions to the alluvial aquifer of East Plum Creek and Plum Creek from Sedalia Well Nos. 1 and 2, and any additional wells lawfully added to the plan for augmentation approved by the 93CW182 Decree, will be replaced with the following sources: (1) return flows from diversions by the Sedalia Well Nos. 1 and 2, and any additional wells lawfully added to the 93CW182 plan of augmentation, from the alluvium of East Plum Creek; (2) the Denver Basin ground water rights decreed in Case No. 93CW181; (3) the New Denver Basin Water Rights; (4) the portion of the Denver Basin ground water rights decreed in Case Nos. 85CW322 and 94CW228 that are owned by the District and described in Paragraph 9 of this decree; (5) the Denver Basin ground water rights decreed in Case No. 87CW94 described in Paragraph 7 of this decree; (6) the Denver Basin ground water rights decreed in Case No. 87CW95 described in Paragraph 8 of this decree (the foregoing water rights listed in this sub-paragraph 14.a., items (2) through (6) are collectively referred to as the "Denver Basin Augmentation Sources"); and (7) the changed Stephen Sump No. 1/Ball Ditch water right described in Paragraph 11 of this decree.

b. Replacement of out-of-priority depletions to the alluvial aquifer of East Plum Creek and Plum Creek from Sedalia Well Nos. 1 and 2 through return flows shall be pursuant to the terms and conditions of the 93CW182 Decree. Water diverted under the Denver Basin Augmentation Sources will be either (1) provided as return flows by pumping the water into Sedalia Water and Sanitation District's water delivery system, for which the furthest most downstream point of delivery is the NW1/4 of Section 23, Township 7 South, Range 68 West of the 6th P.M., or (2) directly released to either East Plum Creek or Plum Creek at locations adjacent to the wells to be constructed on parcels identified in Exhibit B, subject to the terms and conditions in Paragraph 14.e and the following sentence. To the extent that there are senior water rights calling upstream from such points of direct release adjacent to the well locations identified in Exhibit B, the District will not utilize those points of direct release to replace out-of-priority stream depletions in order to ensure that all replacements are made upstream from senior calling water rights. The amount of water from the Denver Basin Augmentation Sources necessary to replace the out-of-priority depletions of the Sedalia Well Nos. 1 and 2, and any additional wells lawfully added to the 93CW182 augmentation plan, shall be determined according to the methodologies provided in the terms and conditions of the 93CW182 Decree for both fully consumable not nontributary and nontributary water from the Denver Basin Aquifers.

c. The augmented structures identified in Paragraph 12 above shall not divert or withdraw water turned into and carried in the natural stream under the dominion and control of any person or entity other than the Applicant (the "Carried Water"), except to the extent the replacement supply is delivered to the stream above the United Water and Sanitation District's surface point of diversion located in Section 15, Township 7 South, Range 68 West of the 6th P.M. The replacement supply provided to augment withdrawal of Carried Water must be of a quality to meet the requirements for which Carried Water will be used, but of no better quality than would have been realized through stream conveyance of the Carried Water.

d. The District's use of Replacement Water Credits attributable to its 27.1 percent interest in the Stephen Sump No. 1/Ball Ditch Water Right to replace the out-of-priority depletions of the Sedalia Well Nos. 1 and 2 shall be in compliance with the terms of the 93CW182 Decree and shall also comply with all terms and conditions of this decree, including but not limited to, Paragraphs 11.c and 11.e. The District shall bear such transit losses as may be reasonably and lawfully assessed by the Division Engineer for the carriage of the District's Replacement Water Credits from the Ball Ditch headgate, the location of which is described (as the originally decreed point of diversion) in Paragraph 11.a.ii above, down West Plum Creek to the confluence with East Plum Creek.

e.

i. At any time that:

a) the holder of a decreed exchange appropriated prior to October 29, 2010 is exchanging or would exchange water up East Plum Creek or West Plum Creek either:

1) from a point located at or below Louviers stream gauge on Plum Creek to a point upstream of the west section line of Section 23, Township 7 South, Range 68 West of the 6th P.M. or to the East Plum Creek / West Plum Creek confluence; or

