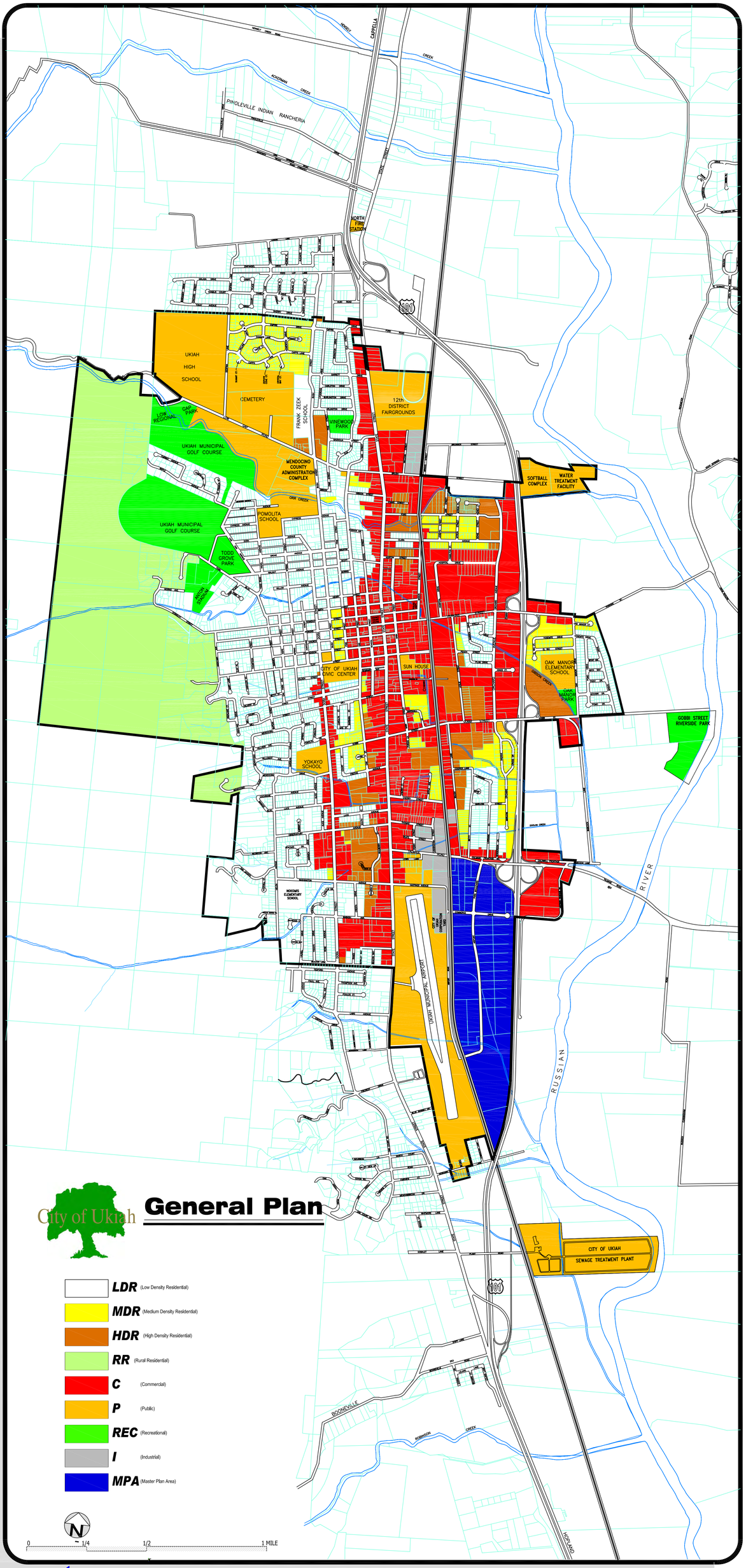

PINOLEVILLE INDIAN RANCHERIA
NORTH FIRE STATION
UKIAH HIGH SCHOOL
CEMETERY
FRANK ZEEK SCHOOL
LOW REGIONAL
OAK PARK
VINEWOOD PARK
12th DISTRICT FAIRGROUNDS
UKIAH MUNICIPAL GOLF COURSE
MENDOCINO COUNTY ADMINISTRATION COMPLEX
SOFTBALL COMPLEX
WATER TREATMENT FACILITY
POMOLITA SCHOOL
UKIAH MUNICIPAL GOLF COURSE
TODD GROVE PARK
ALBION SCHOOL
CITY OF UKIAH CIVIC CENTER
SUN HOUSE
OAK MANOR ELEMENTARY SCHOOL
OAK MANOR PARK
GOBBI STREET RIVERSIDE PARK
YOKAYO SCHOOL
YOKOMAIS ELEMENTARY SCHOOL
UKIAH MUNICIPAL AIRPORT
RUSSIAN RIVER
CITY OF UKIAH SEWAGE TREATMENT PLANT
ROOSEVILLE
HOPLAND
General Plan
City of Ukiah
LDR (Low Density Residential)
MDR (Medium Density Residential)
HDR (High Density Residential)
RR (Rural Residential)
C (Commercial)
P (Public)
REC (Recreational)
I (Industrial)
MPA (Master Plan Area)
0
1/4
1/2
1 MILE

CITY OF UKIAH ZONING MAP

Zones

- GU
- DC
- UC
- CN
- C1
- C2
- PF
- PD-Residential
- PD-Commercial
- M
- R1
- R1H
- R2
- R3
- Homeless Shelter Boundary
- Downtown Zoning Code
- Planned Development
- Airport Compatibility Zone
- Ukiah City Limit

ZONING ORDINANCE AMENDMENTS
(to City Zoning Map after 2013)

Ord. No. 1158, adopted June 17, 2015
Ord. No. 1160, adopted September 16, 2015
Ord. No. 1161, adopted September 16, 2015
Ord. No. 1175, adopted February 15, 2017

Planned Developments (PDs)	
Map ID	PD Name
1	Las Casas Estates
	Unit 1, Phase A
2	Las Cases Estates
	Unit 1, Phase B
3	Sierra Sunset, Unit 1
4	Sierra Sunset, Unit 2
5	Sierra Sunset, Unit 3
6	Sierra Sunset Village
7	Sierra Sunset
8	Vineyard View Estates
	Unit 4, Phase 1
9	Vineyard View Estates
	Unit 4, Phase 2
10	Orchard Village
11	Ukiah Green
12	Ukiah Green South
13	Cleveland Lane
14	Marlene Estates
15	Brookside Estates
16	950 Marlene Street
	(Carlile)
17	Myszka
18	Creekside Court
19	Orrs Creek Neighborhood
	125-137 Ford Street
20	Cottage Lane
21	South Main Street
22	Myron Street
23	Airport Industrial Park
24	PEP Housing

Compliance with the General/Area Plan & Zoning Code

Please see attached Attachment 14 from the TCAC application which is signed by the community development director stating we are in compliance with the Housing Overlay Zone and the Zoning.

State of California

Tax Credit Allocation Committee

ATTACHMENT 14
Verification of Zoning and Land Use Entitlement Approvals

Agency Name	City of Ukiah Community Development Department	Contact Name	Craig Schlatter
Address	300 Seminary Avenue	Title	Director of Community Development
City	Ukiah, CA 95482	Email	cschlatter@cityofukiah.com

Project Name	Acorn Valley Plaza	Proposed Number of Units:	71
Project Address / Site	210 East Gobbi Street	Assessor Parcel Number(s):	00304077,00304078,00304079
Project City	Ukiah	Census Tract Number(s):	116
Project County	Mendocino		

The entire parcel upon which the above-described low-income project will be located is zoned C1- HOZ which allows for multi-family residential development of no greater than 28 units per acre. This project is eligible to apply for a density bonus that would allow a maximum density of 30 units per acre. The project, as proposed, is zoned for the intended use or is existing legal non-conforming.

Please complete the following table and confirm all necessary public or tribal approvals **subject to the discretion of local or tribal elected officials** necessary to begin construction are either finally approved or not applicable by **July 1, 2021** with appeal periods, if any, expired by **July 31, 2021**.

Please note, the following approvals, even if they are discretionary, are not required (by CDLAC and TCAC) to be obtained at the time of the CDLAC and TCAC applications: design review, initial environmental study assessments, variances, and development agreements.

Action	Requirement		Type of Approval Required	Approval Date	Appeal Expiration Date
	Yes/No	Comments			
Streamlined Ministerial Approval (SB35)	No		Select		
Streamlined Approval ( )	No		Select		
Site/Plot Plan Review	No		Select		
Parcel Map	No		Select		
Conditional Use Permit	Yes	Project is within a Housing Overlay Zone	By Right	3/3/21	3/17/21
Variance Approval	No		Select		
Change of Zone	No		Select		
General Plan Amendment	No		Select		
Development Agreement or similar	No		Select		
Phase I Environmental Site Assessment	No		Select		
CEQA Review	No		Select		
Soil and Toxic Reports	No		Select		
Article 34 of State Constitution	No		Select		
Design/Architectural Review	Yes	Project is within a Housing Overlay Zone	By Right		
Coastal Commission	No		Select		
Other:	No		Select		
Other:	No		Select		

As indicated in the table above, the proposed development complies with the general plan and conditional use requirements (if any), and has obtained all applicable local land use approvals.

Are you aware of any state/local approvals still required from the Planning Commission, City Council, Board of Supervisors, or other agency for this project?

Yes ☐ **No** ■

If yes, please list: _____

Completed By: _____ (Signature)

Date: 06/09/2021

City of Ukiah
COMMUNITY DEVELOPMENT DEPARTMENT

Planning Services Division
300 Seminary Avenue
Ukiah, CA 95482
planning@cityofukiah.com
www.cityofukiah.com/planning-services
Phone: (707) 463-6268
Fax: (707) 463-6204

2021 Fees for Permits and Services

Application Type & Account Number	Adopted Fee
Address Change (10023110-44153)	**$100**
Amendment – Site Development Permit/Use Permit (10023110-42320)	
Amendment - Major	**$1000-$3000 Deposit (1)**
Amendment - Minor Level 1	**$500**
Amendment - Minor Level 2	**$900**
Annexation (10023122-44152)	**$1000-$3000 Deposit (1)**
Appeal (10023110-42320)	
By Project Applicant	**$500 Deposit (1)**
By Public	**$500 (10)**
Boundary Line Adjustment (BLA) (10023110-44128)	
BLA	**$350**
BLA - Affordable Housing Project	**$260**
BLA - Special Housing Needs Project	**$170**
Lot Merger	**$350**
Business License	
Staff Review	**$0**
California Environmental Quality Act (CEQA) (4)	
Archeological Search for Environmental Review	**SSU Northwest Information Center Fee**
Document Filing (6)	**$50**
Special CEQA Document or Complex Initial Environmental Study (10023123-42330)	**Full Consultant Fee plus 15% Administration Fee**
Environmental Impact Report (EIR) (Deposit Account-Project Specific)	**Full Consultant Fee plus 15% Administration Fee**
Fish & Game Fee EIR (5) (6)	**CDFW Filing Fee**
Fish & Game Fee Negative Declaration (5) (6)	**CDFW Filing Fee**
Mitigation Monitoring (10023110-44153)	**$200**
Determinations of Appropriate Use (10023110-42320)	
Planning Director Review	**$200**
Document and Map Fees (10000000-48110)	
General Plan	**$30**
Zoning Ordinance	**$30**
Subdivision Ordinance	**$30**
Master Bike/Pedestrian Plan	**$30**
Airport Master Plan	**$15**
Landscaping Guidelines	**$15**
Design Guidelines	**$15**
Creek Plans	**$15**
General Plan Map	**$30**
Zoning Map	**$30**
Other Plans	**$5-$30**
Misc. Maps, Graphics and Reports	**$5-$30**

Photo Copy (First 5 copies per day are free and scanning/emailing is free)	**$.10 per page**
Encroachment into Right of Way (10023300-42310)	
Special Encroachment for signs, planters, etc.	**$50**
General Plan Amendment (10023122-44152)	**$1000-$3000 Deposit (1)**
General Plan/Advance Planning Maintenance Fee (9) (900.205.234)	**15% of total building permit cost**
Mural Permit (10023110-42320)	
Planning Commission Review (10023110-)	**$450.00**
Outdoor Dining Permit (Building 10023300-42210 / Public Works 10024200-42403)	
New Outdoor Dining Permit ($120 Building / $130 Public Works)	**$250.00**
Renew Outdoor Dining Permit ($50 Building 100231110-42315)	**$50.00**
Pre-Application Review (10023122-44153)	
Planning Commission	**$300 Deposit (1)**
Planning Staff Level 1 (less than 1 hour meeting)	**$0**
Planning Staff Level 2 (more than 1 hour with research & preparation)	**$200 Deposit (1)**
Project Review Committee	**$250 Deposit (1)**
Public Notice (10023122-44153)	
Continuation of Public Hearings at Applicant Request	**$50**
Rezoning (10023122-44152)	
Pre-zoning	**$1000-$3000 Deposit (1)**
Rezoning	**$1000-$3000 Deposit (1)**
Planned Development	**$1000-$3000 Deposit (1)**
Planned Development - Affordable Housing Project (7)	**$800 Deposit (7)**
Planned Development - Special Housing Needs Project (8)	**$600 Deposit (8)**
Sign Permit (10023300-42310)	
Minor (up to 1 hour of analysis and administrative review)	**$50**
Major (more than 1 hour)	**$150**
Site Development Permit (10023110-42320)	
Major	**$1000-$3000 Deposit (1)**
Major - Affordable Housing Project (7)	**$800 Deposit (7)**
Major - Special Housing Needs Project (8)	**$600 Deposit (8)**
Minor - Level 1 (parking lot expansions, minor exterior modifications, to existing commercial/industrial buildings, and similar projects)	**$500**
Minor - Level 2 (Minor additions, significant exterior alterations, and similar projects)	**$900**
Site Inspection Request	
Property owner/Applicant	**$0**
Special Meeting (10023300-42260)	
Planning Commission	**$300**
Specific Plan/Master Plan (10023110-42320)	
Specific Plan/Master Plan Review	**$2000-$3000 Deposit (1)**
Specific Plan/Master Plan - Affordable Housing Project (7)	**$800 Deposit (7)**
Specific Plan/Master Plan - Special Housing Needs Project (8)	**$600 Deposit (8)**
Staff Review/Research (10023110-44153)	
Building Permit Review Fee Discretionary Review Projects	**$50**
Certificate of Compliance (recognize existing parcels)	**$300**
Staff Hourly Rate (adjusts annually)	**$105(16)**
Demolition Permit Historical Review	**$350**
Zoning/Planning Research - Level 1 (up to 1 hour)	**$0**
Zoning/Planning Research - Level 2 (more than 1 hour)	**$200 Deposit (1)**
Subdivision (10023110-44151)	
Exception	**$500 Deposit (1)**
Exception – Affordable Housing Project (7)	**$400 Deposit (7)**
Exception – Special Housing Needs Project (8)	**$200 Deposit (8)**
Major	**$1000-$3000 Deposit (1)**
Major - Affordable Housing Project (7)	**$800 Deposit (7)**

Major - Special Housing Needs Project (8)	**$600 Deposit (8)**
Minor	**$900**
Minor - Affordable Housing Project	**$720**
Minor - Special Housing Needs Project	**$540**
Modification to Recorded Subdivision Map	**$600**
Subdivision/Parcel Map Time Extension	**$200**
Temporary Objects/Sidewalk Café Encroachment Permit (Planning 1023300-42310 / Public Works 10024200-42402)	
Planning Fee $50 plus Public Works Fee $45	**$95**
Use Permit (10023110-42320)	
Major	**$1000-$3000 Deposit (1)**
Major - Affordable Housing Project (7)	**$800 Deposit (7)**
Major - Special Housing Needs Project (8)	**$600 Deposit (8)**
Minor - Level 1 (Temporary outdoor sales/display, special events and similar small projects)	**$500**
Minor - Level 2 (Minor expansions or changes in use per the provisions contained in Article 20, Chapter 2 of the City Code)	**$900**
Cannabis Related Business Use Permit Renewal	**$1000 Deposit (1)**
Variance (10023110-42320)	
Major	**$1000-$3000 Deposit (1)**
Major - Affordable Housing Project (7)	**$800 Deposit (7)**
Special Housing Needs Project (8)	**$600 Deposit (8)**
Minor - Level 1 (Seeking 3 feet or less of relief from a yard setback requirement)	**$500**
Minor - Level 2 (Seeking more than 3 feet but less than 50% relief from yard setback requirements)	**$900**
Violation/Penalty (10023110-44153)	
Work without Required Permit	**Double the Cost of the Permit**

1. **The application is subject to full cost recovery of staff time and materials required to process the application. Applicants will be billed for the full cost of processing the application based on staff time and materials over and above the amount of the deposit. For applications requesting multiple discretionary permits, the deposit shall be the sum of the individual application fees and/or deposits.**
2. **Very minor projects such as parking lot expansions, minor exterior modifications to existing commercial/industrial buildings, etc.**
3. **See Article 20, Chapter 2 of the Ukiah Municipal Code.**
4. **The cost for basic CEQA Initial Studies and Negative Declarations will be recovered through the 100% cost recovery for the discretionary permit.**
5. **Fee is required unless the applicant provides the City with Dept. of Fish & Game determination that the project will not have an effect on fish and wildlife.**
6. **Mendocino County Clerk processing fee. Check made payable to Mendocino County.**
7. **Affordable Housing Projects. Project proposing 100% of the housing units to be "locked-in" affordable to citizens earning less than 80% of the area median income, "sweat equity" residential projects and residential second units. The project is subject to 80% cost recovery.**
8. **Special Needs Project. Projects involving housing for identified groups in need such as seniors, homeless persons, and the mentally ill. The project is subject to 60% cost recovery.**
9. **General Plan/Advance Planning Maintenance Fee. This fee is charged on all Building Permit and will be used to update the General Plan, Zoning Ordinance and other long range planning documents.**
10. **When an application is appealed by a member of the public, the appeal is processed as a flat fee application.**
11. **A reduced Fee of 80% cost recovery rather than 100% will be applied to the following Planning Permit Projects: Solar PV, LEED certification, public access easement (creeks, streets, pedestrian paths, etc.), substantial over-planting of trees, significant creek restoration and/or public access, and similar design elements.**
12. **A reduced Fee of 80% cost recovery rather than 100% will be applied to Planning Applications made by downtown businesses (DZC area) for new business or expansion of existing businesses.**
13. **A reduced Fee of 80% cost recovery rather than 100% will be applied to locally inspired Public Art that is publicly "accessible" and included as a prominent component in a project.**
14. **No Planning Permit or Fees required for Community gardens, outdoor dining, live entertainment, sidewalk cafés and tasting rooms if they comply with specific standards.**
1. **A reduced Fee of 80% cost recovery rather than 100% will be applied for projects that provide Energy and Water Conservation measures including**
2. **the installation of significant energy or water conservation fixtures, appliances or equipment beyond green building code requirements.**
3. **$105 Department-wide hourly rate with an automatic adjustment to the hourly rate based on the Consumer Price Index (CPI) annual rate beginning at January 2021, and continuing for each of the subsequent four years through the endo f 2025.**

Amended March 21, 2007 Updated 12/30/2013 for 2014 CEQA Fees, Updated 5/21/2014 for Outdoor Dining and Temp Encroachment, Amended June 1, 2016, Amended January 22, 2018. Amended January 15, 2020.

CITY OF UKIAH
Department of Community Development
300 Seminary Avenue, Ukiah, CA 95482
Phone (707) 463-6268
Web address: www.cityofukiah.com/community-development/

New Residential Construction
Design and Development Standards Checklist

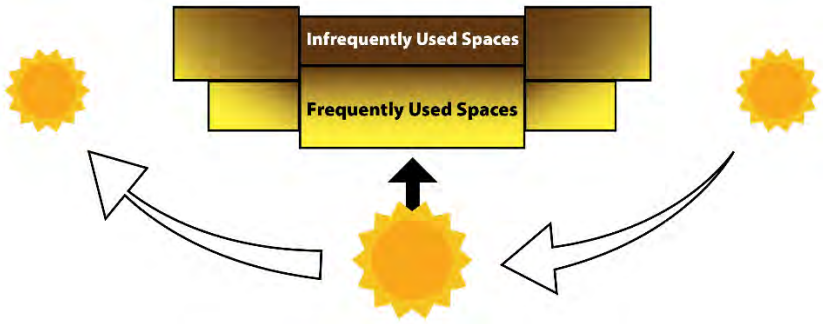
The following standards apply to all new residential construction projects, excluding single-family homes. Standards for the other reviewing departments have been added as a supplement to the packet. This checklist is a helpful tool to use during the design stage of the development to ensure your project qualifies to go straight to building permit submission, skipping the discretionary Planning permit process and saving both time and money. Applicants who choose not to adhere to the adopted Objective Standards may still proceed through the City's existing discretionary review process.

THE PROCESS:

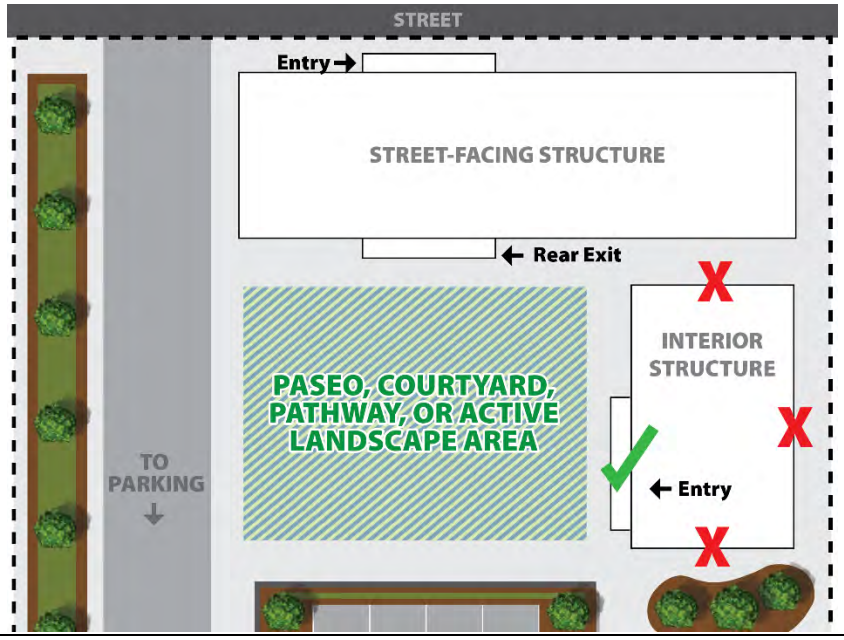
1. Contact Community Development at the number above to schedule a Pre-Development Team Meeting. There is no cost to the developer for this service. The reviewing departments will provide location and project-specific feedback to assist in the development of a complete application.
2. After the Pre-Application Development Team Meeting, submit this completed checklist as part of your Building Permit plan check application.

Development Standards

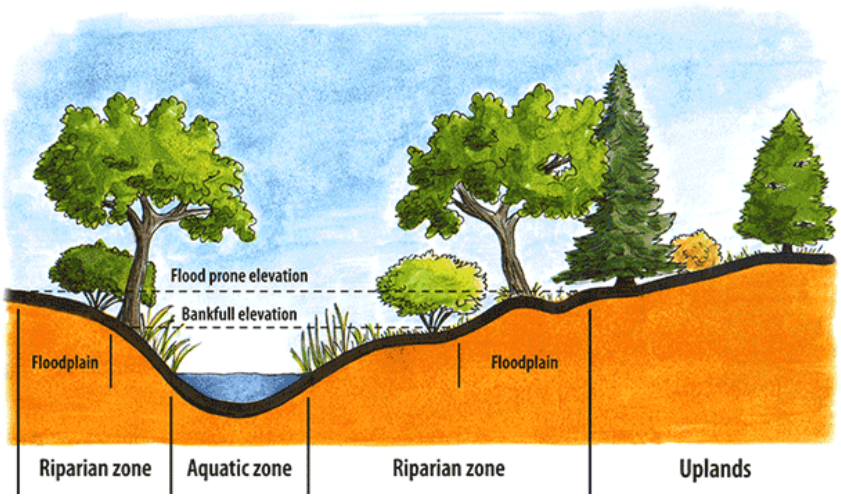
Use this checklist to ensure that your project design satisfies the criteria for ministerial review. Please include all information necessary to verify compliance on the plan set, indicating the sheet number where the information can be found.