2) from the East Plum Creek / West Plum Creek confluence to a point on West Plum Creek or to a point on East Plum Creek; and

b) the reach between the Sedalia Wells and the west section line of Section 23, Township 7 South, Range 68 West of the 6th P.M. is limiting the exchange potential available to such exchange; or

c) the reach between Sedalia Wells and the East Plum Creek / West Plum Creek confluence is reducing the amount of the substituted supply available for such exchange,

then the District will not rely on the additional replacement sources described in Paragraph 13 herein except to the extent such sources accrete to the stream in the form of fully consumable septic return flows from within the District's boundaries, or are introduced to the stream at or above the point at which the Sedalia Wells' depletions accrue to the stream.

ii. In addition, to the extent the Denver Basin ground water rights described in Paragraph 13 of this decree are pumped directly to Plum Creek or East Plum Creek to make augmentation replacements under this plan and the conditions described in subsection a), b) or c) of Paragraph 14.e.i. exist, the furthest downstream point of delivery of the water shall be Plum Creek in the Northwest Quarter of Section 23, Township 7 South, Range 68 West of the 6th P.M.

iii. At times when the conditions described in subsection a), b) or c) of Paragraph 14.e.i. do not exist, the Denver Basin ground water rights described in Paragraph 13 of this decree may be delivered to any location upstream of the Louviers gauge for replacement of depletions. The Louviers gauge is located in the SE1/4 of Section 33, Township 6 South, Range 68 West of the 6th P.M., Douglas County, Colorado at a point approximately 2,800 feet from the north section line and 900 feet from the east section line of said Section 33. In the event that the location of the Louviers stream gauge is modified, the new location will be applicable so long as such new location is within one mile of the current location of the gauge.

f. Accounting for Use of Additional Replacement Sources. At a minimum, the following additional information shall be included and integrated into the District's accounting for the plan for augmentation approved in the 93CW182 Decree:

i. The amount of Denver Basin ground water from the sources described in Paragraphs 13.a, 13.b, 13.c, and 13.d of this decree delivered into the District's water delivery system.

ii. The amount of return flows attributable to the delivery of the Denver Basin ground water from the sources described in Paragraphs 13.a, 13.b, 13.c, and 13.d of this decree in to the District's supply system, as calculated pursuant to the terms and conditions of the 93CW182 Decree.

iii. The amount of Denver Basin ground water from the sources described in Paragraphs 13.a, 13.b, 13.c, and 13.d of this decree delivered directly to Plum Creek and East Plum Creek for replacement of depletions and the location of such deliveries.

iv. The average measured daily flow at the Louviers stream gauge.

v. Whether Centennial Water and Sanitation District (or its successors and assigns) is diverting pursuant to its Lower Plum Creek Ditch priority pursuant to the decree entered on April 17, 1980 in Case No. W-6072, Water Division No. 1, Colorado.

vi. The daily Replacement Water Credit available to the District's Stephen Sump No. 1/Ball Ditch Water Right pursuant to Paragraph 11 above and the amount of such credits allocated to replacement of out-of-priority depletions under the plan for augmentation approved in the 93CW182 Decree.

vii. The average measured daily flow at the stream gauge identified in Paragraph No. 11.e.i for the first day of April through the last day of February.

viii. Until such time as the Court has entered a plan for augmentation specifying the terms and conditions for replacement of depletions associated with withdrawal of not non-tributary groundwater, no not non-tributary groundwater shall be used as a replacement source pursuant to this decree.

ix. The accounting provisions shall include daily calculation and replacement of out-of-priority East Plum Creek well depletions resulting from withdrawal and use of water from Sedalia Well Nos. 1 and 2.

x. Daily well meter readings for wells withdrawing the Denver Basin Ground Water Rights changed pursuant to this decree, wells withdrawing the Denver Basin Ground Water Rights pursuant to the decree entered in Case No. 10CW260 in Water Division No. 1, and the Sedalia Well Nos. 1 and 2.

xi. When applicable, the Applicant shall bear such transit losses as may be reasonably and lawfully assessed by the Division Engineer for the carriage of water through stream reaches in the same manner as used for other water users. Transit losses are subject to modification as determined by the Division Engineer.

g. Pursuant to C.R.S. §37-92-305(5), the augmentation sources provided hereunder shall be of a quality and quantity so as to meet the requirements for which the water of the senior appropriator has normally been used, and such substituted water shall be accepted by the senior appropriator in substitution for water derived by the exercise of his decreed rights.