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
A. Setbacks					
☐	☐	**(1) Front:** The front setback shall comply with the Project Site's zoning district front setback requirements.		☐	☐
☐	☐	**(2) Setback Landscaping:** Areas between the required setback and street improvements shall be landscaped per the landscaping requirements in subsection L of this section.		☐	☐
☐	☐	**(3) Side (Interior):**		☐	☐
☐	☐	a. Minimum Side Setbacks: There is no minimum interior side setback; provided, that structures comply with the building and fire code standards for structure separation.		☐	☐
☐	☐	b. Zero Setback: If zero setbacks are proposed, the side setback opposite the zero setback shall be a minimum of five feet (5').		☐	☐
☐	☐	**(4) Rear:** The rear setback shall comply with the base zone rear setback requirements.		☐	☐
B. Property Access					
☐	☐	**Property Access.** There shall be vehicular access from a dedicated and improved street, easement, or alley to off-street parking areas.		☐	☐
C. Street Frontage					
☐	☐	**Street Frontage.** Every primary residential structure shall have frontage on a public street or an accessway which has been approved for residential access by the City.		☐	☐
D. Structure Orientation					
☐	☐	**Structure Orientation.** Structures shall incorporate site design that reduces heating and cooling needs by orienting structures (both common facilities and dwelling units) on the parcel to reduce heat loss and gain, depending on the time of day and season of the year. **Figure 1: Orientation to Reduce Heat Loss and Gain**  		☐	☐

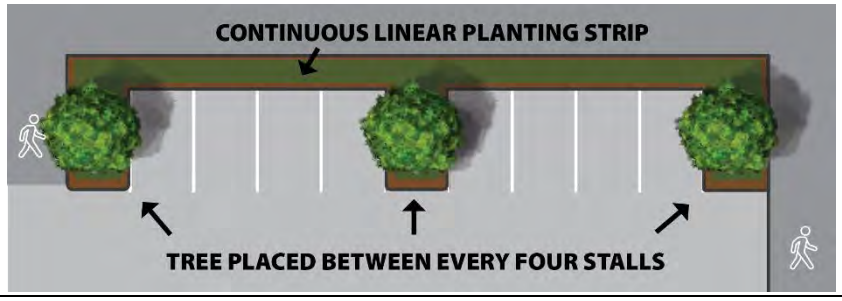
Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
E. Structure Height					
☐	☐	**Structure Height.** Structure height shall comply with the base zone maximum allowable height.		☐	☐
F. Alternative Energy Applications					
☐	☐	**Alternative Energy Applications.** All structures shall be designed to allow for the installation of alternative energy technologies including but not limited to active solar, wind, or other emerging technologies, and shall comply with the following standards:		☐	☐
☐	☐	1. Installation of solar technology on structures such as rooftop photovoltaic cell arrays shall be installed in accordance with the State Fire Marshal safety regulations and guidelines.		☐	☐
☐	☐	2. Roof-mounted equipment shall be located in such a manner so as to not preclude the installation of solar panels. (see Ukiah City Code (UCC) §9055.1 DEVELOPMENT STANDARDS, Figure 1-1).		☐	☐
G. Utility Lines					
☐	☐	**Utility Lines**. All utility lines from the service drop to the structure shall be placed underground.		☐	☐
H. HVAC Systems					
☐	☐	**HVAC Systems.** All HVAC systems shall be located on the roof of the structure to minimize noise impacts to adjacent properties.		☐	☐
I. Mail and Package Delivery Location					
☐	☐	**Mail and Package Delivery Location.** For multifamily development projects greater than four (4) dwelling units, mailboxes and package delivery areas shall be in locations that are visible by residents at the interior of a structure entrance, elevator lobby, or stairwell.		☐	☐
J. Primary Entrances					
☐	☐	**(1) Entry Lighting.** All primary structure entrances shall include dusk to dawn lighting for safety and security per Section P in this checklist.		☐	☐
☐	☐	**(2) Interior-Facing Structures.** a. The primary entrance of each interior-facing structure shall be oriented toward paseos, courtyards, pathways, and active landscape areas.		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
		Figure 2: Interior-facing Structures (Structures not facing a public street)  			
☐	☐	b. For safety, units not facing the street shall be oriented to provide visual access to entryways, pedestrian pathways, recreation areas, and common facilities from dwelling units.		☐	☐
K. Open Space					
		Open Space. The following development standards apply to multifamily developments greater than four (4) dwelling units:			
☐	☐	**1. Public Open Space**:		☐	☐
☐	☐	**a. Public Open Space**: Not less than ten percent (10%) of the gross acreage of the total project shall be set aside as public open space to allow for active and passive recreation opportunities and that includes shading elements to benefit all residents of the project (see (UCC) §9055.1 DEVELOPMENT STANDARDS, Figure 1-2). Open space ownership and maintenance shall be the responsibility of the property owner(s).		☐	☐
☐	☐	**b. Connections**: Public open space areas shall be directly connected to all interior space areas (i.e., community room, recreation room, exercise center), trash and recycling enclosures, laundry facilities (if applicable), structure entrances, parking areas, and mail delivery areas by pedestrian-oriented pathways.		☐	☐
☐	☐	**c. Landscaping**: A minimum of fifteen percent (15%) of the required public open space shall be landscaped with materials and plantings consistent with the standards in subsection L of this section (Landscaping) and the subject parcel's underlying base zone landscaping requirements.		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
☐	☐	**d. Lighting**: In addition to the exterior lighting standards in subsection P of this section, public open space areas shall incorporate accent lighting. Accent lighting may include string lighting in trees or crisscrossed over pedestrian areas, courtyards, or plazas; lighting in fountains; or lighting of significant structures or architectural design features.		☐	☐
☐	☐	**e. Public Gathering Space**: Public open space areas shall include a minimum of two (2) of the following public gathering spaces:		☐	☐
☐	☐	(1) Patio seating area for a minimum of eight (8) people. Patio seating can be fixed chairs and tables, table/bench combination, or landscape materials (i.e., slabs of stone or rock);		☐	☐
☐	☐	(2) Garden space;		☐	☐
☐	☐	(3) Water feature in the form of a fountain, bubblers, or water play pad;		☐	☐
☐	☐	(4) BBQ area no smaller than two hundred (200) square feet with a minimum of three (3) BBQs and tables; or		☐	☐
☐	☐	(5) Pedestrian plaza no smaller than two hundred (200) square feet with a minimum of four (4) benches.		☐	☐
☐	☐	**f. Recreation Facilities**: A maximum of twenty-five percent (25%) of the required public open space area may be paved for recreation facilities including but not limited to basketball courts, tennis courts, common playground, or swimming pools.		☐	☐
☐	☐	**(2) Private Open Space**:		☐	☐
☐	☐	a. **Ground Floor Units**: Each ground floor dwelling unit shall include a minimum of forty (40) square feet of private open space in the form of a covered or uncovered patio to allow for light, air, and privacy.		☐	☐
☐	☐	b. **Above-Ground-Floor Units**: Each above-ground-floor dwelling unit shall include a minimum of forty (40) square feet of private open space in the form of a terrace, balcony, or rooftop patio to allow for light, air, and privacy.		☐	☐
L. Landscaping					
☐	☐	**(1) Landscaping Plans.** Existing features, such as trees, creeks, and riparian habitats shall be incorporated into landscaping plans. The riparian area is the interface between land and a river or stream.		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
		Figure 4: Riparian Corridor  *Source: slco.org*			
☐	☐	**(2) Site Landscaping.**		☐	☐
☐	☐	a. All street trees shall be planted consistent with the standard planting detail on file with the City Engineer. The Ukiah Required Street Tree List is available under "Tree Lists" at www.cityofukiah.com/documents-and-maps/.		☐	☐
☐	☐	b. Vegetation (i.e., bushes, shrubs, flowers) shall be maintained at a height of no more than three feet (3') when located adjacent to pedestrian pathways and building facades and placed in such a manner that does not obstruct lighting.		☐	☐
☐	☐	**(3) Irrigation.** Site landscaping shall include an automated irrigation system with a minimum of seventy-five percent (75%) of system being drip irrigation to reduce water consumption.		☐	☐
☐	☐	**(4) Maintenance.** All trees and on-site landscaping shall be maintained by the property owner.		☐	☐
☐	☐	**(5) Landscaping Plant Selection.**		☐	☐
☐	☐	a. Landscape planting shall consist of at least seventy-five percent (75%) native, drought-tolerant plants and/or flowering plants.		☐	☐
☐	☐	b. All tree plantings shall be equivalent to a fifteen (15) gallon container or larger.		☐	☐
☐	☐	c. Street trees shall be selected from the approved species on the Ukiah Master Tree List - Required Street Tree List. This list is available under "Tree Lists" at www.cityofukiah.com/documents-and-maps/.		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
M. Personal Outdoor Storage Spaces					
☐	☐	**Personal Outdoor Storage Spaces.** A minimum of ten (10) square feet (eighty (80) cubic feet) of personal outdoor storage space shall be provided for each dwelling unit. Personal outdoor storage areas shall be covered and able to be locked.		☐	☐
N. Bicycle Parking					
☐	☐	**(1) Class I Bicycle Parking.** One Class I bicycle parking space (i.e., bicycle locker) is required for every fifteen (15) dwelling units. The Class I bicycle space shall be located within or directly adjacent to the required public open space area.		☐	☐
☐	☐	**(2) Class II Bicycle Parking.** For multifamily development projects greater than four (4) dwelling units, one Class II bicycle parking space (i.e., inverted U-rack, ribbon rack, wave rack) is required for every three (3) dwelling units. The Class II bicycle space shall be located within or directly adjacent to the required public open space area. **Figure 5: Class II Bicycle Parking Examples** 		☐	☐
O. Parking and Circulation					
☐	☐	**(1) Parking Areas.**		☐	☐
☐	☐	a. Parking Lot Design and Location		☐	☐
☐	☐	(1) Parking is prohibited within required sight distance areas. Sight distance area is the area visible to the driver of a vehicle. The site distance area is reviewed and approved by the Public Works Department.		☐	☐
☐	☐	(2) Multifamily development projects greater than fifteen (15) dwelling units shall not site more than fifty percent (50%) of the total parking stalls in a single parking area.		☐	☐
☐	☐	(3) Multifamily development projects greater than four (4) dwelling units shall not provide parking areas between the building(s) and the primary street frontage.		☐	☐
☐	☐	(4) Parking areas within a site shall be internally connected and use shared driveways.		☐	☐
☐	☐	b. Parking Lot Landscaping: The following development standards apply to multifamily development projects greater than four (4) dwelling units. The Ukiah Required Parking Lot Tree List is available online under "Tree Lists" at www.cityofukiah.com/documents-and-maps.		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
☐	☐	(1) Parking areas with twelve (12) or more parking stalls shall have a tree placed between every four (4) parking stalls with a continuous linear planting strip, rather than individual planting wells, unless infeasible. **Figure 6: Parking Lot Tree Requirement** 		☐	☐
☐	☐	(2) Parking areas shall provide shade trees in landscaped areas and along pedestrian pathways. Parking areas shall be designed to provide a tree canopy coverage of fifty percent (50%) over all paved areas within ten (10) years of planting.		☐	☐
☐	☐	(3) Parking areas shall provide a minimum ten-foot (10') buffer between the parking and structures. This buffer can include walkways and/or landscaping.		☐	☐
☐	☐	(4) Parking areas shall use concrete curbing or raised planting areas to protect landscaped areas from encroaching vehicles.		☐	☐
☐	☐	(5) At least seventy-five percent (75%) of parking lot trees shall be deciduous species.		☐	☐
☐	☐	c. Parking Lot Lighting: The following development standards apply to multifamily development projects greater four (4) dwelling units.		☐	☐
☐	☐	(1) Parking lots shall include pole-mounted lighting that shall be no more than sixteen feet (16') in height.		☐	☐
☐	☐	(2) Parking lot lighting shall be directed downward to minimize glare.		☐	☐
☐	☐	d. Carports: Carports shall be reserved for vehicles and shall not be used as storage space.		☐	☐
☐	☐	e. Individual Garage Parking: For multifamily development projects greater than four (4) dwelling units, indoor vehicle parking in the form of garages is encouraged, but not required.		☐	☐
☐	☐	**(2) Required Parking:**		☐	☐
☐	☐	a. Guest Parking: A minimum of three (3) guest parking spaces shall be provided for every six (6) dwelling units.		☐	☐
☐	☐	b. Parking Standards: Multifamily dwelling parking standards shall be consistent with the parking regulations in Chapter 2, Article 17 OFF-STREET PARKING AND LOADING, with the exception of a minimum of one parking space per dwelling unit.		☐	☐

Applicant Use:				Staff Use Only:	
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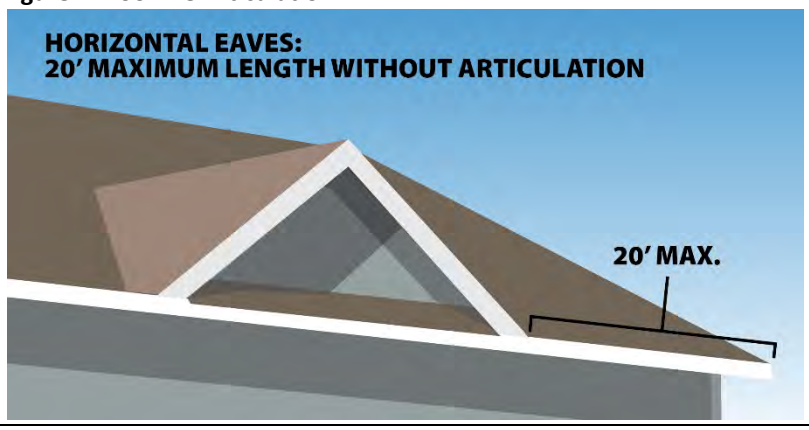
P. Exterior Lighting					
☐	☐	**(1)** Pedestrian-oriented lighting shall be provided in active pedestrian areas (i.e., paseos, interior sidewalks, pathways, etc.) for safety and security.		☐	☐
☐	☐	**(2)** Pedestrian pathway (excluding street-fronting sidewalks) lighting features shall not exceed ten feet (10') in height.		☐	☐
☐	☐	**(3)** Active pedestrian areas shall incorporate free-standing lighting separate from structures.		☐	☐
☐	☐	**(4)** Pedestrian pathways, elevator lobbies, parking areas, stairwells, and other common areas shall have minimum illumination levels of one-half (0.5) foot-candle at the pathway surface to clearly show walking conditions.		☐	☐
☐	☐	**(5)** Overhead sports court lighting shall illuminate only the intended area. Light trespass onto neighboring parcels is prohibited.		☐	☐
☐	☐	**(6)** Outdoor lighting shall use energy efficient lighting technology and shall be shielded downward to reduce glare and light pollution.		☐	☐
Q. Privacy					
☐	☐	**(1) Privacy.** Any balcony, window, or door shall use at least one of the following development approaches to lessen the privacy impacts onto adjacent properties. These techniques include: use of obscured glazing, landscaped/privacy buffer in the required setback with a minimum of five feet (5'), window placement above eye level, or locating balconies, windows, and doors facing toward the street and backyard. Trees and landscaping used as a landscaped/privacy buffer shall be planted and maintained by the property owner to preserve the privacy of adjacent property owners.		☐	☐
R. Trash and Recycling Enclosures					
☐	☐	**Trash and Recycling Enclosures.** The following trash and recycling enclosure development standards apply to multifamily development projects greater than four (4) dwelling units:		☐	☐
☐	☐	**(1)** Walls either made of masonry, metal, or wood with finished metal doors.		☐	☐
☐	☐	**(2)** Vehicle and pedestrian access gates.		☐	☐
☐	☐	**(3)** Downward lighting for safety and security.		☐	☐
S. Structure Identification					
☐	☐	**Structure Identification.** Structure identification numbers shall be placed along pedestrian pathways and roads and shall be readable from a distance of at least sixty feet (60').		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
T. Signage and Information					
☐	☐	**Signage and Information.** Developments shall comply with the sign standards in Division 3, Chapter 7 of the Ukiah Municipal Code (Signs). In addition, all directional signage and informational kiosks (i.e., development maps) shall be located at the entrances of individual buildings and at convergences of main pedestrian pathways.		☐	☐

Design Standards

These Objective Design Standards may be applied to duplexes, triplexes, four-plexes, and projects greater than four (4) dwelling units.

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
A. Carports					
☐	☐	**(1)** For multifamily development projects greater than four (4) dwelling units, carports shall not be visible from the street.		☐	☐
☐	☐	**(2)** Carports shall include the approved color palette, materials, and design elements of the structure.		☐	☐
B. Color Palettes					
☐	☐	**(1)** All structures shall include at least one primary color and a maximum of two (2) accent colors, in addition to the color of the roofing material.		☐	☐
☐	☐	**(2)** Each structure elevation shall include two (2) colors in the selected color palette.		☐	☐
☐	☐	**(3)** Projects that include more than ten (10) dwelling units shall include at least two (2) color palettes, where no single-color palette shall be used on more than fifty percent (50%) of the dwelling units.		☐	☐
C. Fences and Walls					
☐	☐	**Fences and Walls**. The following materials are prohibited for all fences and walls: 1. Electrified; 2. Barbed wire/razor wire; 3. Sharp objects such as spires and glass; 4. Cyclone or chain link; and 5. Vinyl.		☐	☐
D. Glazing					
☐	☐	**Glazing.** Structures shall incorporate the use of energy efficient glazing to reduce heat loss and gain.		☐	☐
E. Common Mailboxes					
☐	☐	**Common Mailboxes.** Common mailboxes shall be painted using the approved color palette for the overall development.		☐	☐
F. Trash and Recycling Enclosures					
☐	☐	**Trash and Recycling Enclosures.** Trash and recycling enclosure walls and metal doors shall be painted in accordance with the approved color palette for the overall project.		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
G. Roof Design and Materials					
☐	☐	**(1)** Horizontal eaves longer than twenty feet (20') shall be broken up by gables, building projections, or other forms of articulation. Articulation, in this instance, means the breaking up of large, otherwise featureless spaces or masses. **Figure 7: Roofline Articulation**  		☐	☐
☐	☐	**(2)** Roof overhangs shall be a minimum of twelve inches (12").		☐	☐
☐	☐	**(3)** The following are allowable roofing materials:		☐	☐
☐	☐	a. Nonreflective standing seam metal roofs in shades of tan, brown, black, light blue, red, and green;		☐	☐
☐	☐	b. Cool foam roofs (white);		☐	☐
☐	☐	c. Clay tile; and		☐	☐
☐	☐	d. Architectural composition shingles.		☐	☐
H. Screening					
☐	☐	**Screening.** All screening of ground-mounted, wall-mounted, and roof-mounted equipment shall be painted in accordance with the approved color palette for the project. Visual screening shall be installed if ground-mounted or wall-mounted equipment faces the street.		☐	☐
I. Stairways/Stairwells					
☐	☐	**Stairways/Stairwells.** Exterior stairways/stairwells that are not enclosed shall not be visible from the public right-of-way.		☐	☐

Applicant Use:				Staff Use Only:	
Comply	**N/A**	**Standard**	**Sheet #**	**Included**	**Missing**
J. Structure Massing					
☐	☐	**Structure Massing.** Structures that have a length longer than thirty feet (30') shall include facades with varying modulation with a minimum depth of two feet (2') at intervals of no more than ten feet (10') (see UCC §9055.2 DESIGN STANDARDS, Figure 1-8). **Figure 8: Varying façade modulation** 		☐	☐
K. Structure Materials and Elements					
☐	☐	**(1)** Drainpipes, parapets, and ledges shall not be located near windows, corridors, and balconies. If such placement is not feasible, they shall face parking lots, public spaces, and roads.		☐	☐
☐	☐	**(2)** All structures shall include a minimum of two (2) primary materials (i.e., stone, wood, masonry, or metal) on each structure elevation. Each material shall comprise at least twenty percent (20%) of the elevations excluding windows and railings.		☐	☐
☐	☐	**(3)** All structures that use exterior veneers shall ensure the edge of the veneer is not obvious by prohibiting the use of vertical joints at exterior corners.		☐	☐
☐	☐	**(4)** The following primary structure materials are prohibited:		☐	☐
☐	☐	a. Heavy timber, exposed logs in their natural state;		☐	☐
☐	☐	b. Stucco textured foam, synthetic stucco, vinyl or vinyl clad materials; and		☐	☐
☐	☐	c. Unfinished galvanized metals.		☐	☐

CITY OF UKIAH
Department of Community Development
300 Seminary Avenue, Ukiah, CA 95482
Phone (707) 463-6268
Web address: www.cityofukiah.com/community-development/

Housing Development Packet
Supplemental Information from Reviewing Departments

The City of Ukiah supports an increase in housing opportunities for households with incomes at all levels, and continually seeks ways to streamline the housing development process. This Supplement includes project criteria required by the departments reviewing the building permit application, and is to be used to assist prospective developers prior to submitting an application.

The following standards apply to all new residential construction projects except single-family dwellings.

Community Development Department – Building Division (707) 463-6268; BuildingDivision@CityofUkiah.com

- The design and construction of all site alterations shall comply with the current versions (at the date of submission of the building permit application) of the following: California Building Code, Plumbing Code, Electrical Code, California Mechanical Code, California Fire Code, California Energy Code, Title 24 California Energy Efficiency Standards, California Green Building Standards Code and City of Ukiah Ordinances and Amendments.
- Backflow devices are required on domestic water lines on buildings that are two-stories and higher.

The Building Permit Application form and Checklist for Accepting Residential Permit Applications, as well as other helpful handouts can be found on the Building Division webpage, www.cityofukiah.com/building-services/.

Ukiah Valley Fire Authority (707) 462-2938

- The design and construction of all site alterations shall comply with the current versions of the California Fire Code, Title 19, and all other pertinent codes and standards.

Electric Utility Department (707) 467-5711 (Program Coordinator)

- All utility lines from the structure to the first point of interconnection at the utility are to be placed underground.
- Building permit submittal shall include load calculations. During building permit application review, the specific service requirements, voltage, developer costs, utility easements, and additional requirements will be determined.

Public Works Department (707) 463-6282 (Permits, Easements)

- All work within the public right-of-way shall be performed by a licensed and properly insured contractor. The contractor shall obtain an encroachment permit for work within this area. Encroachment permit fee shall be $45 plus 3% of estimated construction costs. Any disturbed areas in the public right-of-way will be subject to applicable trench cut fees.

- Any existing curb and gutter in disrepair that is adjacent to the subject property shall be repaired. All work shall be done in conformance with the City of Ukiah Standard Drawings 101 and 102 or as directed by the City Engineer.
- Provide itemized Engineer's Estimates of cost for site improvements (excluding joint trench utilities) and separately, for the public improvements within the street right-of-way.
- Applicant shall upgrade existing sidewalk along subject property frontage to meet ADA requirements, including at the existing driveway approach and/or curb ramp. Public sidewalk improvements outside of the street right-of-way will require a sidewalk easement dedicated to the City.