15. **Change in Wastewater Treatment Methodology**: In the event of a change from septic treatment of wastewater to a different methodology for treatment and delivery of return flows to Plum Creek, the District will submit an application to amend its plan for augmentation in Case No. 93CW182 setting forth a revised methodology for determining the amount, timing, and location of return flows to be utilized for the replacement of depletions in the District's plan for augmentation. The application shall be filed as soon as practicable in advance of the beginning of any such changes.

CONCLUSIONS OF LAW

16. **Incorporation.** To the extent that any of the Findings of Fact constitute Conclusions of Law, the Findings of Fact are incorporated herein.

17. **Jurisdiction.** The Court has jurisdiction over this Application and over all parties.

18. **Accordance with Law.** This Application is in accordance with law and should be granted, subject to the terms and conditions contained within this decree.

DECREE OF THE COURT

19. **Incorporation.** The foregoing Findings of Fact and Conclusions of Law are incorporated herein by this reference.

20. **Approval of Changes of Water Right.** The changes of water rights set forth herein are in accordance with law and are hereby granted subject to the terms of this decree.

21. **Approval of Additional Sources of Replacement Water in Plan for Augmentation.** The addition of additional replacement sources to the plan for augmentation approved in the 93CW182 Decree, as set forth herein, is in accordance with law and is hereby granted subject to the terms of this decree.

22. **Use of Structures.** Nothing in this decree shall be construed to create or enlarge any right of the District to utilize land or structures owned by parties other than the District.

23. **No Injury.** The terms and conditions provided for in this decree are adequate to assure that no injury to any water users will result from either the operation of the changes of water rights approved herein, or from the approval of use of the additional sources of replacement water described herein in the plan for augmentation approved in the 93CW182 Decree.

24. **Accounting**. The District shall revise its accounting for the plan for augmentation approved in the 93CW182 Decree to incorporate the additional replacement sources described in Paragraph 13 of this decree, consistent with the terms and conditions of this decree and the 93CW182 Decree. The District shall revise its accounting for the plan for augmentation approved in Paragraph 28.C. of the 93CW182 Decree to provide that depletions to East Plum Creek will be accounted for on a daily basis, consistent with the terms and conditions of this decree and the 93CW182 Decree. Accounting for the use of the additional replacement sources described in Paragraph 13 of this decree in the manner described in Paragraph 14 of this decree shall be on accounting forms acceptable to the Division Engineer. These forms shall also contain the information required by the 93CW182 Decree and shall be submitted on a monthly basis within thirty (30) days of the end of the preceding month to the Division Engineer and Water Commissioner. The monthly accounting shall also be provided to any Objector making a written request for such accounting, upon payment of reasonable copying costs. The accounting shall be delivered to the Division Engineer and Water Commissioner in the manner prescribed in the 93CW182 Decree and shall be delivered to Objectors in the same format. The accounting forms are not decreed herein and may be changed from time to time so long as the information required by this decree and the 93CW182 Decree is included in the forms and such changes are approved by the Division Engineer. Copies of any revised forms shall be provided to Objectors. The District shall provide copies of the proposed accounting forms consistent with this decree as well as supporting documentation to the Objectors and the Division Engineer within thirty (30) days of entry of this decree. Any Objector may submit comments concerning the proposed accounting forms to the Division Engineer within forty-five (45) days of entry of this decree. The Division Engineer shall notify the District in writing of any comments and/or perceived problems with the accounting forms within sixty (60) days of the entry of this decree so that the District has sufficient time to correct and resubmit the accounting forms to the Division Engineer. The District's use the additional replacement sources described in Paragraph 13 of this decree pursuant to the terms and conditions of this decree shall not be required to cease due to the failure of the Division Engineer to review and approve the accounting forms in a timely manner.