STREET TREE INFO WITH FRONTAGE INFO

- If the building permit value is equal to or greater than one-third of the value of the existing structure, curb, gutter, sidewalk and street trees shall be provided along the subject property street frontage pursuant to Section 9181 of the Ukiah City Code. This shall include the repair or upgrade of existing curb, gutter, sidewalk, driveway approaches and/or curb ramps to meet current ADA standards, and the planting of street trees as required.
- Standard street tree requirements include street trees spaced approximately every 30 feet along the public street, within tree wells where feasible, otherwise within 5 feet of the back of sidewalk. Street trees shall be installed in accordance with City Standard Drawing No 601. Tree types shall be approved by the City Engineer.

WATER METER

- Capital Improvement fees for water service are based on the water meter size. A fee schedule for water meter sizes is available upon request. Additionally, there is a cost for the City to construct the water main taps for the proposed water services to serve the project.

BACKFLOW DEVICES

- All irrigation and fire services shall have approved backflow devices.

SEWER

- Existing sewer laterals planned to be utilized as part of this project shall be cleaned and tested and replaced if required. If an existing lateral is to be abandoned, it shall be abandoned at the main to the satisfaction of the Public Works Department.
- The proposed structure shall be separately connected to the sewer main, unless this requirement is waived by the City Engineer. Existing sewer laterals shall be cleaned and tested in accordance with City of Ukiah Ordinance No. 1105 and replaced if required.

EROSION CONTROL - DRAINAGE- STORM WATER

- If the project area disturbs greater than one acre, the applicant must obtain a Storm Water Permit from the Regional Water Quality Control Board prior to construction. The Storm Water Pollution Prevention Plan (SWPPP)shall be prepared by a Qualified SWPPP Developer, and implemented by a Qualified SWPPP Practitioner. Also, an Air Quality Permit from the Mendocino County Air Quality Control Board will be required.
- A detailed sediment and erosion control plan shall be included with the project plans, prepared by a Civil Engineer or other licensed erosion control specialist.
- Construction operations shall incorporate best management practices as necessary to prevent sediment from entering the streets and storm drains. Disturbed areas and stockpiles within the property shall be protected and monitored, and silt fence or other measures installed if needed to contain sediment. Streets and sidewalks shall be kept clean and clear of dust and debris at all times

- Prior to construction of site improvements, a final grading and drainage plan, and an erosion and sediment control plan, prepared by a Civil Engineer, shall be submitted for review and approval by the Department of Public Works. A final drainage report shall be provided to support the design of the proposed drainage system.
- Grading operations shall incorporate best management practices as necessary to minimize erosion and prevent sediment from entering the creek. Disturbed areas within the property shall be protected as soon as possible and monitored during the rainy season, and silt fence or other measures installed if needed to contain sediment until permanent soil stabilization is established.
- Roof drains shall be designed to maximize infiltration into landscaped areas, and not discharge directly into storm drains or into the street.
- The project engineer shall provide direct oversight and inspection during project construction, with special attention to implementation of best management practices for sediment and erosion control, and the proper grading, installation, and landscaping of the bioretention areas. Upon completion of the work, a report shall be submitted by the project engineer to the Department of Public Works stating that the improvements have been completed in accordance with the approved plans and conditions of approval, shall function as intended, and all areas have been permanently stabilized to prevent sediment and erosion

FLOOD PLAIN

- If the property is located within the floodplain and is subject to the floodplain provisions of the California Building Code and National Flood Insurance Program requirements. Based on the estimated value of work being more than 50 percent of the assessed valuation of the structure, the proposed work is considered a "substantial improvement," for purposes of flood plain management. Therefore, verification will be required that the entire existing structure, including any additions, is constructed at or above the base flood elevation. (Note that the "substantial improvement" determination may be re-evaluated by the City based upon a certified appraisal of the market value of the structure furnished by the applicant.) The following shall be required:
    - A pre-construction elevation certificate, based on the plans, will be required prior to the issuance of a building permit.
    - A post construction elevation certificate based on construction will be required prior to final inspection.

PAVING

- All areas of circulation should be paved with a minimum of 2" of AC on 6" of Base or other suitable surface approved by the City Engineer. This includes the proposed driveways and parking areas. If heavy truck traffic is anticipated from the solid waste company, delivery trucks, or other heavy vehicles, the pavement section should be calculated appropriately to ensure that it can withstand the loading.

STORM DRAIN

- Storm drain inlet filters shall be installed and maintained in all on-site storm drain inlets within paved areas.
- The development application should include a conceptual grading and drainage plan, prepared by a Civil Engineer, showing existing and proposed storm drain facilities, existing and proposed grades, and drainage patterns of adjoining areas. Any downstream drainage impacts should be identified and addressed. We recommend the addition of post-construction BMP's (best management practices) in the design of the development where feasible. Such measures may include vegetated swales and/or pervious pavement to infiltrate and treat roof and pavement run-off.
- Maintenance and inspection of all post-construction best management practices (BMPs) are the responsibility of the property owner. In accordance with the LID Manual, a legally binding, signed maintenance agreement approved by the City of Ukiah is required for the proposed storm water

treatment planters and all post-construction BMPs, and shall be recorded prior to final approval of the building permit.

- Should improvements exceed 10,000 square feet of new or replaced impervious surface, post-construction storm water mitigation measures may be required.

- City Clerk
- City Council
- City Manager
- Community Development
- Community Services
- Electric Utility
- Finance
- Fire (Ukiah Valley Fire Authority)
- Human Resources
- Information Technology
- Office of Emergency Management
- Police Department
- Public Works
- Purchasing
- Risk Management
- Successor Agency/ Oversight Board

Upcoming Events

FEB 2 Wed — 6:00 pm City Council Meeting @ Teleconference

FEB 9 Wed — 6:00 pm Planning Commission @ Teleconference

FEB 16 Wed — 6:00 pm City Council Meeting @ Teleconference

FEB 21 Mon — all-day Presidents' Day

View Calendar

Building and Code Enforcement Services

The Building and Code Enforcement Services Division is responsible for reviewing plans, issuing building permits, and performing field inspections to ensure compliance with local and state mandated regulations related to building construction, maintenance, rehabilitation, and accessibility. The Division partners with the Ukiah Police Department for code enforcement activities and to ensure building safety.

The primary goal of Building Services is to provide quality services to the community in a manner that is comprehensive, efficient, knowledgeable, and helpful to the public. Building Services is staffed by the Building Official and Development Permit Coordinator.

Further assistance related to the planning of your construction project is available on the Apps & Handouts, and More Help tabs below.

What's New | Building Codes and Design Values | Fees | Apps & Handouts | Rapid Review | FAQ | More Help

The City of Ukiah has adopted the following codes:

2019 California Building Code

2019 California Residential Code

2019 California Electrical Code

2019 California Mechanical Code

2019 California Plumbing Code

2019 California Fire Code

2019 California Green Building Standards Code

2019 California Energy Code

Design Values for the City of Ukiah

Seismic Design Category: D and E

Wind Speed: 110 mph

Exposure: B or C

Snow Load: No snow load unless above 1,300 foot elevation

60 minute rainfall: 1.5 inches

Matthew Keizer

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Steven Oropeza

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Building Services Division

Phone: 707-467-5786

Counter Hours (Building Permit Issuance)
Monday – Friday
8:00 a.m. – 11:30 a.m.
1:00 p.m. – 4:30 p.m.

Rapid Review
Wednesday
2:00 p.m. – 4:00 p.m.
Appointment Required

Building Official Technical Assistance Counter Hours:
Monday – Thursday
8:00 a.m. - 9:00 a.m.
1:00 p.m. - 2:00 p.m.

Building Inspection Services:
Monday – Thursday
9:00 a.m. – noon
2:00 p.m. – 5:00 p.m.

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- City Clerk
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Matthew Keizer

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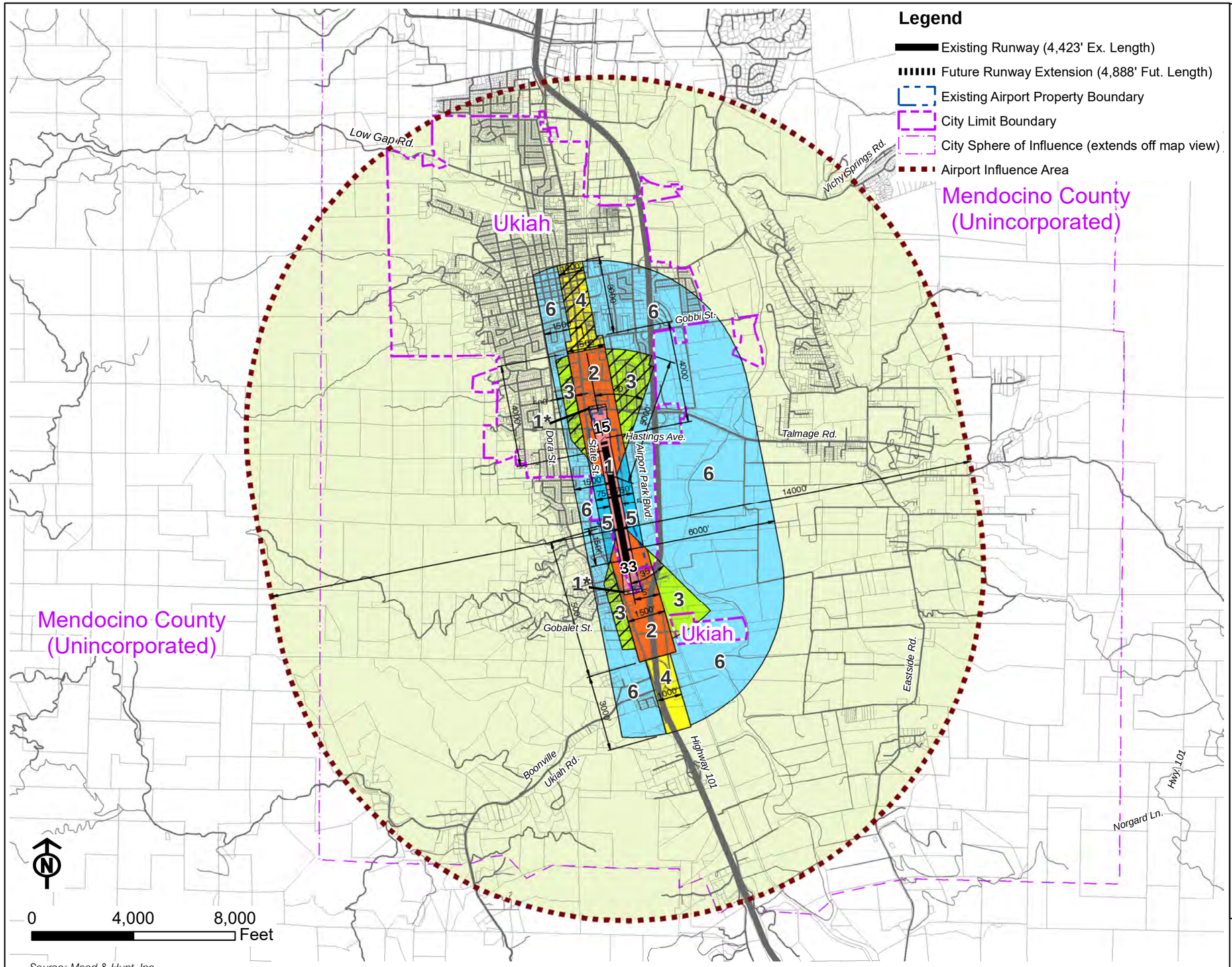


Compatibility Zones

- Zone 1: Runway Protection Zone (RPZ)
- Zone 1*: Ultimate Runway Protection Zone (RPZ)
- Zone 2: Inner Aprroach/Departure Zone
- Zone 3: Inner Turning Zone
- Zone 4: Outer Approach/Departure Zone
- Zone 5: Sideline Zone
- Zone 6: Traffic Pattern Zone
- Urban Overlay Zone
- Other Airport Environs

Notes

1. All Compatibility Zones: Reflect safety zones for a General Aviation Runway with Single-Sided Traffic Pattern provided in the 2011 California Airport Land Use Planning Handbook (Handbook).

- Zone 1: Based on the Runway Protection Zones (RPZs) provided in City and FAA approved Airport Layout Plan (2016).

- Zone 1* reflects an ultimate Runway Protection Zone (RPZ) for an ultimate runway length of 5,000 feet to serve future operations by CalFire Lockheed C-130 aircraft.

- Zones 2 and 4 (north): Zone 2 reflects Handbook Safety Zone 2 for existing Runway 15 end. Zone 4 includes outer portions of Handbook Safety Zone 2 for future Runway 15 end. Future northerly runway extension is intended to provide additional runway length for departures to south; landing threshold at Runway 15 end will remain in its current position.

- Zones 2 – 4 (south): Offset by 5-degrees to reflect southern flight route where aircraft use Highway 101 as a landmark

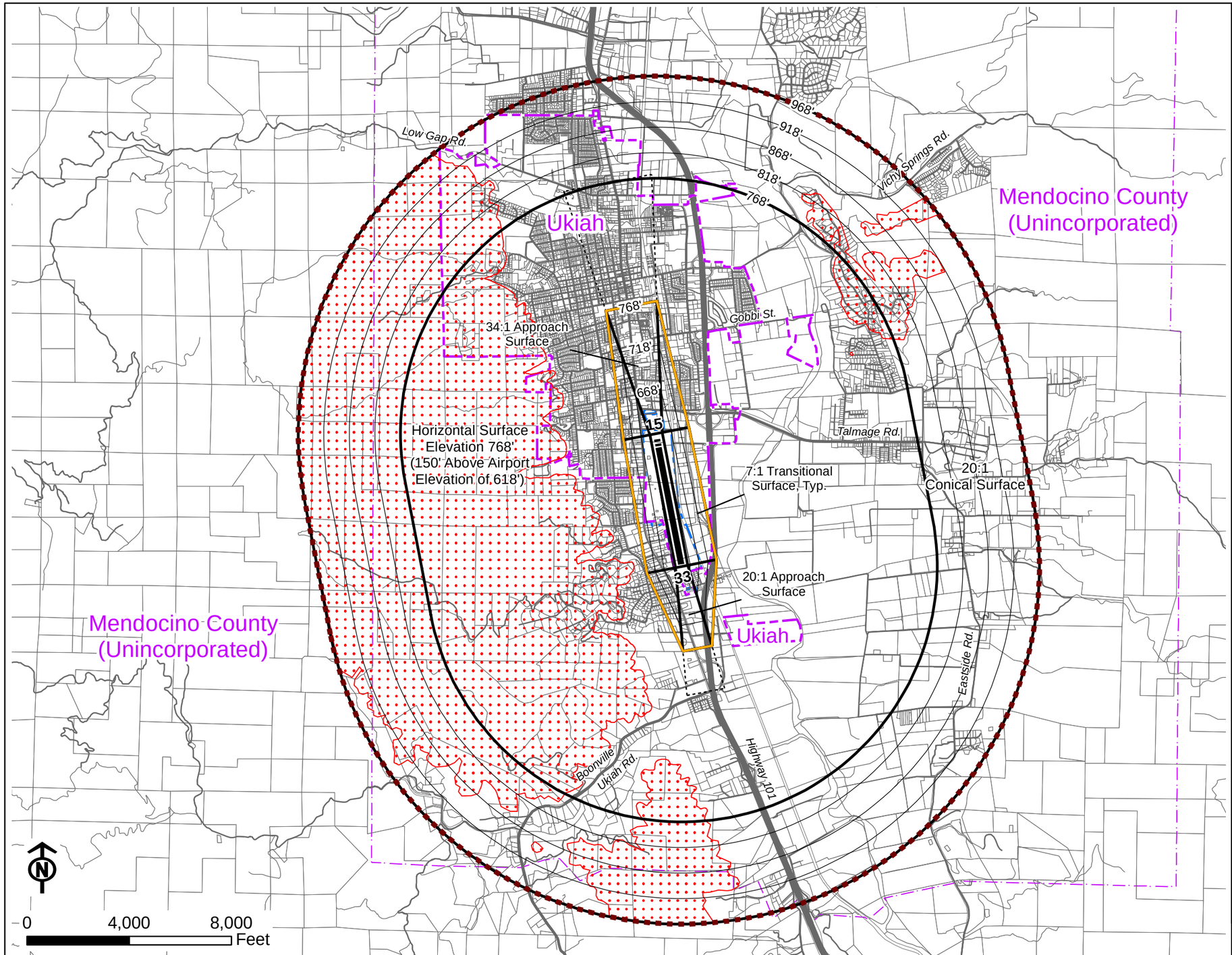
- Urban Overlay Zone: Provides a density increase within Zones 3 and 4 to North and Zone 3 to Southwest to reflect existing land use patterns.

Mendocino County
Airport Land Use Commission

Ukiah Municipal Airport
Land Use Compatibility Plan
(Adopted May 20, 2021)

Map 3A

Compatibility Policy Map
Ukiah Municipal Airport



Source: Mead & Hunt, Inc.

Legend

- Existing Runway (4,423' Ex. Length)
- Future Runway Extension (4,888' Fut. Length)
- Existing Airport Property Boundary
- City Limit Boundary
- City Sphere of Influence (extends off map view)
- Airport Influence Area

Airspace Obstruction Surfaces[1]

- Airspace Protection Zones
- Airspace Protection Surface Contour (50' interval)
- Airspace Critical Protection Zone
- Airspace High Terrain Zone

Notes

1. Source: Title 14 Code of Federal Regulation Part 77, Safe, Efficient Use and Preservation of Navigable Airspace as applied to Ukiah Municipal Airport future runway length.

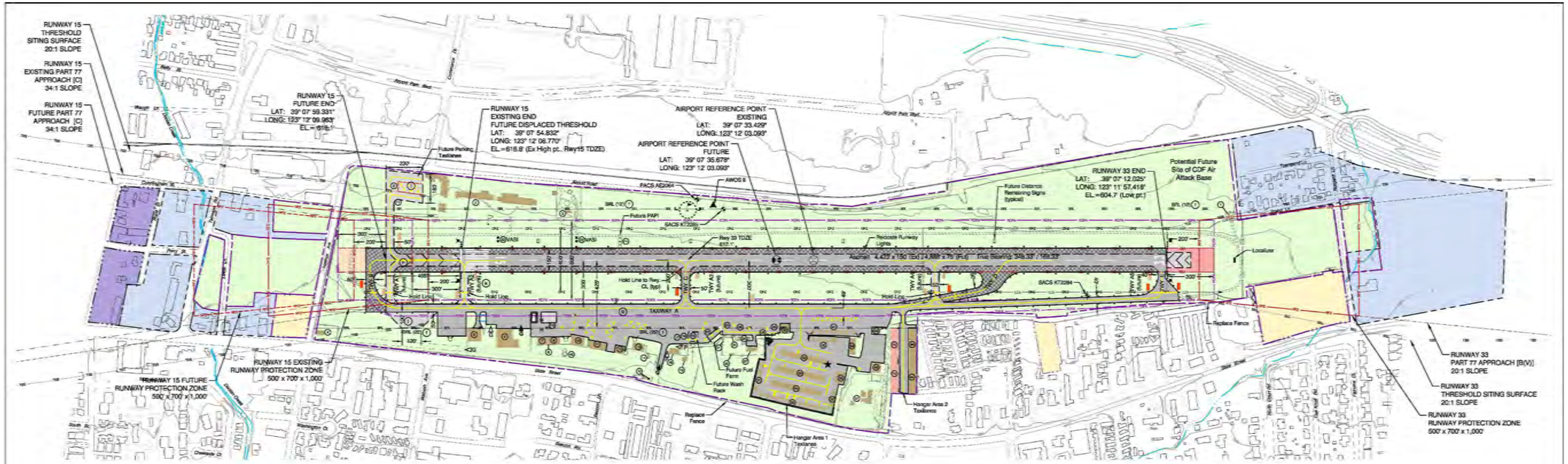
Mendocino County
Airport Land Use Commission

Ukiah Municipal Airport
Land Use Compatibility Plan
(Adopted May 20, 2021)

Map 3B

Airspace Protection Zones

Ukiah Municipal Airport



DRAWING LEGEND

	EXISTING	FUTURE
ACTIVE AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED	N/A	
AIRPORT PROPERTY		
AVIGATION EASEMENT		
EXISTING AV. EASEMENT / FUTURE PROPERTY		
AIRPORT REFERENCE POINT		
RUNWAY SAFETY AREA		
RUNWAY PROTECTION ZONE		
RUNWAY OBJECT FREE AREA		
OBSTACLE FREE ZONE		
PART 77 RUNWAY APPROACH SURFACE		
THRESHOLD SITING SURFACE		
TAXIWAY OBJECT FREE AREA		
LOCALIZER CRITICAL AREA		N/A
BUILDING RESTRICTION LINE		N/A
BUILDING - ON AIRPORT		
BUILDING - OFF AIRPORT		N/A
BUILDING - OFF AIRPORT, TO BE REMOVED	N/A	
PAVED ROAD		
AIRPORT SERVICE ROAD - PAVED		N/A
AIRPORT SERVICE ROAD - GRAVEL		N/A
FENCE		
VEHICLE GATE/PEDESTRIAN GATE	◀G / ◀P	◁G / ◁P
WIND CONE		P
AIRFIELD SIGNS		
VASI (VISUAL APPROACH SLOPE INDICATOR)		N/A
PAPI (PRECISION APPROACH PATH INDICATOR)	N/A	
AIRFIELD LIGHTS - SINGLE/GROUP/REILS	/ /	- / - / N/A
BEACON		N/A
YELLOW CHEVRON MARKINGS	N/A	
UTILITY POLE		N/A
SECURITY LIGHTING	N/A	N/A
DISTANCE REMAINING SIGN	N/A	
TOPOGRAPHIC CONTOURS		N/A
MONUMENT		N/A
WATERWAY / CULVERT		N/A
HELICOPTER PAD	N/A	
SECTION CORNER		N/A

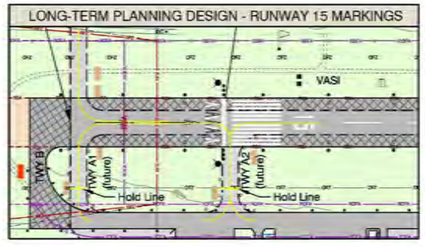
AIRPORT DATA

		EXISTING	FUTURE
AIRPORT REFERENCE CODE		B-I-5000	No Change
MEAN MAX. TEMP. (Hottest Month) (d)		92.7° F (July)	No Change
AIRPORT ELEVATION (Above Mean Sea Level) (c)		617.0'	618.1'
AIRPORT NAVIGATIONAL AIDS		Localizer, Vortac, GPS, Beacon, VASI, REILs, ASOS	Same + PAPI replacing VASI
AIRPORT REFERENCE POINT (b)	LATITUDE	39° 07' 33.429" N	39° 07' 35.679" N
	LONGITUDE	123° 12' 03.093" W	123° 12' 03.093" W
MISCELLANEOUS FACILITIES		Fuel (100LL + Jet), powerplant & airframe service, FBOs	No Change
CRITICAL AIRCRAFT		Beech King Air 200	No Change
MAGNETIC VARIATION (e)		14° 17' 35" E (April 2014)	Moving 0° 5.9' W / Year
NPIAS SERVICE LEVEL		General Aviation	No Change
STATE SERVICE LEVEL		Regional	No Change
AIRPORT ACREAGE	Fee Simple	160.2 acres	166.9 acres
	Avigation Easement	42.9 acres	39.4 acres

EXISTING BUILDING AND FACILITY LEGEND

EXISTING FACILITIES	ELEVATION	EXISTING FACILITIES	ELEVATION	EXISTING FACILITIES	ELEVATION
1 Localizer Equipment Building	614'	17 Covered Picnic Area	635'	33 T-hangars (10)	637'
2 City of Ukiah - Corporate Yard	632'	18 Storage	625'	34 Shade Hangars (14)	636'
3 Fuel Storage Tank	626'	19 Commercial Building	640'	35 Portable T-hangars	636'
4 Commercial Building	641'	20 Portable Office	636'	36 Portable T-hangars	636'
5 Box Hangar	642'	21 Storage	631'	37 Oak Valley Nursery	635'
6 FBO (2)	642'	22 WASI (visual approach slope indicator)	617'	38 Box Hangar	650'
7 FBO	648'	23 Covered Storage	627'	39 Box Hangar (2)	638'
8 Portable Office	637'	24 Electrical Vault	625'	40 Portable T-hangars	630'
9 Box Hangar	644'	25 Storage	623'	41 Portable T-hangars	628'
10 Airport Maintenance	643'	26 Fire Retardant Storage	625'	42 FBO	631'
11 FBO (2)	642'	27 FBO Offices	643'	43 FBO	643'
12 Box Hangar	652'	28 Portable T-hangar	630'	44 Box Hangars (4)	640'
13 Airport Administration	648'	29 Storage	628'	45 Box Hangars (6)	643'
14 Storage Building	644'	30 Box Hangar	632'	46 Street Sweeper Fuel Station	634'
15 Electrical Vault and Future Standby Generator	641'	31 Portable T-hangars	630'		
16 Commercial Building	641'	32 T-hangars (10)	634'		

LONG-TERM PLANNING DESIGN - RUNWAY 15 MARKINGS



LAYOUT PLAN NOTES

- ALP prepared using design criteria from FAA Advisory Circulars 150/5300-13A Change 1, "Airport Design", 150/5070-6A, "Airport Master Plans" and Part 77 of the Federal Aviation Regulations ("FAR), "Safe, Efficient Use, and Preservation of the Navigable Airspace."

(a) The proposed 465 foot runway extension project identified herein is for long-term planning purposes only. This proposed project shall not be undertaken without prior NEPA environmental processing and written FAA approval. Precondition will include FAA Forecast approval and FAA approval off airfield standard design.

(b) All coordinates NAD83. Horizontal data source: AGIS Survey by Woolpert, March 2009.

(c) All elevations NAVD88. Data source: AGIS Survey by Woolpert, March 2009.

(d) Temperature Source: Western Regional Climate Center, Station #049122, Ukiah, California.

(e) Magnetic Declination Source: NOAA, National Geophysical Data Center.

(f) The building restriction line (BRL) is based on a composite of airfield design setbacks such as the taxiway object free area (TOFA) and Part 77 airspace surfaces. Allowable building elevations above ground level are noted at each line. 25 feet above runway elevation on west side of runway, and 10 feet above runway elevation on east side of runway.

(g) Taxiway object free area (TOFA) from Taxiway A centerline is based on critical aircraft wingspan. Taxiway centerline to object separation equal to 0.7 times the critical aircraft wingspan plus 10 feet: [0.7(54.5')+10']=49 feet. Wing tip clearance equal to 0.2 times the wingspan plus 10 feet: [0.2(54.5')+10']=21 feet.

(h) Future chevrons shown as near-term marking solution. See inset below for long-term marking design.

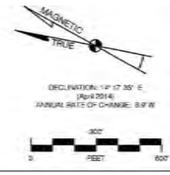
(i) Proposed tie-down apron is depicted for long-term planning purposes only.

(j) Proposed run-up apron is depicted for long-term planning purposes only.

(k) Proposed New Taxiway A2 to existing Runway 15 end threshold and new chevrons aft of existing Runway 15 end will correct and eliminate the non-standard aligned taxiway design.

FUTURE FACILITIES

(c)	Proposed Tiedown Apron
(d)	Future Fuel Farm
(e)	Future Wash Rack
(f)	Future PAPI
(g)	Future Box Hangars
(h)	Future Helicopter Parking Spaces



Accepted by Caltrans Division of Aeronautics as basis of ALUCP on 5/23/19

SUBMITTED BY:

By _____ Date _____

FAA Approval Space

NO.	REVISION	SPONSOR	DATE
2	Corrected Part 77 Approach Slope to Runway 15	Mead & Hunt, Inc.	April 2015
1	ALP Update (AC 13A Compliance, Rwy. Width Reduction, Rwy End Mods)	Mead & Hunt, Inc.	April 2015

UKIAH MUNICIPAL AIRPORT
UKIAH, CALIFORNIA
AIRPORT LAYOUT PLAN

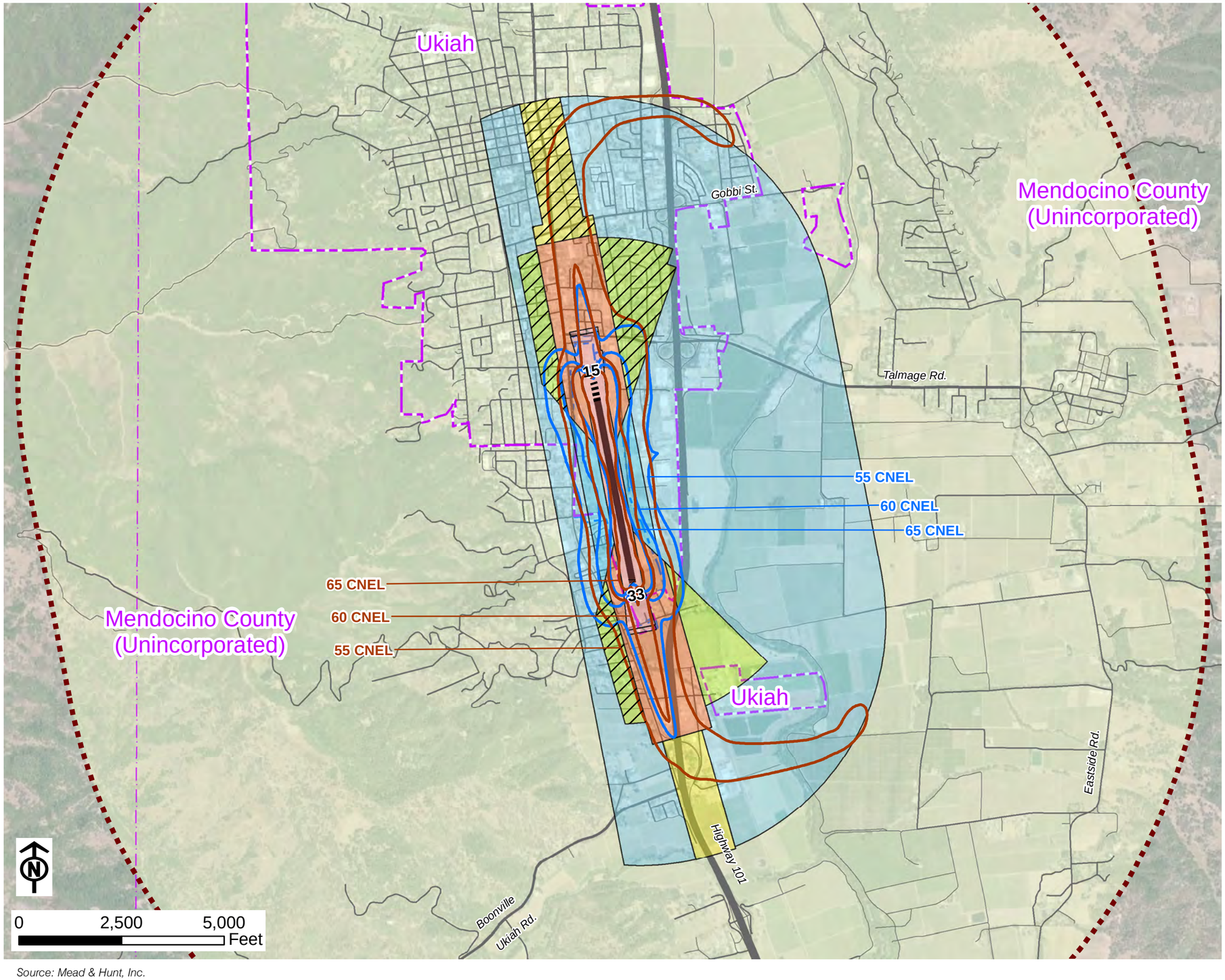
Mead & Hunt
133 Aviation Boulevard, Suite 100
Santa Rosa, California 95403
(707) 526-5010
Fax (707) 526-9721
www.meadhunt.com

City of Ukiah

DESIGN:	CS/BM	DRAWN:	TE/DS	DATE:	April 2015	SHEET	2	OF	11

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number [assigned] as provided under Title 49 U.S.C., Section 47104. The contents do not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

C:\Users\870\me\appdata\local\temp\AcPublish_7948\UKI-airport-layout-Exh 4-2.dwg May 30, 2019 - 2:49pm



Source: Mead & Hunt, Inc.

Legend

- Existing Runway (4,423' Ex. Length)
- Future Runway Extension (4,888' Fut. Length)
- Existing Airport Property Boundary
- City Limit Boundary
- City Sphere of Influence (extends off map view)
- Airport Influence Area[3]

Compatibility Zones

- Zone 1: Runway Protection Zone (RPZ)
- Zone 1*: Ultimate Runway Protection Zone (RPZ)
- Zone 2: Inner Aprroach/Departure Zone
- Zone 3: Inner Turning Zone
- Zone 4: Outer Approach/Departure Zone
- Zone 5: Sideline Zone
- Zone 6: Traffic Pattern Zone
- Urban Overlay Zone
- Other Airport Environs

Airport Noise Contours

- Avg. Annual Day (30,916 Future Annual Ops)[1]
- Cal Fire Typical Fire-Event Day[2]

Notes

1. Source: Mead & Hunt, Inc. (May 2019). Forecast based on 2019 activity data provided by Ukiah Municipal Airport Management. Forecast represents a theoretical maximum for compatibility planning purposes.

2. Source: Mead & Hunt, Inc. (2019). The Cal Fire noise contours represent a typical fire event day with 44 Departures and 44 arrivals split evenly between Runways 15 and 33. Aircraft type modeled was the S-2T.

3. Portions of the Airport Influence Area may extend beyond map limits.

Mendocino County
Airport Land Use Commission

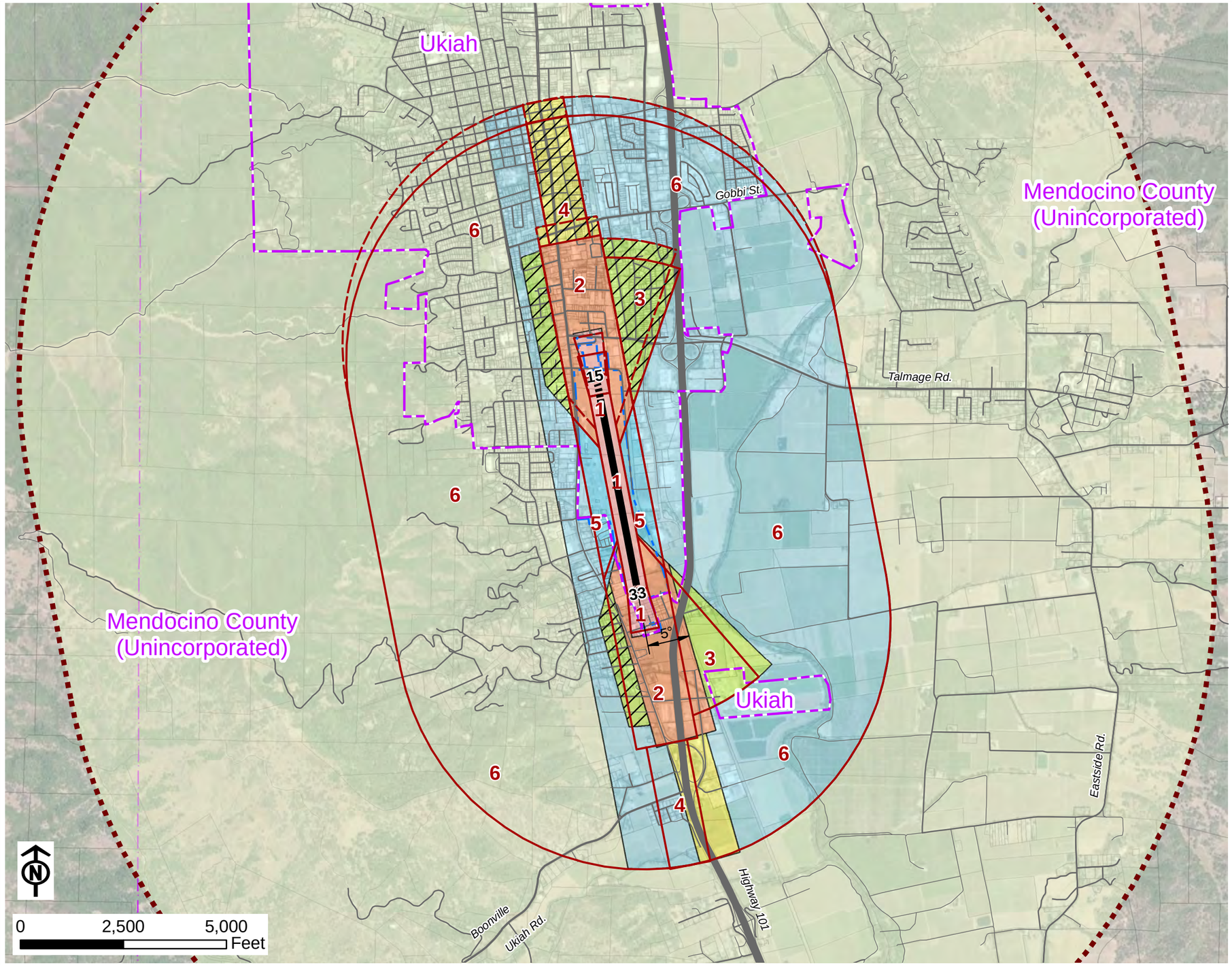
Ukiah Municipal Airport
Land Use Compatibility Plan

(Adopted May 20, 2021)

Exhibit 4-4

Compatibility Factors: Noise

Ukiah Municipal Airport



Source: Mead & Hunt, Inc.

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- Zone 5: Sideline Zone
- Zone 6: Traffic Pattern Zone
- Urban Overlay Zone
- Other Airport Environs

[1]

Handbook Safety Zones (Med. GA Runway)

- Safety Zones (Applied to Existing Runway)
- Safety Zones (Applied to Fut. Runway Extension)

1 Runway Protection Zone
2 Inner Approach/Departure Zone
3 Inner Turning Zone
4 Outer Approach/Departure Zone
5 Sideline Zone
6 Traffic Pattern Zone

Notes

1. Source: California Airport Land Use Planning Handbook (Handbook) published by California Department of Transportation, Division of Aeronautics (2011). Consistent with Handbook, Zone 1 modified to reflect the Runway Protection Zone (RPZ) on FAA-approved Airport Layout Plan (2015).

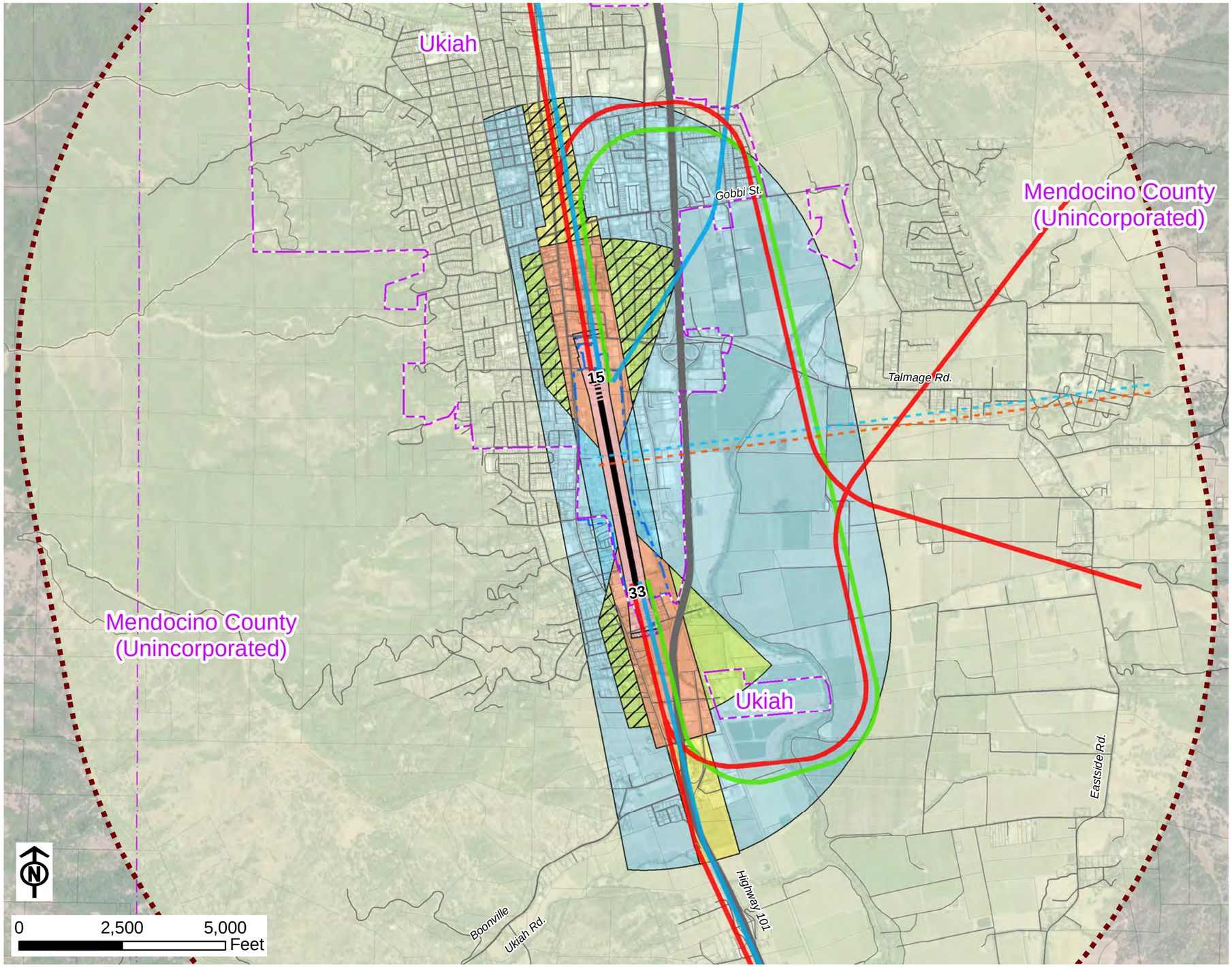
2. Portions of the Airport Influence Area may extend beyond map limits.

Mendocino County
Airport Land Use Commission
Ukiah Municipal Airport
Land Use Compatibility Plan
(Adopted May 20, 2021)

Exhibit 4-5

Compatibility Factor: Safety

Ukiah Municipal Airport



Source: Mead & Hunt, Inc.

Legend

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- Future Runway Extension (4,888' Fut. Length)
- Existing Airport Property Boundary
- City Limit Boundary
- City Sphere of Influence (extends off map view)
- Airport Influence Area [2]

General Flight Patterns [1]

- Fixed Wing Aircraft - Arrival
- Fixed Wing Aircraft - Departure
- Fixed Wing Aircraft - Touch-and-Go
- Helicopter - Arrival
- Helicopter - Departure

Compatibility Zones

- Zone 1: Runway Protection Zone (RPZ)
- Zone 1*: Ultimate Runway Protection Zone (RPZ)
- Zone 2: Inner Aprroach/Departure Zone
- Zone 3: Inner Turning Zone
- Zone 4: Outer Approach/Departure Zone
- Zone 5: Sideline Zone
- Zone 6: Traffic Pattern Zone
- Urban Overlay Zone
- Other Airport Environs

Notes

1. Source: General flight patterns identified by Ukiah Airport Management.

2. Portions of the Airport Influence Area may extend beyond map limits.

Mendocino County
Airport Land Use Commission

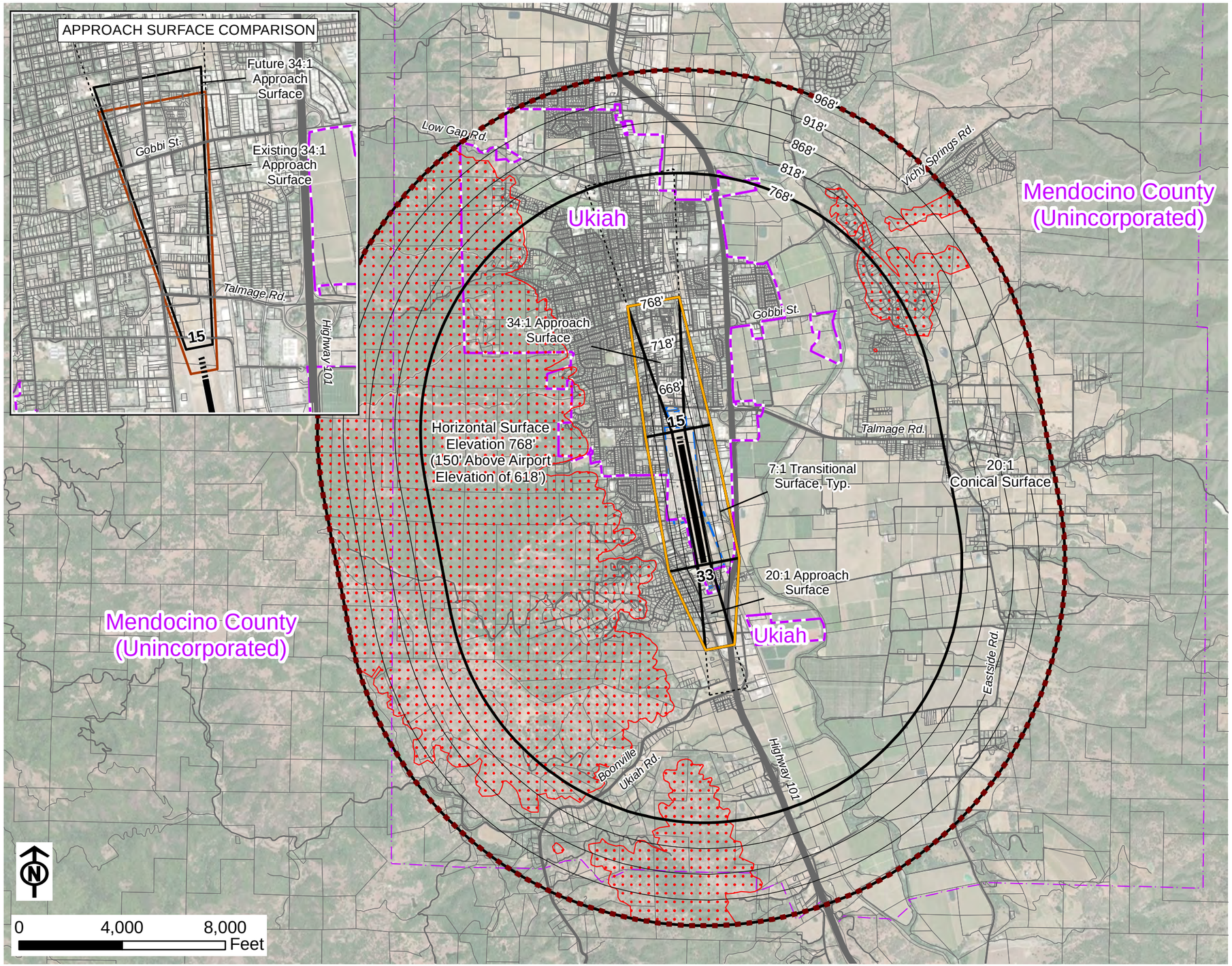
Ukiah Municipal Airport
Land Use Compatibility Plan

(Adopted May 20, 2021)

Exhibit 4-6

Compatibility Factor: Overflight

Ukiah Municipal Airport



Source: Mead & Hunt, Inc.