25. **Retained Jurisdiction**. Pursuant to the provisions contained in C.R.S. § 37-92-304(6), the approval of the changes of water rights and the use of the additional replacement sources in the plan for augmentation approved in the 93CW182 Decree approved herein shall be subject to the continuing jurisdiction of the Water Court. The retained jurisdiction period shall run for a period from the entry of this decree until five (5) years from the time when the District provides actual notice to all objectors listed in Paragraph 3 that all of the additional water rights described in Paragraph 13 are first used in the augmentation plan. Any party may within said period, petition the Water Court for the purpose of modifying this decree. Such petition shall be filed with the Water Court under this caption and case number and shall be served on the parties or the counsel of record

for all parties who have appeared herein. The party filing the petition shall have the burden of going forward to establish a prima facie case based on the facts alleged in the petition. If the Court finds those facts to be established, the District shall thereupon have the burden of proof to show: (a) that the petitioner is not materially injured; or (b) that any modification sought by the petitioner is not required to avoid material injury to petitioner; or (c) that any term or condition proposed by the District in response to the petition does avoid material injury to the petitioner. If no petition is lodged within the described period and if the retained jurisdiction is not extended by the Water Court in accordance with the provisions of the statute, the retained jurisdiction shall automatically expire and the decree shall become final under its own terms.

26. **Administration**. State water administration officials shall administer the water rights and use of water described in this decree in accordance with the terms and conditions set forth in this decree. As long as depletions are replaced as set forth in this plan for augmentation, use of the Sedalia Well Nos. 1 and 2 shall not be curtailed. Pursuant to Section 37-92-305(8), C.R.S., the State Engineer shall curtail all out-of-priority diversions, the depletions from which are not so replaced as to prevent injury to vested water rights.

27. **No Precedent**. There was no trial in this matter and no factual issues were litigated. The findings of fact, conclusions of law and decree were completed as the result of substantial discussions, negotiations and compromises by, between and among the District and the several objectors pertaining to all parts of the findings, conclusions and decree. It is specifically understood and agreed by the parties hereto, and found and concluded by the court, that the acquiescence of the parties to a stipulated decree under the specific factual and legal circumstances of this contested matter and upon the numerous and interrelated compromises reached by the parties shall never give rise to any argument, claim, defense or theory of acquiescence, waiver, bar, merger, stare decisis, res judicata, estoppels, laches, or otherwise, nor to any administrative or judicial practice or precedent, by or against any of the parties hereto in any other matter, case or dispute, nor shall testimony concerning such acquiescence of any party to a stipulated decree herein be allowed in any other matter, case or dispute. All parties stipulate and agree that they do not intend the findings, conclusions and decree to have the effect of precedent or preclusion on any factual or legal issue in any other matter. The parties further stipulate and agree that they each reserve the right to propose or to challenge any legal or factual position in any other plan for augmentation or other matter filed in this or any other court without limitation by these Findings of Fact, Conclusions of Law, Judgment and Decree.

28. **Binding Effect of Decree**. The District shall record this decree with the Clerk and Recorder for Douglas County within 10 days after the Decree becomes final upon the expiration of the right of all parties to appeal this decree.

Dated: July 1, 2015.

BY THE COURT:

James F. Hartmann
Water Judge, Water Division 1

ATTACHMENT C

EES
Entitlement and Engineering Solutions, Inc

September 21, 2023

Douglas County Planning Division
10 Third Street
Castle Rock, CO 80104

Re: 5779 Airport Road, Sedalia, CO 80135 - Commitment Letter

To Whom It May Concern:

On behalf of Sedalia Water and Sanitation District (District), I am writing to inform you that Pursuant to Section 1808A.01 of the Douglas County Zoning Resolution, the Sedalia Water and Sanitation District (the "District") acknowledges its willingness and ability to serve the property proposed for the Asphalt Production Facility Use by Special Review (US2021-002). The applicant is included within the District under the "Order Approving Sedalia Water and Sanitation District's Motion for Order for Inclusion" dated October 23, 2006, and recorded on January 16, 2007 at Reception number 2007004713.

The proposed improvements, which include the addition of an asphalt plant, result in an increase in water usage. The proposed increase in usage is under the allowed amount per the Well Permit and thus the District will continue to serve the property as it currently does which is further outlined below. This Agreement will be contingent on approval of the US2021-002 Use by Special Review by the Board.