Legend

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- Future Runway Extension (4,888' Fut. Length)
- Existing Airport Property Boundary
- City Limit Boundary
- City Sphere of Influence (extends off map view)
- Airport Influence Area

Airspace Obstruction Surfaces[1]

- Airspace Protection Zones (14 CFR Part 77)
- Airspace Protection Surface Contour (50' interval)
- Existing Approach Surface (Runway 15; See inset)
- Airspace Critical Protection Zone
- Airspace High Terrain Zone

Notes

1. Source: Title 14 Code of Federal Regulation Part 77, Safe, Efficient Use and Preservation of Navigable Airspace as applied to Ukiah Municipal Airport future runway length.

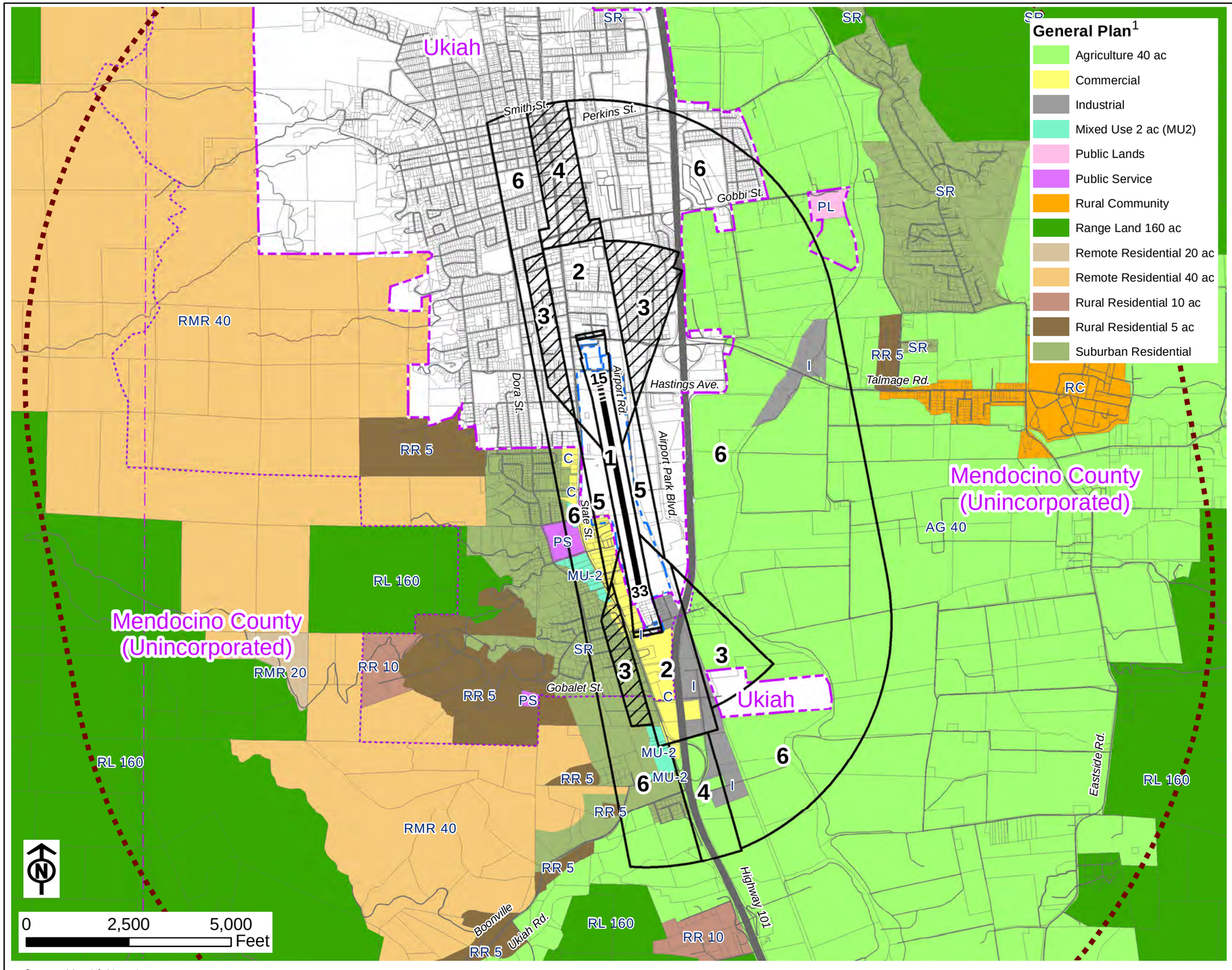
Mendocino County
Airport Land Use Commission

Ukiah Municipal Airport
Land Use Compatibility Plan
(Adopted May 20, 2021)

Exhibit 4-7

Compatibility Factor: Airspace

Ukiah Municipal Airport



Source: Mead & Hunt, Inc.

Legend

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- Airport Influence Area [2]

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- Zone 6: Traffic Pattern Zone
- Urban Overlay Zone

Notes

1. Source: Mendocino County Planning Department (April 2019).

2. Portions of the Airport Influence Area may extend beyond map limits.

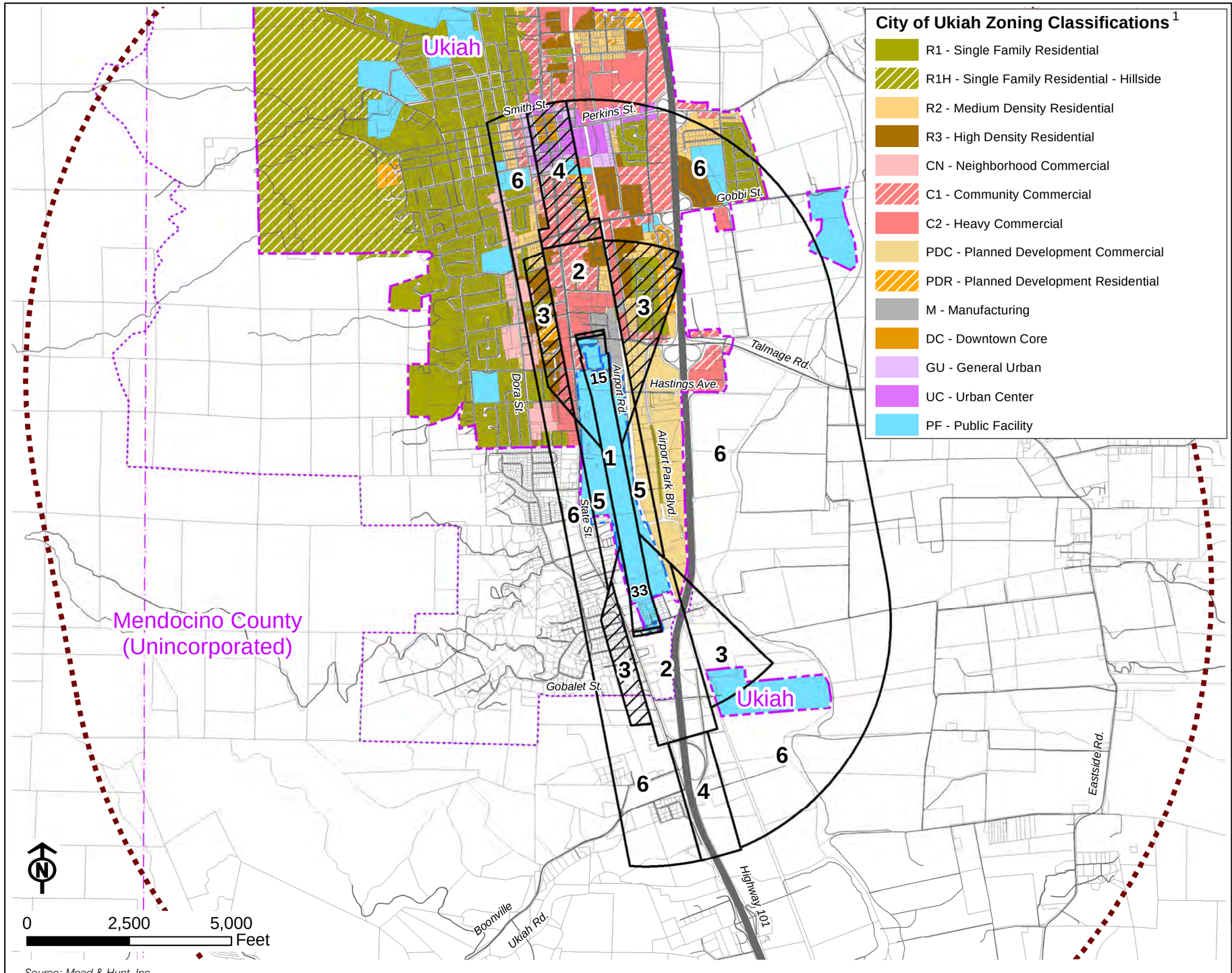
Mendocino County
Airport Land Use Commission

Ukiah Municipal Airport
Land Use Compatibility Plan
(Adopted May 20, 2021)

Exhibit 4-9

County of Mendocino General Plan Land Uses

Ukiah Municipal Airport



Source: Mead & Hunt, Inc.

City of Ukiah Zoning Classifications [1]

- R1 - Single Family Residential
- R1H - Single Family Residential - Hillside
- R2 - Medium Density Residential
- R3 - High Density Residential
- CN - Neighborhood Commercial
- C1 - Community Commercial
- C2 - Heavy Commercial
- PDC - Planned Development Commercial
- PDR - Planned Development Residential
- M - Manufacturing
- DC - Downtown Core
- GU - General Urban
- UC - Urban Center
- PF - Public Facility

Legend

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- City Sphere of Influence (extends off map view)
- Airport Influence Area [2]

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- Zone 5: Sideline Zone
- Zone 6: Traffic Pattern Zone
- Urban Overlay Zone

Notes

1. Source: City of Ukiah.

2. Portions of the Airport Influence Area may extend beyond map limits

Mendocino County
Airport Land Use Commission

Ukiah Municipal Airport
Land Use Compatibility Plan
(Adopted May 20, 2021)

Exhibit 4-10

City of Ukiah General Land Uses

Ukiah Municipal Airport

§6054 CONSTRUCTION OF BUILDINGS AND PROJECTS

It shall be unlawful for any person within a residential zone, or within a radius of five hundred feet (500') therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures or projects or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist or any other construction type device (between the hours of 7:00 P.M. of one day and 7:00 A.M. of the next day) in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless beforehand a permit therefor has been duly obtained form the Director of Public works. No permit shall be required to perform emergency work as defined in §6046 of this Article. (Ord. 748, Article 1, adopted 1980)

- City Clerk
- City Council
- City Manager
- Community Development
- Community Services
- Electric Utility
- Finance
- Fire (Ukiah Valley Fire Authority)
- Human Resources
- Information Technology
- Office of Emergency Management
- Police Department
- Public Works
- Purchasing
- Risk Management
- Successor Agency/ Oversight Board

Upcoming Events

FEB 2 Wed	6:00 pm City Council Meeting @ Teleconference
FEB 9 Wed	6:00 pm Planning Commission @ Teleconference
FEB 16 Wed	6:00 pm City Council Meeting @ Teleconference
FEB 21 Mon	all-day Presidents' Day

Construction

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Stormwater can be diverted away from the construction site, while silt fences and other erosion controls can be put in place to minimize the amount of sediment that gets into the water. Also, soil erosion can be prevented by minimizing the disturbed area during construction projects, and by placing seed and mulch on bare areas as early as possible.

Construction vehicles can leak fuel, oil and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies. Make sure to clean up spills immediately and properly dispose of cleanup materials.

The EPA has a wonderful poster available that outlines best management practices that you can implement on your next construction project.

Mendocino County

Air Quality Management District

Wildfire Smoke Protection Air Advisory

Enter your search

Dust Control

Grading Information

Regulation 1 of the Mendocino County Air Quality Management District has three rules relating to the control of fugitive dust :

These regulations apply to both incorporated and unincorporated areas of Mendocino County. Violations of these regulations can result in fines and penalties and/or legal action.

- Rule 1-400(a) -
  Prohibits activities that "cause injury, detriment, nuisance or annoyance to a considerable number of persons...or which endanger the...health or safety of...the public…"

- Rule 1-430(a) -
  Prohibits activities which "...may allow unnecessary amounts of particulate matter to become airborne..."

- Rule 1-430(b) -
  This rule requires that "...reasonable precautions shall be taken to prevent particulate matter from becoming airborne…"

Fugitive Dust

Fugitive dust is caused by grading, track-out from equipment and vehicles, exposed stockpiles, unpaved roads, staging areas, parking lots, etc.

Emissions of fugitive dust from grading operations can become subject to Rule 1-400(a).

The District usually hears about fugitive dust problems from the public who live or work near a project.

The best way to avoid fugitive dust complaints is to implement preventative measures.

Fugitive Dust violations are subject to enforcement action by the District which may include halting activity on a site until the problem can be solved.

Control Measures

Regulation 1, Rule 1-430 requires the following mitigation measures to reduce the amount of fugitive dust generated by construction and grading activities:

1. All visibly dry disturbed soil and road surfaces shall be watered to minimize fugitive dust emissions.

2. All unpaved areas shall have a posted speed limit of 10 mph.

3. Earth or other material tracked onto neighboring paved roads shall be removed promptly.

4. Approved chemical soil stabilizers shall be applied to exposed earth surfaces in inactive construction areas and exposed stock piles (i.e. sand, gravel, dirt).

5. Dust generating activities shall be limited during periods of high winds (over 15 mph).

6. Access of unauthorized vehicles onto the construction site during non-working hours shall be prevented.

7. A daily log shall be kept of fugitive dust control activities.

Following the recommendations should reduce conflicts with project neighbors, avoid the possibility of fines and penalties for violations of District regulations, and most importantly, result in cleaner air for all of us.

Grading Rule Amendments Summary and Available Documents

Copies of the proposed regulation and supporting documents are below: -

Grading Amendment Workshop Presentation

Amendments to Regulation 1 Chapter 1

Amendments to Regulation 1 Chapter 2

Amendments to Regulation 1 Chapter 3

Naturally Occurring Asbestos

State of California Air Resources Board Air Toxic Control Measures for Naturally Occurring Asbestos. This tends to effect new construction and grading activities.

If you have any questions or would like more information please call the District office at 707-463-4354.

Burn Day Status

Burn permits are required for ALL open burning. Burn hours are 9 a.m. to 3 p.m. Burn piles are limited to 4' x 4', unless otherwise stated by a fire agency. You can only burn vegetative matter. Wednesday, March 16, 2022 is a Permissive Burn day.

Español

Burn Permit Application> Click Here
SMP Online Burn Request> Click Here

Credit Card Payments

Service FEES are assessed to all Credit Card transactions by govPayNet:

- Pay Burn Permit> Click Here
- Pay Operating Permit> Click Here
- Pay Fines> Click Here

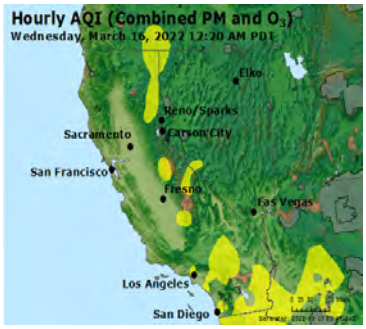
Air Quality for Mendocino

Current Air Quality Index for county:

Observed on 2022-03-16 at 16:00 PST

Ozone: 30
Good

PM2.5: 8
Good



More Air Quality Information:

- Forecast> Click Here
- Current> Click Here
- Get email alerts> Click Here

Map data is collected from AirNow.gov.

News / Advisories

Burn Suspension Lifted. - Burn only on permissive burn days with a valid burn permit..

Air Quality Advisory For Mendocino County covering smoke impacts from wildfires in Northern California (month of September 2021). Click Here for More Information

AB 617 Community Air Protection Incentive Projects - AB 617 Community Air Protection Incentives to Reduce Emissions. Click Here for More Information

Volkswagen Environmental Mitigation Trust - provides about $423 million for California to mitigate the excess nitrogen oxide emissions caused by VW's use of illegal emissions testing defeat devices in certain VW diesel vehicles.. Click Here for More Information

Air District Relaxes Portable Diesel Engine Enforcement - ARB has determined the standards for DPM may not be feasible. Click Here for More Information

The District Mission

The mission of the Mendocino County Air Quality Management District is to protect and manage air quality, an essential public resource upon which the health of the community depends.

Mendocino County Air Quality Management District is one of 35 local Air Districts in California.

Learn more

- **Community**

- Burn Status
- Complaints
- Report Smoky Vehicles
- Advisories

News

- Diesel Engines
- Gasoline Dispensing Facility
- Wildfires

Location / Contact

- 306 East Gobbi Street
- Ukiah, California 95482

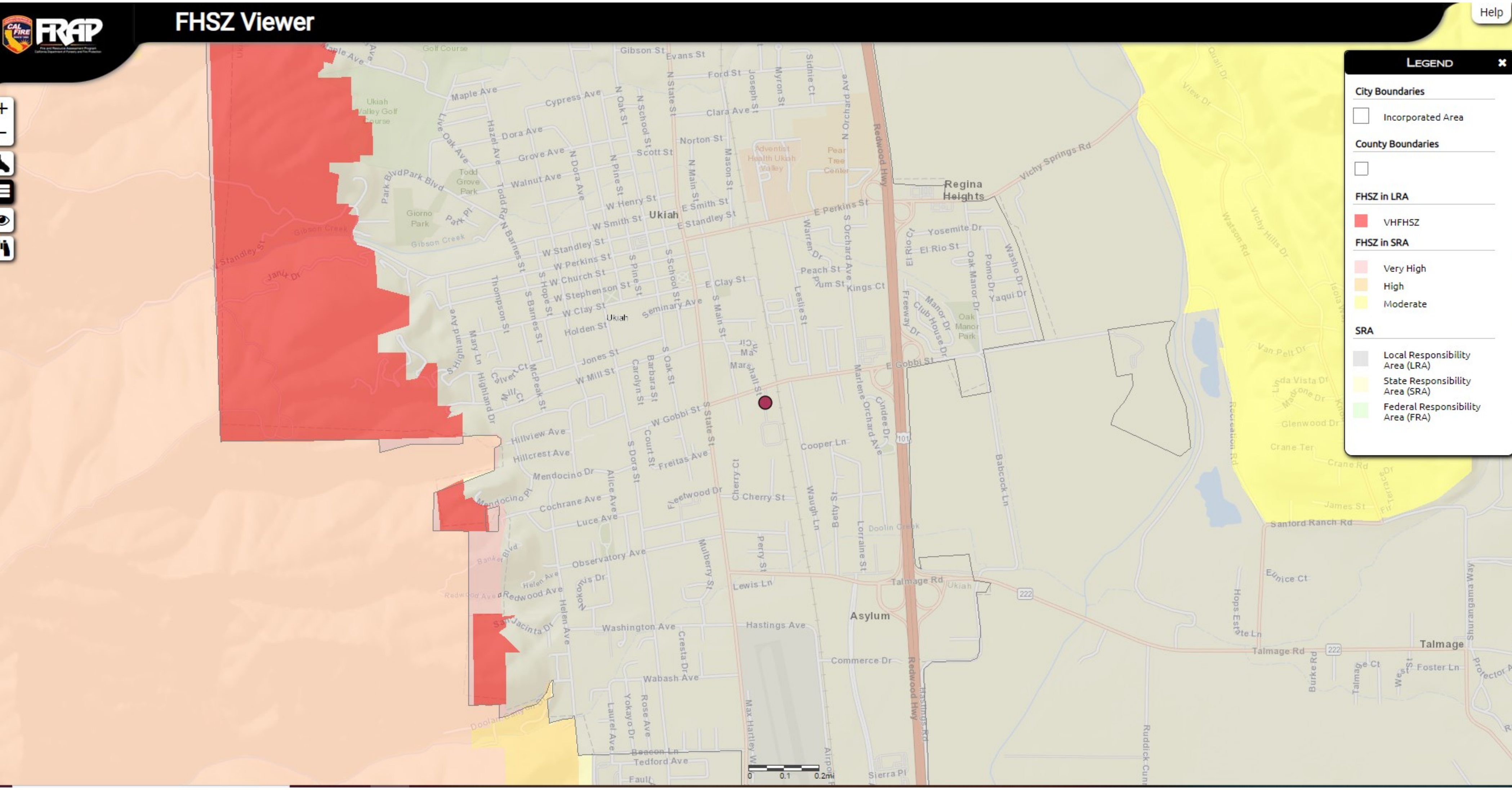
Phone: 707-463-4354

- mcaqmd@mendocinocounty.org

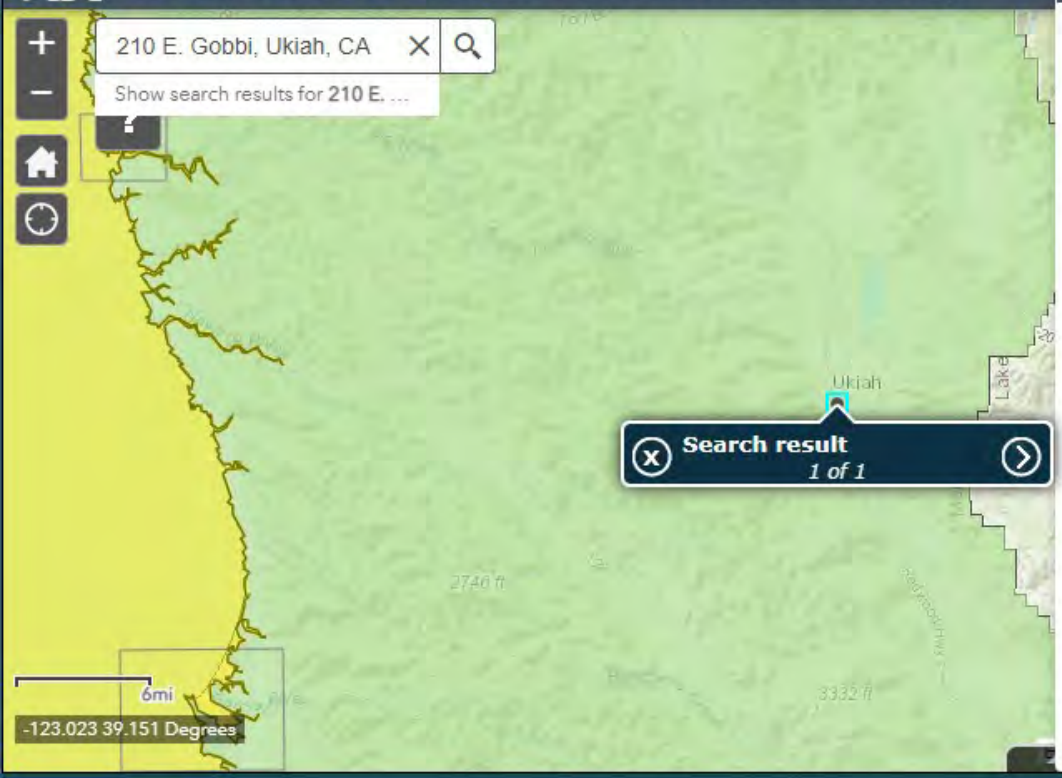
Air Pollution Control-
Executive Officer:

Barbara A. Moed, P.G.

County of Mendocino Website.


FHSZ Viewer
Help
Legend
City Boundaries
Incorporated Area
County Boundaries
FHSZ in LRA
VHFHSZ
FHSZ in SRA
Very High
High
Moderate
SRA
Local Responsibility Area (LRA)
State Responsibility Area (SRA)
Federal Responsibility Area (FRA)
Ukiah
Regina Heights
Asylum
Talmage

CGS Information Warehouse: Tsunami Hazard Area Map



Legend

CA_Tsunami_Inundation_Map_for_Emergency_Planning_2009

CA_Tsunami_Inundation_Quadrangles_2009

CA_Tsunami_Hazard_Line

CA_Tsunami_Hazard_Area_Brochure

CA_Tsunami_Hazard_Area

- Yes, Tsunami Hazard Area
- No, Outside Hazard Area

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
PROPOSED ACORN VALLEY PLAZA
E. GOBBI STREET AND VILLAGE CIRCLE
UKIAH, MENDOCINO COUNTY, CALIFORNIA

May 31, 2022

Prepared For:

THE DANCO GROUP
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125622-0071222.01.001

May 31, 2022
Project No. 71222.00.001

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Email: mowensby@danco-group.com

Reference: **Geotechnical Engineering Investigation Report**
Proposed Acorn Valley Plaza
E. Gobbi Street and Village Circle, Ukiah, Mendocino County, California

Dear Ms. Owensby,

NV5 conducted a geotechnical engineering investigation for the proposed Acorn Valley Plaza project located at E. Gobbi Street and Village Circle in Ukiah, California. NV5's geotechnical engineering investigation of the site was performed consistent with the scope of services presented in the March 22, 2022 proposal (PC22.048).

The findings, conclusions and recommendations presented in this report are based on the following relevant information collected and evaluated by NV5: literature review, surface observations, subsurface exploration, laboratory test results, and previous experience with similar projects, sites and conditions in the area. The approximately three-acre parcel is proposed for high-density residential development consisting of multi-story apartment buildings. There were no seismic hazards identified on the site or in the immediate area that require design mitigation. A major portion of the site supports loose undocumented fills that are not considered suitable for support of the proposed residential improvements. However, it is NV5's opinion that the site is suitable for the proposed construction provided the geotechnical engineering recommendations presented in this report are incorporated into the earthwork and structural improvements. This report should not be relied upon without review by NV5 if a period of 24 months elapses between the issuance report date shown above and the date when construction commences.

NV5 appreciates the opportunity to provide geotechnical engineering services for this important project. If you have questions or need additional information, please do not hesitate to contact the undersigned at 530-894-2487.

Sincerely,

NV5

Santiago Carrillo, EIT
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
DOMINIC J. POTESTIO
NO. 69299
CIVIL
STATE OF CALIFORNIA

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Senior Engineer

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ACRONYMS

°F	degrees Fahrenheit
AB	aggregate base
AC	asphalt concrete
ACI	American Concrete Institute
ASCE	American Society of Civil Engineers
ASTM	ASTM International
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
CAT	Caterpillar
CBC	California Building Code
CGS	California Geological Survey
CQA	Construction Quality Assurance
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EERI	Earthquake Engineering Research Institute
EFP	equivalent fluid pressure
FS	factor of safety
ft/s	feet per second
H:V	horizontal to vertical slope ratio
IBC	International Building Code
km	kilometer
MCE	maximum considered earthquake
M_L	local magnitude earthquake
msl	mean sea level
M_w	modal magnitude
NEIC	National Earthquake Information Center
OSHA	Occupational Safety and Hazards Administration
oz/sy	ounce per square yard
P-wave	seismic compression wave
PCA	Portland Cement Association
pcf	pounds per cubic foot
PGA_M	peak ground acceleration
PI	plasticity index
psf	pounds per square foot
psi	pounds per square inch
PVC	polyvinylchloride
S-wave	shear-wave
SEAOC	Structural Engineers Association of California
sf	square foot
SRMS	Seismic Refraction Microtremor Survey
SSD	saturated surface dry
TI	traffic index
USCS	Unified Soils Classification System
USGS	United States Geological Survey

1.0 INTRODUCTION

NV5 performed a geotechnical engineering investigation and prepared a geotechnical engineering investigation report for the proposed Acorn Valley Plaza high-density residential project at E. Gobbi Street and Village Circle in Ukiah, California, consistent with the scope of services presented in NV5's *Proposal for Geotechnical Engineering Services* (PC22.048), dated March 22, 2022. NV5's findings, conclusions and recommendations are presented herein.

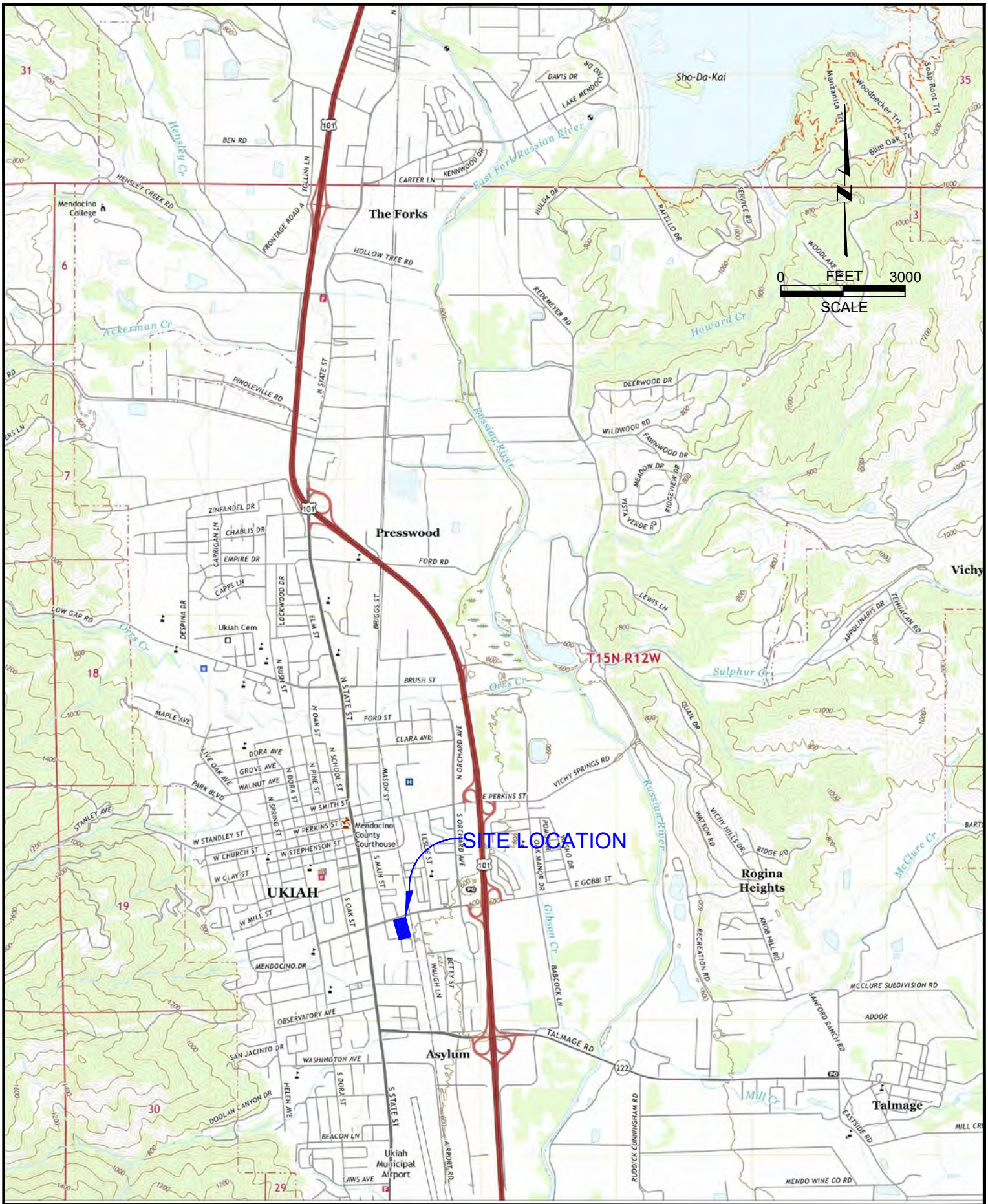
1.1 SCOPE-OF-SERVICES

NV5 performed a specific scope-of-services to develop geotechnical engineering design recommendations for earthwork and structural improvements. Brief descriptions of each work scope task are presented below. A detailed description of each work scope task is presented in Section 2 (Site Investigation) of this report.

- **Task 1 Site Investigation:** NV5 performed a site investigation to characterize the existing surface and subsurface soil, rock and groundwater conditions encountered to the maximum depth excavated. NV5's field engineer/geologist made observations, took representative soil samples, and performed field tests at a limited number of subsurface exploratory locations. NV5 performed laboratory tests on selected soil samples to evaluate their engineering material properties.
- **Task 2 Data Analysis and Engineering Design:** NV5 evaluated the field and laboratory site data and the proposed site improvements and used this information to develop geotechnical engineering design recommendations for earthwork and structural improvements. NV5 used engineering judgment to extrapolate NV5's observations and conclusions regarding the field and laboratory data to other onsite areas located between and beyond the locations of NV5's subsurface exploratory excavations.
- **Task 3 Report Preparation:** NV5 prepared this report to present the findings, conclusions and recommendations for this geotechnical engineering investigation.

1.2 SITE LOCATION AND DESCRIPTION

The proposed Acorn Valley Plaza high-density residential project is located south of E. Gobbi Street on the west and east sides of Village Circle in Ukiah, California. The site is centered at about latitude 39.1433 north and longitude -123.2033 west on the United States Geological Survey's (USGS), 7.5 minute Ukiah Quadrangle topographic map (2022). The property elevation is approximately 600 feet above mean sea level (msl), based on review of the USGS 7.5-minute Ukiah Quadrangle topographic map (2022), and is generally flat. Figure 1 shows the approximate site location and vicinity.



N|V|5	SITE LOCATION ACORN VALLEY PLAZA UKIAH, MENDOCINO COUNTY, CALIFORNIA	DRAWN BY: SC CHECKED BY: DJP PROJECT: 71222.00 DATE: MAY 2022	FIGURE 1

At the time the site investigation was performed on April 26, 2022, the following conditions were observed and are shown in the inset image:

- The rectangular-shaped property is generally comprised of two relatively undeveloped parcels with moderate to high concentrations of weeds and grasses. The existing asphalt concrete roadway identified as Village Circle extends through the center of the site in the north-south direction. An existing concrete slab and foundations were observed in the northeastern portion of the site. Mature trees were observed in the east central and southwestern portions of the site. Soil stockpiles also were observed in the southwestern portion of the site. The site was bounded to the north by E. Gobbi Street, beyond which are commercial buildings; to the east by existing railroad tracks; to the south by an existing apartment complex; and, to the west by existing single-family residences and commercial buildings.

1.3 PROPOSED IMPROVEMENTS

Based on the preliminary project information provided by representatives of Danco Group and NV5's review of the *Schematic Design Architectural Plans*, dated March 4, 2021, and prepared by DG Group Architecture, NV5 understands the proposed development includes four two- to three-story apartment buildings. Two of the proposed buildings are indicated to include ground floor retail suites. The proposed residential structures are anticipated to be constructed with wood or light-metal framing and supported on shallow concrete foundations with interior concrete slab-on-grade floors.

Associated site improvements are indicated to include construction of asphalt concrete and rigid concrete pavements, exterior slab-on-grade concrete flatwork, underground utilities, and landscaping. Earthwork grading may include general site clearing/preparation and minor to moderate cuts and fills required to balance the site to meet the proposed building grades. Figure 2 shows the proposed site improvements and approximate exploratory trench locations.

1.4 INVESTIGATION PURPOSE

The purpose of the geotechnical investigation was to obtain sufficient on-site information about the soil, rock and groundwater conditions to provide geotechnical engineering recommendations for the proposed earthwork and structural improvements. As part of this contract, NV5 did not evaluate the site for the presence of hazardous waste, mold, asbestos and radon gas. Therefore, the presence and removal of these materials are not discussed in this report.

LEGEND

APPROXIMATE EXPLORATORY TRENCH LOCATION, NV5, 2022

T22-1

0 FEET 40

SCALE

EXISTING COMMUNITY

EXISTING SUMMERCREEK VILLAGE APARTMENTS

HALF-COURT B-BALL 2,355 S.F.

TOT LOT 1,394 S.F.

BOCCE BALL 453 S.F.

PERGOLA 806

BLDG. TYPE C

T22-2

VILLAGE CIRCLE

USPS

BLDG. TYPE D

RETAIL

PLAZA

T22-1

E. GOBBI STREET

TRASH

COMMUNITY GARDEN 329 S.F.

BLDG. TYPE B

T22-5

T22-4

RETAIL

BLDG. TYPE A

T22-3

TRASH

Adapted from the March 4, 2021, Acorn Valley Plaza Site Plan, Sheet A2.1, prepared by DG Group Architecture.

NV5

SITE PLAN AND EXPLORATORY TRENCH LOCATIONS

ACORN VALLEY PLAZA

UKIAH MENDOCINO COUNTY, CALIFORNIA

DRAWN BY:	SC
CHECKED BY:	DJP
PROJECT:	71222.00.001
DATE:	MAY 2022

FIGURE 2

2.0 SITE INVESTIGATION

NV5 performed a site investigation to characterize the existing surface and subsurface conditions beneath the proposed improvements. The site investigation included a literature review of published and unpublished geologic documents and maps, a surface reconnaissance investigation, a subsurface exploratory investigation using a track-mounted excavator to excavate exploratory trenches, and a seismic refraction survey. Each component of the site investigation is presented below.

2.1 LITERATURE REVIEW

NV5 performed a limited review of available literature that was pertinent to the project site. The following summarizes NV5's findings:

2.1.1 Site Improvement Plans

Improvement plans were not available for review at the time this report was prepared.

2.2 REGIONAL GEOLOGY

The proposed Acorn Valley Plaza site is situated in the Coast Range Geomorphic Province of California. The Coast Range Geomorphic Province is characterized as northwest-trending mountain ranges and valleys that are subparallel to the San Andreas Fault. Strata of the Coast Range dip beneath alluvium of the Great Valley to the east and rise above the Pacific Ocean to the west. The Coast Range is comprised of thick Mesozoic and Cenozoic sedimentary rocks that were uplifted by the San Andreas Fault, terraced, and wave-cut. In the northern region, the Coast Range is dominated by irregular and knobby topography of the Franciscan Formation. Locally, the Franciscan rocks are overlain by volcanic cones and flows of the Clearlake volcanic field.

In the Ukiah area, the geology is dominated by the Franciscan Formation, Pliocene to Pleistocene nonmarine sedimentary deposits, Quaternary non-marine terrace deposits, and Quaternary alluvial deposits.

2.3 SITE GEOLOGY

Based on review of the *Geologic Map of California: Ukiah Sheet*, published by the California Division of Mines and Geology (Jennings, C.W., and Strand, R.G., 1960), the geology immediately underlying the subject site is comprised of Quaternary nonmarine terrace deposits and Quaternary Alluvium. The Quaternary nonmarine terrace deposits and Alluvium generally consists of Pleistocene to Holocene Age alluvial deposits of gravel, sand, silt, and clay deposited on stream cut surfaces.

2.4 REGIONAL FAULTING AND SEISMIC SOURCES

Regional faulting is associated with the Maacama and Konocti Bay Fault Zones to the east, the San Andreas Fault Zone to the southwest, the Bartlett Springs Fault Zone to the northeast and the Hunting Creek-Berryessa Fault Zone to the southeast. NV5 reviewed the Official Maps of Earthquake Fault Zones delineated by the California Geological Survey through December 2010, on the internet

at http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps. These maps are updates to Special Publication 42, Interim Revision 2007 edition *Fault Rupture Hazard Zones in California*, which describes active faults and fault zones (activity within 11,000 years), as part of the Alquist-Priolo Earthquake Fault Zoning Act. Special Publication 42 and the 2010 on-line update indicate that the site is not located within an Alquist-Priolo active fault zone. However, an Alquist-Priolo active fault zone associated with the Maacama Fault is located approximately 1.4 miles to the east of the site.

According to the Fault Activity Map of California (2010) by the California Geological Survey, Geologic Data Map No. 6 (http://maps.conservation.ca.gov/cgs/fam/), the closest known active fault which has surface displacement within Holocene time (about the last 11,000 years) is the Maacama Fault Zone, which is located approximately 1.4 miles (2.2 kilometers [km]) east of the subject site. The Fault Activity Map of California (2010) also shows the San Andreas Fault Zone located 28 miles (45 km) southwest of the site and the Konocti Bay Fault Zone located 24 miles (38 km) southeast of the site and the Hunting Creek-Berryessa Fault Zone located 10 miles (15 km) east of the site to be known active faults with surface displacement within Holocene time.

2.5 FIELD INVESTIGATION

NV5 performed a field investigation of the site on April 26, 2022. NV5's field engineer/geologist described the surface and subsurface soil, rock and groundwater conditions observed at the site using the procedures cited in the ASTM International, Inc. (ASTM), Volume 04.08, *Soil and Rock (I)* as general guidelines. The field engineer/geologist described the soil color using the general guideline procedures presented in the Munsell® Soil-Color Chart. Engineering judgment was used to extrapolate the observed surface and subsurface soil, rock and groundwater conditions to areas located between and beyond the subsurface exploratory locations. The surface, subsurface and groundwater conditions observed during the field investigation are summarized below.

2.5.1 Surface Conditions

NV5 observed the following surface conditions during the field investigation of the property. Figure 2 shows the proposed site improvements and the approximate exploratory trench locations.

At the time the site investigation was performed on April 26, 2022, the rectangular-shaped property is generally comprised of two relatively undeveloped parcels with moderate to high concentrations of weeds and grasses. The existing asphalt concrete roadway identified as Village Circle extends through the center of the site in the north-south direction. An existing concrete slab and foundations were observed in the northeastern portion of the site. Mature trees were observed in the east central and southwestern portions of the site. Soil stockpiles also were observed in the southwestern portion of the site. The site was bounded to the north by E. Gobbi Street, beyond which are commercial buildings; to the east by existing railroad tracks; to the south by an existing apartment complex; and, to the west by existing single-family residences and commercial buildings.

2.5.2 Subsurface Conditions

The subsurface soil, rock and groundwater conditions were investigated by excavating exploratory trenches and borings. The subsurface information obtained from this investigation method is described in the following subsections.

2.5.2.1 Exploratory Trench Information

NV5 provided engineering oversight during the excavation of 5 exploratory soil trenches at the project site. The trenches were excavated with a Kubota U35-4 track-mounted excavator equipped with an 18-inch bucket. The trenches were excavated to a maximum depth of 7.0 feet bgs.

Figure 2 shows the approximate locations of the subsurface exploratory excavations. Engineering judgment was used to extrapolate the observed soil, rock and groundwater conditions to areas located between and beyond the subsurface exploratory excavations.

NV5's field engineer/geologist logged each exploratory trench using the ASTM D2487 USCS as guidelines for soil descriptions and the American Geophysical Union guidelines for rock descriptions. Relatively undisturbed soil samples were collected with a 2.5-inch inside diameter, split-spoon sampler equipped with stainless steel liner sampler tubes. The sampler was driven into the soil using a hand-operated 40-pound slide hammer with a 15-inch drop. The stainless-steel liner samples were sealed with labeled plastic caps. The stainless-steel liner samples were sealed with labeled plastic caps. Representative bulk samples of the near-surface soil materials generated from the excavation of the exploratory trenches also were collected and placed in labeled sample bags. The soil samples collected from the exploratory trenches were transported to NV5's Chico soil laboratory facility.

Detailed descriptions of the soil, rock and groundwater conditions that were encountered in each subsurface exploratory location are presented on the exploratory trench logs included in Appendix A. The soil and rock descriptions include: visual field estimates of the particle size percentages (by dry weight), color, relative density or consistency, moisture content and cementation that comprise each soil material encountered.

A generalized profile of the soil, rock and groundwater conditions encountered to the maximum depth excavated (7.0 feet) for the proposed improvements is presented below. The soil and/or rock units encountered in the subsurface exploratory excavations were generally stratigraphically continuous across the site with some variations in gradations and thicknesses. The units encountered in general stratigraphic sequence during the subsurface investigation of the site are described below.

- **ML, Low Plasticity Silt Soil:** This soil is considered to be an undocumented fill and native soil consisting of the following field estimated particle size percentages 50 percent low plasticity silt and clay fines, 35 percent fine sand, and 15 percent angular rock fragments. This soil is predominantly brown with a Munsell® Soil-Color Chart designation of (10YR, 5/3). This soil was stiff and moist at the time of the subsurface investigation.
- **CL, Low Plasticity Clay Soil:** This soil is considered to be a native soil consisting of the following field estimated particle size percentages 65 percent low plasticity silt and clay fines and 35 percent fine sand. This soil is predominantly dark yellowish brown with a Munsell® Soil-Color Chart designation of (10YR, 4/4). This soil was firm to very stiff and moist at the time of the subsurface investigation.

- **GM, Silty Gravel Soil:** This soil is considered to be a native soil consisting of the following field estimated particle size percentages: 75 percent low plasticity silt and clay fines and 25 percent fine sand. This soil is predominantly brown with a Munsell® Soil-Color Chart designation of (10YR, 5/3). This soil was very soft to firm and moist to wet at the time of the subsurface investigation.

2.5.2.2 Seismic Refraction Microtremor Survey

A Seismic Refraction Microtremor Survey (SRMS) was performed on the subject property, using the SeisOpt® ReMi™ Vs30 method to determine the in-situ shear-wave (S-wave) velocity profile (Vs Model) of the uppermost 100 feet (30 meters) of soil beneath the site. The measured S-wave profile is used to determine the California Building Code (CBC) Site Class in accordance with Chapter 16, Section 1613.3.2 and Chapter 20 of ASCE 7-16.

The SRMS method is performed at the surface using a conventional seismograph equipped with geophones that record both seismic compression waves (P-waves) and S-waves. The P-wave and S-wave sources consist of ambient seismic microtremors which are constantly being generated by cultural activities and natural noise in the area. The data was collected in a series of twenty-one, 30-second-long, continuous recording periods. The inset image shows the Vs Model subsurface shear-wave velocity profile for the site that was developed from the SeisOpt® ReMi™ data.

The Vs Model developed for the site indicates that the harmonic mean seismic shear wave velocity for the upper 100 feet of the subsurface is approximately 1114 feet per second (ft/s). This weighted shear wave velocity corresponds to the higher range of Site Class D, as described in Chapter 20, Table 20.3-1 Site Classification of ASCE 7-16.

2.5.2.3 Groundwater Conditions

The permanent groundwater table was not encountered to the maximum depth explored of 7.0 feet bgs. However, perched groundwater was encountered at depths of approximately 3.0 to 6.5 feet bgs in three of the five exploratory trenches. The moisture content of each soil unit described on the exploratory boring logs is considered the natural moisture within the vadose soil zone (soil situated above the groundwater table).

NV5 used the Department of Water Resources Water Data Library database (wdl.water.ca.gov/waterdatalibrary) to review historical groundwater elevation data in the immediate area. Based on review of groundwater elevation data generated from a monitoring well located approximately 0.25 miles southeasterly of the project site, NV5 estimates that the historically high groundwater occurs at a depth of approximately 40 to 50 feet bgs in the late winter or spring during periods of above average and prolonged rainfall.