Commitment to Serve 5779 Airport Road, Sedalia, CO 80135:

The District commits to provide service to the proposed development with the following conditions:

1. The District is committed to serving the property located at 5779 Airport Road, Sedalia, CO as an existing customer whose property lies within the district boundary.
2. Service will be provided in accordance with previously approved agreements between the District and the owner of that property.

Water Demand:

The maximum estimated annual water demand for the addition of this asphalt plant is 5.0 acre-feet; which assumes that the onsite well is used exclusively for these operations. In reality, the project is supplemented with imported water, hauled by a water truck as part of the applicant's routine operations. For purposes of this letter, it is assumed that no water will be supplemented by imported water and the onsite well will be used exclusively; providing the maximum annual water demand.

The maximum estimated annual water demand, as provided by the asphalt production facility, for the composite of all facilities located on the site is 50.0 acre-feet; 43.2 acre-feet for concrete operations, 5.0 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations. The low-water annual water estimated demand is estimated at 25.1 acre-feet; 20.1 acre-feet for concrete operations, 3.2 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations.

Historically, recent annual water usage at the facility varies between 21.8 acre-feet and 39.6 acre-feet; with the data for the last two years being 27.73 AF and 27.44 AF. This annual information was provided by the asphalt production facility. The fluctuation is a function of seasonal shut-downs, construction deviations, and imported water usage.

Water Supply:

Per the existing well permit, Well Permit Number 63898, filed with the Office of the State Engineer-Colorado Division of Water Resources, the average annual amount of ground water to be appropriated shall not exceed 50.32 acre-feet.

The permit states "The use of ground water from this well is limited to commercial and industrial use in a concrete production facility and sanitary facility for onsite staff". The asphalt production facility falls under commercial and industrial use.

Feasibility of Supply:

The well and associated infrastructure connecting to the 5779 Airport Road property make it physically and economically feasible for the District to continue service to the proposed development.

Please see the attached Water Summary Report for additional details on the amount of water available to the District to serve the proposed Use by Special Review, US2021-002.

Please contact me with any questions or concerns you may have. You can reach me at 303-656-3208.

Respectfully Submitted,

ENTITLEMENT AND ENGINEERING SOLUTIONS, INC.

Mary Kasal, P.E.
Entitlement and Engineering Solutions
Sedalia Water and Sanitation District Engineer

Attachments:
Water Supply Report

EES
Entitlement and Engineering
Solutions, Inc

September 21, 2023

5779 Airport Road, Sedalia, CO 80135- Water Summary Report

The following report shall be used in conjunction with the "5779 Airport Road- Commitment Letter" dated September 21, 2023.

Per the existing well permit, Well Permit Number 63898, filed with the Office of the State Engineer- Colorado Division of Water Resources, the average annual amount of ground water to be appropriated shall not exceed 50.32 acre-feet. The well permit is attached for reference.

The maximum estimated annual water demand, as provided by the asphalt production facility, for the composite of all facilities located on the site is 50.0 acre-feet; 43.2 acre-feet for concrete operations, 5.0 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations. The low-water annual estimated water demand is estimated at 25.1 acre-feet; 20.1 acre-feet for concrete operations, 3.2 acre-feet for asphalt operations, 1.8 acre-feet for crushing operations.

Historically, recent annual water usage at the facility varies between 21.8 acre-feet and 39.6 acre-feet; with the data for the last two years being 27.73 AF and 27.44 AF. This annual information was provided by the asphalt production facility. The fluctuation is a function of seasonal shut-downs, construction deviations, and imported water usage.

The maximum estimated water demand for the 5779 Airport Road site of 50.0 acre-feet per year falls below the permitted allocation of 50.32 acre-feet per year. Therefore, the existing well is capable of serving the subject property for the water demands they request. All other conditions within the existing well permit must be abided by.

No new water rights shall be conveyed. The proposed water increase for the proposed improvements is below the existing allotment from the well permits.

This report relates to the well that serves the Asphalt Production Facility parcels that are subject of this Land Use Application (US2021-002).

EES, Inc Phone: 303-572-7997 3801 E. Florida Ave. Suite 425 Denver, CO 80210

October 17, 2018

VIA ELECTRONIC MAIL ONLY

Alex Schatz
Brannan Sand and Gravel Company, L.L.C.
2500 Brannan Way
Denver, Colorado 80229

Re: Water Supply Permission for Brannan Asphalt Plant – 5775 Airport Road, Sedalia, Colorado

Dear Alex:

Per the terms of a "Real Property Inclusion Agreement," dated September 26, 2006, as amended September 29, 2008, between Ready Mixed Concrete Company ("RMCC") and the Sedalia Water and Sanitation District ("SWSD"), RMCC is entitled to pump and use ground water from a nontributary Arapahoe Formation well subject to Well Permit No. 63898-F (formerly Owens Brothers Arapahoe Well AD-7609). The well is located at 5775 Airport Road, Sedalia, Colorado. The permit authorizes the appropriation of an average amount of nontributary ground water in the amount of 50.32 acre feet per year at a maximum pumping rate of 120 gallons per minute. The well was decreed in Case No. 87CW095 for all beneficial purposes, including, but not limited to, commercial industrial, municipal and augmentation purposes. This letter confirms that RMCC agrees to provide Brannan Sand and Gravel water RMCC is entitled to pump and use under the terms of Well Permit No. 63898-F for Brannan's use at its planned asphalt batch plant and associated operations.

Thank you.

Sincerely yours,

Robert P. Kepford
General Manager

Ready Mixed Concrete Company Address: 5775 Franklin St. Denver, CO 80216 Office Phone: (303) 383-6446

Water Supply Analysis and Water Plan

Changes in water demand associated with this USR amendment are anticipated to be relatively minimal.

Discounting drinking water, which is imported in bottles, actual metered water usage at another asphalt production facility of similar scale operated by the applicant is 1.33 acre-feet (434,000 gallons) per year. This metered water supply is supplemented with imported water, hauled by a water truck as a part of the applicant's routine operations. Water trucks are deployed to the applicant's asphalt pavement facilities primarily to control dust generated in unpaved yard space. The present application incorporates paved surfaces for the bulk of vehicular trips within the site, though routine use of a water truck at some frequency is planned. In the event that the water truck were to rely exclusively on the on-site well to refill, this would add 3.68 acre-feet (3 daily cycles * 2,000 gallons/truckload * 200 working days requiring water application). The maximum water demand generated by new USR features is calculated as 5.01 acre-feet.

Recent water usage at the USR facility varies between 21.8 acre-feet and 39.6 acre-feet annually. This fluctuation in demand is a function of seasonal shut-downs (e.g., too cold to cure concrete, delivery problems due to weather, planned and unplanned maintenance) and overall construction economics.

Recycling operations on the site (for concrete rubble, etc.) were recently expanded and reconfigured by an administrative USR amendment. It is estimated that water application on a scale similar to the applicant's water truck operation would be appropriate for this use; however, about this impact of approximately 1.8 acre-feet is accounted for in the base USR existing prior to the administrative amendment (see attached Sedalia Water and Sanitation District correspondence from 2015).

The maximum annual water demand for the composite of all USR facilities on the site is 50.0 acre-feet, consisting of:

- 43.2 acre-feet for concrete operations (not counting recycling operations, allowing for growth in concrete production over time)
- 5.0 acre-feet for asphalt operations
- 1.8 acre-feet for recycling operations (accounting for pre-existing and expanded operations)

A low-water usage scenario is budgeted at 25.1 acre-feet annually, as follows:

- 20.1 acre-feet for concrete operations (curtailing concrete production to account for supply shortage)
- 3.2 acre-feet for asphalt operations (relying on water trucks to import no less than 1.8 acre-feet annually)
- 1.8 acre-feet for recycling operations

All low-water usage amounts are subject to supplementation by imported water. This produces an operational water budget that varies between 25.1 acre-feet and 50.32 acre-feet depending on overall availability of on-site and off-site water supplies.