3.0 LABORATORY TESTING

NV5 performed laboratory tests on selected soil samples taken from the subsurface exploratory excavations to determine their geotechnical engineering material properties. These engineering material properties were used to develop geotechnical engineering design recommendations for earthwork and structural improvements. The following laboratory tests were performed using the cited ASTM guideline procedures:

- ASTM D422 Particle Size Gradation (Sieve Only)
- ASTM D2216 Soil Moisture Content
- ASTM D2487 Soil Classification by the USCS
- ASTM D2850 Unconsolidated-Undrained Triaxial Compression Test
- ASTM D2937 In Place Density of Soil
- ASTM D4318 Atterberg Limits (Dry Method)

Table 3.0-1 presents a summary of the geotechnical engineering laboratory test results. Appendix B presents the laboratory test data sheets.

Table 3.0-1, Laboratory Test Results

Trench	Sample		ASTM Test Results(1)							
No.	No.	Depth	D2487 D2488	D2216	D2937	D422		D4318		D2850
			USCS	Moisture Content	Dry Density	Passing No. 4 Mesh Sieve	Passing No. 200 Mesh Sieve	Plasticity Index	Liquid Limit	UU Triaxial Compressive Strength
		(ft)	(sym)	(%)	(pcf)	(%)	(%)	(%)	(%)	(psf)
T22-3	BLK-1	1.5-3	GM	--	--	75.6	43.5	NP	NP	--
T22-4	BLK-2	3-5	CL	--	--	--	--	8	25	--
T22-4	L1-1-2	3.5-4	CL	21.1	103.0	--	--	--	--	3,011.6

Notes:
(1) Laboratory test forms are presented in Appendix B
% percent
ASTM ASTM International
dim dimensionless
ft feet
No. Number
NP Non-Plastic
pcf pounds per cubic foot
psf pounds per square foot
sym symbol
UU Unconsolidated-Undrained
USCS Unified Soils Classification System

4.0 HISTORICAL SEISMICITY

The regional geology and faulting are discussed in Section 2 of this report. NV5 used the USGS National Earthquake Information Center (NEIC) Earthquake Search Results on-line database (http://earthquake.usgs.gov/earthquakes/search) to identify historical seismic activity within a 100 km (62 miles) radial distance of the subject site. A search for earthquakes was limited to moderate to strong events with a minimum magnitude of 5.0 local magnitude [M_L]). The results produced two recent events that occurred within 100 km of the site since 2016. These earthquakes include the following events:

- December 14, 2016, 5.0 M_L earthquake occurred approximately 8 km northwest of The Geysers, approximately 47 km (30 miles) southwest of the subject site. The event recorded a mean intensity of 4.1 at the distance to the subject site, which indicates light shaking and no damage.
- August 10, 2016, 5.1 M_L earthquake occurred approximately 20 km northeast of Upper Lake, approximately 40 km (25 miles) northwest of the subject site. The event recorded a mean intensity of 3.4 at the distance to the subject site, which indicates light shaking and no damage.

Additionally, a number of moderate to strong earthquakes were recorded within the past 150 years, although many of them occurred more than 100 years ago.

- 1962 and 1869, a 5.2M_L (1969) earthquake and a 5.0M_L (1869) earthquake occurred approximately 10km (6 miles) southeast of the subject site, near Ukiah.
- 1969 and 1893, three 5.1M_L to 5.6M_L earthquakes occurred approximately 88 km (55 miles) south of the site, south of Santa Rosa.
- 1898 and 1888, a 6.7M_L (1898) earthquake and a 5.5M_L (1888) earthquake occurred approximately 35 km (22 miles) west-northwest of the site, south of Mendocino.

The Geysers area, located approximately 56 km (35 miles) from the site, also is very active and produces dozens of small earthquakes, below magnitude of 4.0 M_L, on a daily to weekly basis.

5.0 LIQUEFACTION AND SEISMIC SETTLEMENT

NV5 did not perform a detailed evaluation of the potential for seismically induced soil liquefaction at the site. However, based on the relatively shallow depth of competent, cemented gravel and the anticipated depth to the groundwater table, NV5 believes that the site has a low potential for soil liquefaction. The analysis is discussed below.

5.1 LIQUEFACTION

Soil liquefaction results when the shear strength of a saturated soil decreases to zero during cyclic loading that is generally caused by machine vibrations or earthquake shaking. Generally, saturated, clean, loose, uniformly graded sand and loose, silty sand soils of Holocene age are the most prone to undergo liquefaction, however, saturated, gravelly soil, and some clay-rich soil may be prone to liquefaction under certain conditions. The onsite soil and rock materials generally consist of Quaternary-age, dense to very dense, damp to moist, silty gravels.

Permanent groundwater was not encountered in the exploratory trenches advanced to the maximum depth of 7.0 feet bgs. Recent groundwater data collected from nearby groundwater monitoring wells within the past 10 years indicate the groundwater table varied from approximately 40 to 50 feet bgs at the wells. The site soil conditions and recent groundwater depths make the probability of liquefaction occurring during ground shaking caused by a maximum considered earthquake (MCE) to be very low at the property. Based on this information, NV5 believes that the site soil conditions make the probability of liquefaction occurring during a nearby earthquake to be low.

5.2 SEISMIC SETTLEMENT AND LATERAL SPREADING

Because the potential for liquefaction of the soil is considered low, the very dense gravels beneath the site and the relatively flat terrain of the site and surrounding areas, NV5 considers there to be a low probability for the occurrence of post-liquefaction settlement and lateral spreading that would be detrimental to the proposed site improvements.

6.0 CONCLUSIONS

The conclusions presented in this section are based on information developed from the field and laboratory investigations.

1. It is NV5's opinion that the site is suitable for the proposed improvements provided that the geotechnical engineering design recommendations presented in this report are incorporated into the earthwork and structural improvement project plans. Prior to construction, NV5 should be allowed to review the proposed final earthwork grading plan and structural improvement plans to determine if the geotechnical engineering recommendations were properly incorporated, are still applicable or need modifications.
2. Undocumented fills were observed in all five exploratory trench performed across the project site that extended to at least 5.0 feet bgs. These undocumented fills cannot be relied upon for support of the proposed improvements, due to their unknown quality, unknown method of placement, and potential for settlement. Recommendations for mitigating the undocumented fills are presented in Section 7.1 of this report.
3. Based on the site geology, the observations within the exploratory trenches, the site soil profile can be modeled, according to the 2019 CBC, Chapter 16, and ASCE 7-16, Chapter 20, as a Site Class D (Stiff Soil Profile) designation for the purposes of establishing seismic design loads for the proposed improvements.
4. Based on the subsurface soil conditions exposed within the exploratory trenches, other field data, and literature review, NV5 believes that the probability of liquefaction occurring during a nearby earthquake to be low.
5. At the time NV5's initial site investigation was performed on April 26, 2022, the rectangular-shaped property is generally comprised of two relatively undeveloped parcels with moderate to high concentrations of weeds and grasses. The existing asphalt concrete roadway identified as Village Circle extends through the center of the site in the north-south direction. An existing concrete slab and foundations were observed in the northeastern portion of the site. Mature trees were observed in the east central and southwestern portions of the site. Soil stockpiles also were observed in the southwestern portion of the site.
6. The soil conditions observed to a maximum depth of 7.0 feet below the existing ground surface in our subsurface exploratory excavations (described relative to the existing ground surface) generally consisted of: brown, stiff, moist, clayey silt (ML) and dark yellowish brown, dense to very dense, moist, silty gravel (GM).
7. NV5's field and laboratory test data indicates that the native undisturbed silty gravel (GM) soil unit encountered beneath the site has the following general geotechnical engineering properties: dense to very dense, low plasticity, and low to moderate bearing capacity that is suitable for supporting shallow foundations.
8. The permanent groundwater table was not encountered to the maximum depth explored of 7.0 feet bgs. However, perched groundwater was encountered at depths of approximately 3.0 to 6.5 feet bgs in three of the five exploratory trenches. Based on the above average rainfall, subsurface geologic conditions and review of monitoring well data near the site, NV5 assumes that for design and evaluation purposes, the historically high groundwater table will probably be encountered at a depth of approximately 40 to 50 feet bgs.

7.0 RECOMMENDATIONS

Undocumented fills were observed across a major portion of the site and are not considered suitable for support of the proposed structural improvements. NV5 developed geotechnical engineering design recommendations for earthwork and structural improvements from the field and laboratory investigation data. Subsequent to earthwork and site preparation, it is anticipated that the proposed apartment buildings may be founded on conventional continuous and/or spread footings founded in undisturbed native soils or properly compacted fill. NV5's recommendations are presented below.

7.1 EARTHWORK GRADING

NV5's earthwork grading recommendations include: demolition and abandonment of existing site improvements, import fill soil, temporary excavations, stripping and grubbing, native soil preparation for engineered fill placement, engineered fill construction with testable earth materials, cut-fill transitions, fill slope grading, cut slope grading, cut-fill transitions, erosion controls, underground utility trenches, construction dewatering, soil corrosion potential, subsurface groundwater drainage, surface water drainage, grading plan review and construction monitoring.

7.1.1 Import Fill Soil

Import fill soil should meet the geotechnical engineering material properties described in Section 7.1.6.1 (Engineered Fill Construction with Non-Expansive Soil) of this report. Prior to importation to the site, the source generator should document that the import fill meets the guidelines set forth by the California Environmental Protection Agency (CalEPA) Department of Toxic Substances Control (DTSC) in their 2001 "Information Advisory, Clean Imported Fill Material." This advisory represents the best practice for characterization of soil prior to import for use as engineered fill. The project engineer should approve all proposed import fill soil for use in constructing engineered fills at the site.

7.1.2 Temporary Excavations

All temporary excavations must comply with applicable local, state and federal safety regulations, including the current Occupational Safety and Hazards Administration (OSHA) excavation and trench safety standards. Construction site safety is the responsibility of the contractor, who is solely responsible for the means, methods and sequencing of construction operations. Under no circumstances should the findings, conclusions and recommendations presented herein be inferred to mean that NV5 is assuming any responsibility for temporary excavations, or for the design, installation, maintenance and performance of any temporary shoring, bracing, underpinning or other similar systems. NV5 could provide temporary cut slope gradients, if required.

7.1.3 Stripping and Grubbing

The site should be stripped and grubbed of vegetation and other deleterious materials, as described below.

1. Strip and remove the top 4 to 6 inches of organic-laden topsoil and other deleterious materials from the building area. Remove all existing trees within the proposed building pad areas. Grub

the underlying 6 to 8 inches of soil to remove any large vegetation roots or other deleterious material while leaving the soil in place. The project geotechnical engineer or their representative should approve the use of any soil materials generated from the clearing and grubbing activities.

2. Completely remove all existing structures, stockpiles, concrete pipe, underground utilities and other deleterious debris from the site. Abandonment of any underground utilities within the construction area that will not interfere with the proposed site improvements should be plugged with cement grout to reduce migration of soil and/or water. Excavate the remaining cavities or holes to a sufficient width so that an approved backfill soil can be placed and compacted in the cavities or holes. Enough backfill soil should be placed and compacted in order to match the surrounding elevations and grades. The project geotechnical engineer or their representative should observe and approve the preparation of the cavities and holes prior to placing and compacting engineered fill soil in the cavities and holes.
3. Completely remove all undocumented fill materials, as exposed in our exploratory excavations. The project geotechnical engineer or their representative should approve the use of the undocumented fill materials in engineered fill construction prior to constructing compacted engineered fills. Recommendations for engineered fill construction to restore areas of removed undocumented fills to design grades are presented in Section 7.1.5 of this report
4. Excessively large amounts of vegetation, concrete rubble, deleterious materials and oversized rock materials should be removed from the site.

7.1.4 Native Soil Preparation for Engineered Fill Placement

After completing site stripping and grubbing activities, the exposed native soil within the building pads and extending at least 5 feet beyond the limits of the building pads should be overexcavated a minimum of one foot below existing site grades, or finished pad grade, whichever is deeper, and the exposed grade be prepared for placement and compaction of non-expansive engineered fills, as described below. Native soil outside of building pads also should be prepared for placement and compaction of non-expansive engineered fills, as described below.

1. The native soil should be scarified to a minimum depth of 12 inches below the existing land surface, stripped and grubbed surface, or exposed following overexcavation. Large vegetation roots and other deleterious materials encountered during scarification should be removed from the native soil. The native soils should then uniformly moisture conditioned. If the soil is classified as a coarse-grained soil by the Unified Soils Classification System (USCS) (i.e., GP, GW, GC, GM, SP, SW, SC or SM) then it should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content. If the soil is classified as a low plasticity fine-grained soil by the USCS (i.e., CL, ML), then it should be moisture conditioned to between 2 and 4 percentage points greater than the ASTM D1557 optimum moisture content. If soil is classified as a high plasticity fine-grained soil by the USCS (i.e., CH, MH), the soil should be removed from the building pad areas or contact NV5 for further recommendations.
2. The native soil should then be compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry unit weight (density). The moisture content, density and relative percent compaction should be tested by the project engineer or his/her field representative to evaluate whether the compacted soil meets or exceeds the minimum percent compaction and moisture content requirements. The earthwork contractor shall assist the project engineer or his/her field representative by excavating test pads with the on-site earth moving equipment. Native soil preparation beneath concrete slab-on-grade structures (i.e.,

floors, sidewalks, patios, etc.) and AC pavement should be prepared as specified in Section 7.2 (Structural Improvements).

3. The prepared native soil surface should be proof-rolled with a fully loaded 4,000-gallon-capacity water truck with the rear of the truck supported on a double-axle, tandem-wheel undercarriage or approved equivalent. The proof-rolled surface should be visually observed by the project engineer or his/her field representative to be firm, competent and relatively unyielding. The project engineer or his/her field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed in place of proof rolling as described above.
4. Construction Quality Assurance (CQA) tests should be performed using the minimum testing frequencies presented in Table 7.1.4-1 or as modified by the project engineer to better suit the site conditions.
5. The native soil surface should be graded to minimize ponding of water and to drain surface water away from the building foundations and associated structures. Where possible, surface water should be collected, conveyed and discharged into natural drainage courses, storm sewer inlet structures, permanent engineered storm water runoff percolation/evaporation basins or engineered infiltration subdrain systems.

Table 7.1.4-1, Minimum Testing Frequencies

ASTM No.	Test Description	Minimum Test Frequency(1)
D1557	Modified Proctor Compaction Curve	1 per 1,500 CY or Material Change (2)
D6938	Nuclear Density and Nuclear Moisture Content	1 per 250 CY

Notes:
(1) These are minimum testing frequencies that may be increased or decreased at the project engineer's discretion based on the site conditions encountered during grading.
(2) Whichever criteria provide the greatest number of tests.

ASTM = ASTM International
CY = cubic yards
No. = number

7.1.5 Engineered Fill Construction with Testable Earth Materials

Engineered fills are constructed to support structural improvements. Engineered fills should be constructed using non-expansive soil as described in Section 7.1.5.1. If possible, the use of expansive soil for constructing engineered fills should be avoided. If the use of expansive soil cannot be avoided, then engineered fills should be constructed as described in Section 7.1.5.2 or as modified by the project engineer. If soil is to be imported to the site for constructing engineered fills, then NV5 should be allowed to evaluate the suitability of the borrowed soil source by taking representative soil samples for laboratory testing. Testable earth materials are generally considered to be soils with gravel and larger particle sizes retained on the No. 4 mesh sieve that make up less than 30 percent by dry weight of the total mass. The relative percent compaction of testable earth materials can readily be determined by the following ASTM test procedures: laboratory compaction curve (D1557), field moisture and density (D6938). Construction of engineered fills with non-expansive and expansive testable earth materials is described below.

7.1.5.1 Engineered Fill Construction with Non-Expansive Soil

Construction of engineered fills with non-expansive soil should be performed as described below.

1. Non-expansive soil used to construct engineered fills should consist predominantly of materials less than ½-inch in greatest dimension and should not contain rocks greater than 3 inches in greatest dimension (oversized material). Non-expansive soil should have a plasticity index (PI) of less than or equal to 15, as determined by ASTM D4318 Atterberg Indices testing. Oversized materials should be spread apart to prevent clustering so that void spaces are not created. The project engineer or his/her field representative should approve the use of oversized materials for constructing engineered fills.
2. Non-expansive soil used to construct engineered fills should be uniformly moisture conditioned. If the soil is classified by the USCS as coarse grained (i.e., GP, GW, GC, GM, SP, SW, SC or SM), then it should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content. If the soil is classified by the USCS as fine grained (i.e., CL, ML), then it should be moisture conditioned to between 2 and 4 percentage points greater than the ASTM D1557 optimum moisture content.
3. Engineered fills should be constructed by placing uniformly moisture conditioned soil in maximum 8-inch-thick loose lifts (layers) prior to compacting.
4. The soil should then be compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.
5. The earthwork contractor should compact each loose soil lift with a tamping foot compactor such as a Caterpillar (CAT) 815 Compactor or equivalent as approved by NV5's project engineer or his/her field representative. A smooth steel drum roller compactor should not be used to compact loose soil lifts for construction of engineered fills.
6. The field and laboratory CQA tests should be performed consistent with the testing frequencies presented in Table 7.1.5.1-1 or as modified by the project engineer to better suit the site conditions.

Table 7.1.5.1-1, Minimum Testing Frequencies for Non-Expansive Soil

ASTM No.	Test Description	Minimum Test Frequency(1)
D1557	Modified Proctor Compaction Curve	1 per 1,500 CY or Material Change (2)
D6983	Nuclear Moisture and Density	1 per 250 CY

Notes:
(1) These are minimum testing frequencies that may be increased or decreased at the project engineer's discretion based on the site conditions encountered during grading.
(2) Whichever criteria provide the greatest number of tests.

ASTM = ASTM International
CY = cubic yards
No. = number

7. The moisture content, density and relative percent compaction of all engineered fills should be tested by the project engineer's field representative during construction to evaluate whether the compacted soil meets or exceeds the minimum compaction and moisture content requirements.

The earthwork contractor shall assist the project engineer's field representative by excavating test pads with the on-site earth-moving equipment.

8. The prepared finished grade or finished subgrade soil surface should be proof-rolled as mentioned above in Section 7.1.4, Paragraph 3.

7.1.5.2 Engineered Fill Construction with Expansive Soil

NV5 did not encounter highly expansive soil within the shallow soil or zone that would be influenced by the foundation loads at the site during the subsurface investigation. If expansive soils are encountered during grading of the site, and if the property owner desires to use expansive soil to construct engineered fills, then NV5 should be notified to prepare recommendation options for constructing fills with potentially expansive soil.

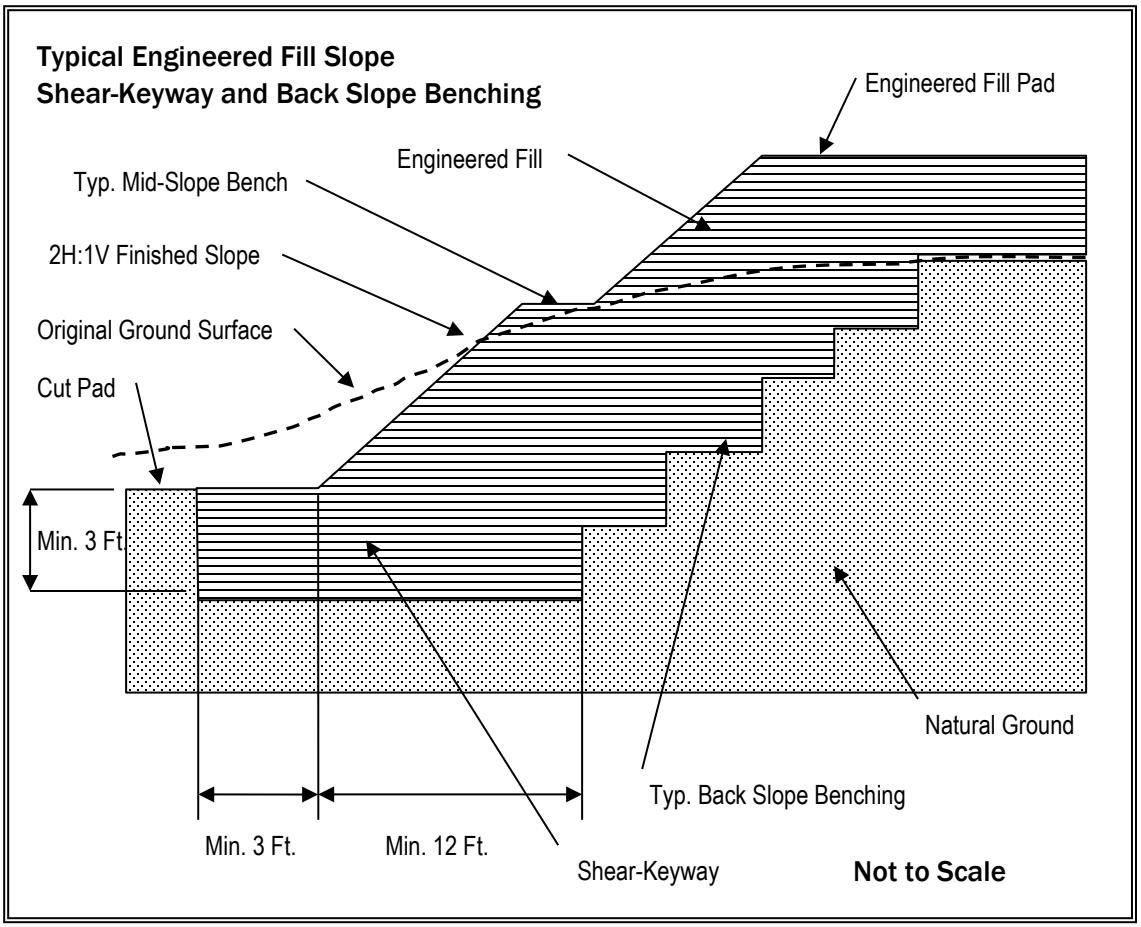
7.1.6 Fill Slope Grading

Fill slopes should be graded as described below.

1. Fill slopes should be graded with a maximum slope gradient of 2H:1V, and with a maximum vertical height of 15 feet. If fill slopes are to be graded steeper than 2H:1V and/or with a vertical height greater than 15 feet, then NV5 should be notified so that slope stability analysis of the proposed slope configuration can be performed, and revised recommendations provided.

2. A shear-keyway should be graded at the base of the fill slope prior to constructing the fill slope. The shear-keyway should be a minimum of 15 feet wide and extend to a minimum depth of 3 feet below the finished subgrade surface, or deeper as determined by the project engineer during grading. The shear-keyway base should be graded with a minimum slope gradient of 2 percent toward the inside fill slope surface.

3. Fill slopes should be graded in horizontal lifts to the lines and grades shown on the grading plans. The design-finished grade of a fill slope should be achieved by overbuilding the slope face and then cutting it back to the design-finished grade. Fill slopes should not be graded (extended horizontally) by compacting moisture conditioned, loose soil lifts on the slope face as thin veneer layers. In other words, do not construct engineered fill slopes by placing and compacting successive thin layers (veneers) of soil over the fill slope face at an inclination that is roughly coincident with the final fill slope horizontal to vertical slope ratio. The in-slope edge of each horizontal lift should be benched into the firm, competent and relatively unyielding soil of the natural ground slope.



4. If groundwater seepage from the slope and/or shear-keyway areas is encountered during grading, or if the site conditions indicate that groundwater seepage does occur during the wet winter season, then NV5 should be notified so that NV5 can assess the conditions and provide a design for installation of permanent dewatering subdrains.

5. Surface benches should be graded into the finished fill slope with a minimum width of 10 feet and with maximum vertical intervals of 15 feet between benches, or at mid-slope height if the total vertical slope height is between 15 feet and 30 feet.

6. Benches should be graded with a minimum slope gradient of 2 percent toward the inside fill slope surface. In other words, the bench slope gradient should cause surface water to drain toward the fill slope side of the bench (not over and down the fill slope face).