On-site water supply is provided by a nontributary groundwater well. Well AD-7609 (State permit # 63898-F) is a Denver Basin deep well accessing the Arapahoe aquifer. This well is decreed for annual withdrawal of 50.32 acre-feet, most recently adjudicated in Division One Water Court case 2010CW261 (attached). While the well has been dedicated to the Sedalia Water and Sanitation District as part of an inclusion agreement, day-to-day operation of the well is conducted by Ready Mixed Concrete Company. The inclusion agreement provides for Ready Mixed Concrete Company to use the full amount of water rights (see Paragraph 6(b)(i) of the attached decree, holding that it does not modify or diminish the inclusion agreement). Concrete production under the amended USR has been and will be at all time the primary water use at the site. Allocating water to ancillary water demands at the same facility is assumed to be consistent with permit and inclusion requirements.

Also attached for reference is a copy of the agreement between the applicant and Ready Mixed Concrete Company by which the well is made available for all uses on the site, including those that are newly incorporated by this USR amendment. Currently, well water is pumped directly to a cistern at the concrete plant. As proposed, a water tank in the asphalt production and recycling area will serve as a distribution point to uses in the USR amendment area, including fire flows as may be required.

The applicant is also investigating other wells and off-site sources of water to enhance the reliability and resilience of supply.

The subject Property resides in the Margin B Water Supply Zone of Douglas County. The anticipated demand does not cause water usage to exceed any already-established appropriation from the Denver Basin aquifers underlying the property. The anticipated new demand is also a fraction of the amount of water in all Denver Basin aquifers underlying the site subject to annual appropriation. On this basis, the proposed land use does not cause water usage to exceed the 50 percent of appropriable supply according to Douglas County standards.

The subject Property is also in the Douglas County Interim Water and Sanitation Overlay District. As provided in the Douglas County Zoning Resolution, where a property is zoned for General Industrial use in the overlay district, "The type and scale of the proposed use and the water and sewer demand of the proposed use shall be used to determine if the use of individual wells and on-site wastewater treatment systems is suitable. It is anticipated that the need for the overlay district will diminish or cease when central facilities become available."

At present, the subject Property does not fall within the boundaries of any central water or sanitation system. While the site will be included in the Sedalia Water and Sanitation District by virtue of the relevant inclusion agreement, there are no present plans for expansion of services in the area. Nor does the property reside within 400 feet of any existing central water line. The nearest existing central water and sanitary sewer services are those of the Sedalia District. At its nearest reach, the Sedalia district's central water lines are over two miles distant to the south.

Water use was addressed at the time of prior land use development proposals for the Property. For example, the Sedalia inclusion agreement is the result of a 2005 application for a site improvement plan (SIP) similar to – in fact, more intense in scope and scale than – the present application. The applicant does not propose subdivision or rezoning that will fundamentally change water demand on the Property.

According to DCZR criteria (DCZR 1803A), the water supply for the USR amendment is adequate:

1. The decree for Well AD-7609 water rights includes industrial uses.
2. The amended USR does not rely on renewable water.
3. Withdrawals of water from Well AD-7609 do not experience variations based on the hydrologic cycle.
4. The maximum water budget is 50.32 acre-feet annually. Of this amount, 50.0 acre-feet are dedicated to the concrete, asphalt and recycling operations. This leaves 0.32 acre-feet, more than capable of absorbing any incidental use, such as the 500 square-foot planned control room space (requires 0.056 acre-feet according to DCZR 1805A.02.4). The total water budget can be reduced by half in a low-water usage scenario.

The Applicant is in communication with the Sedalia Water and Sanitation District. A letter similar to the attached 2015 correspondence is sought to establish compliance with DCZR 1806A.02.4 or any other applicable standard.

Attachments:

Commitment Letter from Sedalia Water and Sanitation District by EES, Inc., dated February 27, 2015
Groundwater Well Permit 63898-F
Inclusion Agreement, recorded 2007
Amendment to Inclusion Agreement, recorded 2008
Decree in Division One Water Court case 2010CW261

Form No.
GWS-25

OFFICE OF THE STATE ENGINEER
COLORADO DIVISION OF WATER RESOURCES

818 Centennial Bldg., 1313 Sherman St., Denver, Colorado 80203
(303) 866-3581

EXST

WELL PERMIT NUMBER 63898 -F -
DIV. 1 WD 8 DES. BASIN MD

APPLICANT

READY MIXED CONCRETE CO
4395 WASHINGTON ST
DENVER, CO 80216-

(303) 292-1771

APPROVED WELL LOCATION
DOUGLAS COUNTY
SW 1/4 NW 1/4 Section 3
Township 7 S Range 68 W Sixth P.M.

DISTANCES FROM SECTION LINES
1400 Ft. from North Section Line
850 Ft. from West Section Line

UTM COORDINATES (Meters,Zone:13,NAD83)
Easting: Northing:

CHANGE/EXPANSION OF USE OF AN EXISTING WELL

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not ensure that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation Contractors in accordance with Rule 18.
3) Approved pursuant to CRS 37-90-137(4) and the decree granted for the Owens Brothers Arapahoe Well no. 25769-F in case no. 87CW095 Division 1 Water Court. The operation of this well is subject to the terms and conditions of said decree.
4) Approved for the use of an existing well constructed under permit no. 25769-F.
5) The use of ground water from this well is limited to commercial and industrial use in a concrete production facility and sanitary facility for onsite staff.
6) The pumping rate of this well shall not exceed 120 GPM.
7) The average annual amount of ground water to be appropriated shall not exceed 50.32 acre-feet.
8) Production is limited to the Arapahoe aquifer.
9) The entire length of the hole shall be geophysically logged as required by Rule 9 of the Statewide Nontributary Ground Water Rules prior to installing casing.
10) The owner shall mark the well in a conspicuous place with well permit number(s), name of the aquifer, and court case number(s) as appropriate. The owner shall take necessary means and precautions to preserve these markings.
11) A totalizing flow meter must be installed on this well and maintained in good working order. Permanent records of all diversions must be maintained by the well owner (recorded at least annually) and submitted to the Division Engineer upon request.
12) This well shall be not more than 200 feet from the location specified on this permit.
13) This well shall be at least 600 feet from any existing well, completed in the same aquifer, that is not owned by the applicant.
14) Pursuant to CRS 37-90-137(9)(b) and the Denver Basin Rules, no more than 98% of the nontributary ground water withdrawn annually shall be consumed and the well owner shall demonstrate to the reasonable satisfaction of the State Engineer that no more than 98% of the water withdrawn will be consumed.
15) This well is subject to administration by the Division Engineer in accordance with applicable decrees, statutes, rules, and regulations.

NOTE: The ability of this well to withdraw its authorized amount of water from this non-renewable aquifer may be less than the 100 years upon which the amount of water in the aquifer is allocated, due to anticipated water level declines.

JMW 2/13/06

APPROVED
JMW

Hal D. Simpson
State Engineer

Joanna Williams
By

Receipt No. 0547626 DATE ISSUED 02-13-2006 EXPIRATION DATE N/A

ATTACHMENT D

Steve Kelton

From: Mary Kasal <mary.kasal@ees.us.com>
Sent: Wednesday, April 3, 2024 8:42 AM
To: Steve Kelton
Subject: [EXTERNAL] RE: water use at 5779 Airport Road

This email was sent from a source outside of Brannan, please be cautious of links, attachments, and phishing requests.

Morning Steve,

The District has no problem with you using a portion of the allocated water for irrigation. Essentially, what you use the water for is up to you, it just can't exceed the usage values that have been determined.

Thanks,

MARY KASAL, PE
Principal
EES
C 303-656-3208

From: Steve Kelton <skelton@brannan1.com>
Sent: Tuesday, April 2, 2024 5:17 PM
To: Mary Kasal <mary.kasal@ees.us.com>
Subject: water use at 5779 Airport Road

Hi, Mary.

In conjunction with the County's USR process for our proposed asphalt plant, it will be necessary to use some of the well water to irrigate the landscape according to current County standards. The onsite well has sufficient capacity for our industrial needs including irrigation of the facility grounds, which is an accessory part of the industrial use. Can you please confirm that using a portion of our well water for landscape irrigation needs is consistent with the District's expectations ?

Thanks,

Steve

Steve Kelton
Brannan Companies
2500 Brannan Way
Denver, CO 80229

skelton@brannan1.com
desk: 303-383-6433
cell: 720-910-4376