7. Fill soils used to construct slopes should be uniformly moisture conditioned, placed in loose lifts, and compacted as described in Section 7.1.5.

7.1.7 Cut Slope Grading

Cut slopes should be graded as described below.

1. Cut slopes should be graded with a maximum slope gradient of 2H:1V and with a maximum vertical height of 15 feet. If cut slopes are to be graded steeper than 2H:1V and/or with a vertical height greater than 15 feet, then NV5 should be notified so that NV5 can perform a slope stability analysis of the proposed slope configurations and provide revised recommendations, if necessary.

2. Surface benches should be graded into the finished cut slope with a minimum width of 10 feet and with maximum vertical intervals of 10 feet between benches, or at the mid-slope height if the total vertical slope height is greater than 15 feet but less than 30 feet.

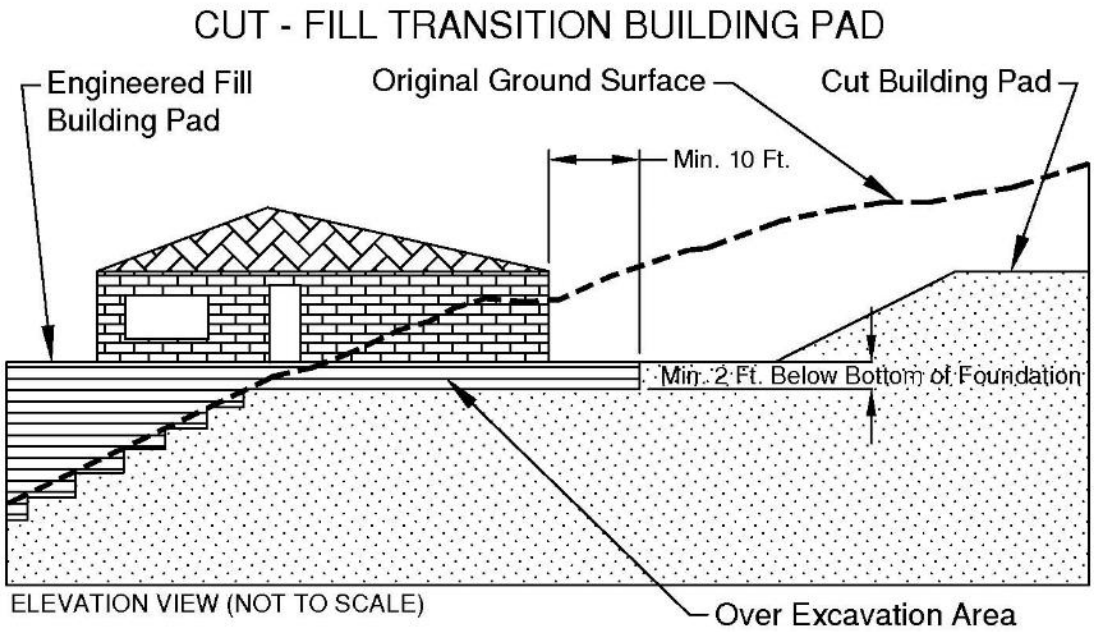
3. The benches should be graded with a minimum slope gradient of 2 percent toward the cut. In other words, the bench slope gradient should cause surface water to drain toward the cut slope side of the bench (not over and down the cut slope face).

7.1.8 Cut-Fill Transitions

NV5 has not reviewed the final grading plan; however, due to the presence of existing structures, trees and undocumented fill, NV5 prepared additional recommendations to properly construct the building pads for the proposed apartment buildings so that cut-fill transitions are not constructed that may be subject to differential settlement in the future.

The recommendations presented in this section are intended to reduce the magnitude of differential settlement-induced structural distress associated with variable fill depth beneath structures.

1. Building pads should be graded such that cut-fill transition lines do not occur on the surface or directly beneath any structures. If a cut-fill transition line will occur on the surface and crosses directly beneath a building footprint area, then the building pad areas should be over excavated and replaced with compacted engineered fill soil to eliminate the surface exposure of the cut-fill transition contact. This construction method will eliminate the occurrence of what is commonly referred to as a “hard-point or hard-line” beneath the building footprint. The hard-line demarks an abrupt change in both the elastic and consolidation settlement behaviors of the engineered fill and native soil and/or rock materials exposed on opposite sides of the hard-line on the building pad surface. This abrupt change in material behaviors can result in development of cracks in the building foundations and/or concrete slab-on-grade floors that are typically coincident with the location and orientation of the underlying hard-line. Over excavation of the entire building pad footprint area and then replacing with engineered fill to the finished design subgrade elevations will significantly diminish the adverse impacts of the hard-line or cut/fill transition line beneath the building footprint area.
2. The depth of over excavation will depend on the foundation depth on the cut-side of the transition line and the total fill thickness on the fill-side of the transition line. The entire building and to a minimum distance of 10 feet beyond the building’s foundation should be underlain by a minimum of 2 feet of non-expansive engineered fill below the bottom of the foundations, with differential fill depths beneath foundation and structures not exceeding 5 feet, as shown on the inset figure below.



3. Following over-excavation of the cut area, the cut portion of the cut/fill building pad, should be scarified and compacted in accordance with Section 7.1.4. Engineered fill placement should following the recommendations of Section 7.1.5.

7.1.9 Erosion Controls

Erosion controls should be installed as described below.

1. Erosion controls should be installed on all cut and fill slopes to minimize erosion caused by surface water runoff.
2. Install on all slopes either an appropriate hydroseed mixture compatible with the soil and climate conditions of the site, as determined by the local United States Soil Conservation District or apply an appropriate manufactured erosion control mat.
3. Install surface water drainage ditches at the top of cut and fill slopes (as necessary) to collect and convey both sheet flow and concentrated flow away from the slope face.
4. The intercepted surface water should be discharged into a natural drainage course or into other collection and disposal structures.

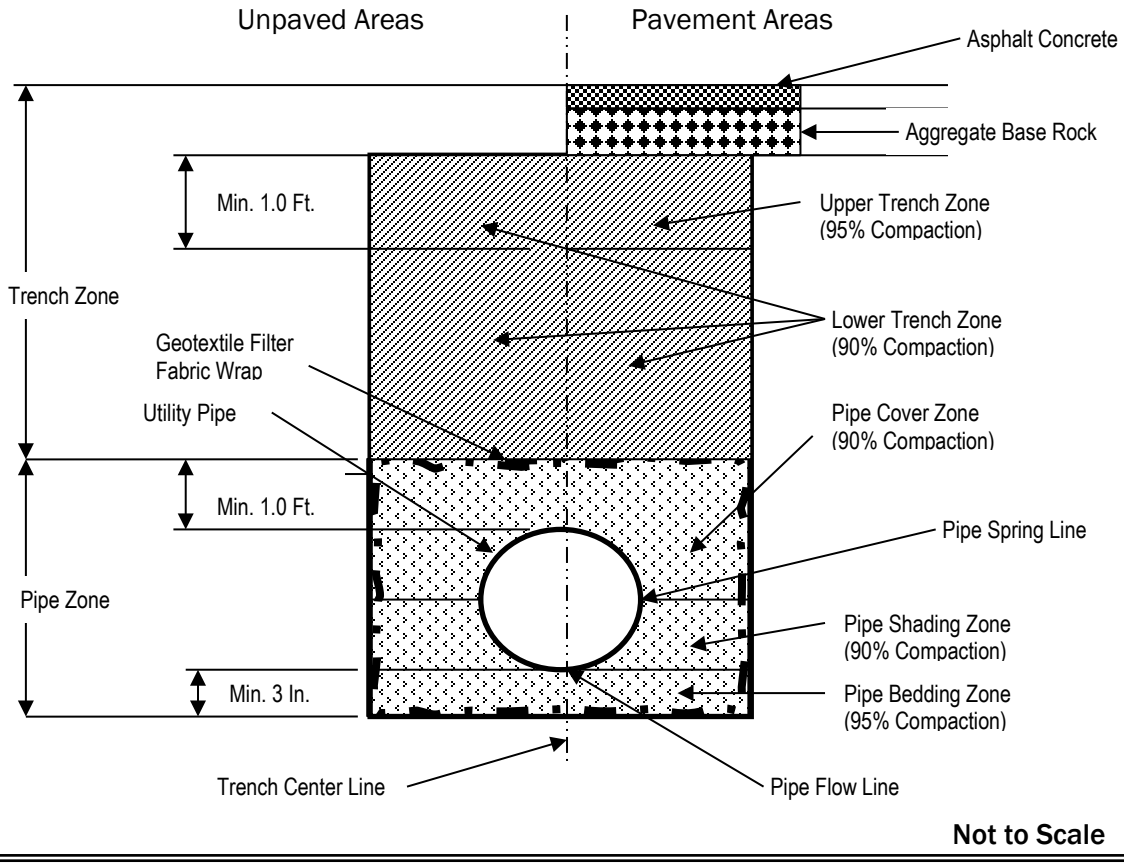
7.1.10 Underground Utility Trenches

Underground utility trenches should be excavated and backfilled as described below for each trench zone shown in the figure below.

1. **Trench Excavation Equipment:** NV5 anticipates that the contractor will be able to excavate all underground utility trenches with a Case 580 Backhoe or equivalent, however, deeper utility trenches (10-feet or greater) may require larger equipment.

2. **Trench Shoring:** All utility trenches that are excavated deeper than 5 feet bgs are required by California OSHA to be shored with bracing equipment or sloped back to an appropriate slope gradient prior to being entered by any individuals.
3. **Trench Dewatering:** NV5 does not anticipate that the proposed underground utility trenches will encounter shallow groundwater. However, if the utility trenches are excavated during the winter rainy season, then shallow or perched groundwater may be encountered. The earthwork contractor may need to employ dewatering methods as discussed in Section 7.1.11 in order to excavate, place and compact the trench backfill materials.
4. **Pipe Zone Backfill Type and Compaction Requirements:** The backfill material type and compaction requirements for the pipe zone, which includes the bedding zone, the shading zone and the cover zone, are described in Detail 7.1.10-1 below.

Detail 7.1.10-1 TYPICAL TRENCH BACKFILL ZONES



- **Pipe Zone Backfill Material Type:** Trench backfill used within the pipe zone, which includes the bedding zone, the shading zone and the cover zone, should consist of ¾-inch-minus, washed, crushed rock, imported sand, or Class 2 AB. The crushed rock particle size gradation should meet the following requirements (percentages are expressed as dry weights using ASTM D422 test method): 100 percent passing the ¾-inch sieve, 80 to 100 percent passing

the ½-inch sieve, 60 to 100 percent passing the 3/8-inch sieve, 0 to 30 percent passing the No. 4 sieve, 0 to 10 percent passing the No. 8 sieve, and 0 to 3 percent passing the No. 200 sieve. If groundwater is encountered within the trench during construction, or if groundwater is expected to rise during the rainy season to an elevation that will infiltrate the pipe zone within the trench, then the pipe zone material should be wrapped with a minimum 6 ounce per square yard, non-woven geotextile filter fabric such as TenCate® Mirafi N140 or an approved equivalent. The geotextile seam should be located along the trench centerline and have a minimum 1-foot overlap. If the utility pipes are coated with a corrosion protection material, then the pipes should be wrapped with a minimum 6 ounce per square yard, non-woven, geotextile cushion fabric such as TenCate® Mirafi N140 or an approved equivalent. The geotextile cushion fabric should have a minimum 6-inch seam overlap. The geotextile cushion fabric will protect the pipe from being scratched by the crushed rock backfill material.

- **Pipe Bedding Zone Compaction:** Crushed rock placed in the pipe bedding zone (beneath the utilities) should be consolidated using mechanical equipment to a firm unyielding condition. Imported sand or Class II AB placed in the pipe bedding zone (beneath the utilities) should be a minimum of 3 inches thick, moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density. Crushed rock should be mechanically consolidated under the observation of NV5.
- **Pipe Shading Zone Compaction:** Crushed rock placed within the pipe shading zone should be consolidated using mechanical equipment to a firm unyielding condition, shovel slicing material to support the pipe bells or haunches. Imported sand or Class II AB placed within the pipe shading zone (above the bedding zone and to a height of one pipe radius above the pipe spring line) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. Crushed rock should be mechanically consolidated under the observation of NV5. The pipe shading zone backfill material should be shovel-sliced to remove voids, support the pipe bells or haunches and to promote compaction.
- **Pipe Cover Zone Compaction:** Crushed rock placed within the pipe cover zone should be consolidated using mechanical equipment to a firm unyielding condition. Native soils, imported sand, and Class II AB placed within the pipe cover zone (above the pipe shading zone to 1 foot over the pipe top surface) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. Crushed rock should be mechanically consolidated under the observation of NV5.

5. **Trench Zone Backfill and Compaction Requirements:** The trench zone backfill materials consist of both lower and upper zones, as discussed below.

   - **Trench Zone Backfill Material Type:** Soil used as trench backfill within the lower and upper intermediate zones, as shown on the preceding figure, should consist of non-expansive soil with a PI of less than or equal to 15 (based on ASTM D4318) and should not contain rocks greater than 3 inches in greatest dimension.
   - **Lower Trench Zone Compaction:** Crushed rock placed within the lower trench zone should be consolidated using mechanical equipment to a firm unyielding condition. Soils, including

imported sand and Class 2 AB, used to construct the lower trench zone backfills should be uniformly moisture conditioned to within 0 and 4 percentage points of the ASTM D1557 optimum moisture content, placed in maximum 12-inch-thick loose lifts prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

- **Upper Trench Zone Compaction (Road and Parking Lot Areas):** Crushed rock placed within the upper trench zone should be consolidated using mechanical equipment to a firm unyielding condition. Soils, including imported sand and Class 2 AB, used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 and 4 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 8-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.
- **Upper Trench Zone Compaction (Non-Road and Non-Parking Lot Areas):** Crushed rock placed within the upper trench zone should be consolidated using mechanical equipment to a firm unyielding condition. Soils, including imported sand and Class 2 AB, used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 and 2 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 6-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

6. **CQA Testing and Observation Engineering Services:** The moisture content, dry density and relative percent compaction of all engineered utility trench backfills should be tested by the project geotechnical engineer's field representative during construction to evaluate whether the compacted trench backfill materials meet or exceed the minimum compaction and moisture content requirements presented in this report. The earthwork contractor shall assist the project geotechnical engineer's field representative by excavating test pads with the on-site earth moving equipment.

    - **Compaction Testing Frequencies:** The field and laboratory CQA tests should be performed consistent with the testing frequencies presented in Table 7.1.10-1 or as modified by the project engineer to better suit the site conditions.

Table 7.1.10-1, Minimum Testing Frequencies for Utility Trench Backfill

ASTM No.	Test Description	Minimum Test Frequency(1)
D1557	Modified Proctor Compaction Curve	1 per 500 CY (2) Or Material Change
D6983	Nuclear Moisture and Density	1 per 100 LF per 24-Inch-Thick Compacted Backfill Layer (2) The maximum loose lift thickness shall not exceed 12-inches prior to compacting.

Notes:
(1) These are minimum testing frequencies that may be increased or decreased at the project engineer's discretion based on the site conditions encountered during grading.
(2) Whichever criteria provide the greatest number of tests.

ASTM = ASTM International
CY = cubic yards
No. = number

- **Final Proof Rolling:** The prepared finished grade AB rock surface and/or finished subgrade soil surface of utility trench backfills should be proof-rolled as mentioned above in Section 7.1.4, Paragraph 3.

7.1.11 Construction Dewatering

NV5 does not anticipate the need to perform dewatering of the site during earthwork grading however, the earthwork contractor should be prepared to dewater the utility trench excavations and any other excavations if perched water or the groundwater table is encountered during winter or spring grading. The following recommendations are preliminary and are not based on performing a groundwater flow analysis. A detailed dewatering analysis was not a part of the proposed work scope. It should be understood that it is the earthwork contractor's sole responsibility to select and employ a satisfactory dewatering method for each excavation.

1. NV5 anticipates that dewatering of utility trenches can be performed by constructing sumps to depths below the trench bottom and removing the water with sump pumps.
2. Additional sump excavations and pumps should be added as necessary to keep the excavation bottom free of standing water and relatively dry when placing and compacting the trench backfill materials.
3. If groundwater enters the trench faster than it can be removed by the dewatering system, thereby allowing the underlying compacted soil to become unstable while compacting successive soil lifts, then it may be necessary to remove the unstable soil and replace it with free-draining, granular drain rock. Native backfill soil can again be used after placing the granular rock to an elevation that is higher than the groundwater table.
4. If granular rock is used, it should be wrapped in a non-woven geotextile fabric, such as TenCate® Mirafi® N140 or an approved equivalent. The geotextile filter fabric should have minimum 1-foot overlapped seams. The granular rock should meet or exceed the following gradation specifications (all percentages are expressed as dry weights using ASTM D422 test method): 100 percent passing the 3/4-inch sieve, 80 to 100 percent passing the 1/2-inch sieve, 60 to 100 percent passing the 3/8-inch sieve, 0 to 30 percent passing the No. 4 sieve, 0 to 10 percent passing the No. 8 sieve, and 0 to 3 percent passing the No. 200 sieve.
5. NV5 recommends that the utility trench excavations be performed as late in the summer months as possible to allow the groundwater table to reach its lowest seasonal elevation.

7.1.12 Soil Corrosion Potential

The selected materials used for constructing underground utilities should be evaluated by a corrosion engineer for compatibility with the on-site soil and groundwater conditions. NV5 did not perform any testing to determine the corrosion potential of the shallow soils that are anticipated to be in contact with the underground pipes and concrete structures associated with the improvements. NV5's experience with soil encountered in the Ukiah area is that their corrosion potential is moderately corrosive. Buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron should be properly protected against corrosion depending on the critical nature of the structure.

7.1.13 Subsurface Groundwater Drainage

NV5 does anticipate encountering perched groundwater or a shallow local groundwater table during the wet weather construction season. If groundwater is encountered during grading, then NV5 should be allowed to observe the conditions and provide site-specific dewatering recommendations.

7.1.14 Surface Water Drainage

NV5 recommends the following surface water drainage mitigation measures:

1. Grade all slopes to drain away from building areas with a minimum 4 percent slope for a distance of not less than 10 feet from the building foundations.
2. Grade all landscape areas near and adjacent to buildings to prevent ponding of water.
3. Direct all building downspouts to solid pipe collectors which discharge to natural drainage courses, storm sewers, catchment basins, infiltration subdrains or other drainage facilities.

7.1.15 Grading Plan Review and Construction Monitoring

CQA includes review of plans and specifications and performing construction monitoring, as described below.

1. NV5 should be allowed to review the final earthwork grading improvement plans prior to commencement of construction to determine whether the recommendations were implemented and, if necessary, to provide additional and/or modified recommendations.
2. NV5 should be allowed to perform CQA monitoring of all earthwork grading performed by the contractor to determine whether the recommendations have been implemented and, if necessary, to provide additional and/or modified recommendations.
3. NV5's experience, and that of the engineering profession, clearly indicates that during the construction phase of a project the risks of costly design, construction and maintenance problems can be significantly reduced by retaining a design geotechnical engineering firm to review the project plans and specifications and to provide geotechnical engineering observation and CQA testing services. Upon your request we will prepare a CQA geotechnical engineering services proposal that will present a work scope, a tentative schedule and a fee estimate for your consideration and authorization. If NV5 is not retained to provide geotechnical engineering CQA services during the construction phase of the project, then NV5 will not be responsible for geotechnical engineering CQA services provided by others nor any aspect of the project that fails to meet your or a third party's expectations in the future.

7.2 STRUCTURAL IMPROVEMENTS

NV5's structural improvement design criteria recommendations include seismic design parameters, shallow foundations, retaining walls entirely above the groundwater table, retaining wall backfill, concrete slab-on-grade interior floors, sidewalk and patio construction, rigid concrete pavement for heavy truck traffic areas and fire lanes, and flexible pavement. These recommendations are presented hereafter.

7.2.1 Seismic Design Parameters

NV5 developed the code-based seismic design parameters in accordance with Section 1613 of the 2019 CBC and the Structural Engineers Association of California (SEAOC), *Seismic Design Maps* web application. The internet based application (www.seismicmaps.org) is used for determining seismic design values from the 2016 ASCE-7 Standard (erratum released February 2019) and the 2018 International Building Code (IBC). The spectral acceleration, site class, site coefficients and adjusted maximum considered earthquake spectral response acceleration, and design spectral acceleration parameters are presented in Table 7.2.1-1. The Seismic Design Parameter detailed report from the SEAOC analysis is provided in Appendix C.

7.2.1.1 Long-Period Seismic Site Coefficient (F_V)

Using Table 1613.2.3(2) of the 2019 CBC, NV5 calculated the long-period site coefficient (F_v) using S_1=0.747 and linear interpolation of the values presented in the table. Linear interpolating the values resulted in the following equations for calculating F_v:

- $F_v = (-2 \times S_1)+2.6$ (S_1 is less than 0.3)
- $F_v = (-1 \times S_1)+2.3$ (S_1 is greater than 0.3)

$$F_v = (-1 \times S_1) + 2.3 = (-1 \times 0.747) + 2.3 = 1.553$$

7.2.1.2 Seismic Design Category

Based on the short period response acceleration ground motion parameters (S_{DS} = 1.3), the 1-S period response acceleration ground motion parameters (S_{D1} = .773), and the Risk Category of I through III, the Seismic Design Category is D.

7.2.1.3 Geometric Mean Peak Ground Acceleration

NV5 used the SEAOC *Seismic Design Maps* web application to determine the seismic design parameters for the site, including the geometric mean peak ground acceleration (PGA_M). The PGA_M is calculated by using the Site Coefficient (F_{PGA}) multiplied by the PGA mapped values found on Figure 22-9 from ASCE 7-16. The PGA_M was calculated using the following equation:

$$PGA_M = F_{PGA}PGA = 1.1 \times 0.818 = 0.9 \text{ g}$$

The Seismic Design Maps report from the SEAOC analysis is provided in Appendix C.

7.2.1.4 Site-Specific Ground Motion Hazard Analysis

Based on the preliminary information provided to NV5 on the proposed building sizes and types, NV5 understands a ground motion hazard analysis is not required for the site provided the seismic response coefficient (C_s) is determined in accordance with Exception 2 found in Section 11.4.8 of ASCE 7-16.

Table 7.2.1-1 2019 CBC Seismic Design Parameters

Description	Value	Reference
Latitude North (degrees)	39.1433	Google Earth
Longitude West (degrees)	-123.2033	Google Earth
Site Coefficient, F_A	1.0	*2019 CBC, Table 1613.2.3(1),* SEAOC *Seismic Design Maps*
Site Coefficient, F_V	1.553	2019 CBC, *Table 1613.2.3(2),* SEAOC *Seismic Design Maps*
Site Class	D = Stiff Soil	ASCE 7-16 Chapter 20, Table 20.3-1
Short (0.2 sec) Spectral Response, S_S (g)	1.95	ASCE 7-16, Section 11.4.2, SEAOC Seismic Design Maps
Long (1.0 sec) Spectral Response, S_1 *(g)*	0.747	ASCE 7-16, Section 11.4.2, SEAOC Seismic Design Maps
Short (0.2 sec) MCE Spectral Response, S_{MS} *(g)*	1.95	ASCE 7-16, Section 11.4.4, SEAOC Seismic Design Maps
Long (1.0 sec) MCE Spectral Response, S_{M1} *(g)*	1.160	ASCE 7-16, Section 11.4.4, SEAOC Seismic Design Maps
Short (0.2 sec) Design Spectral Response, S_{DS} *(g)*	1.3	ASCE 7-16, Section 11.4.5, SEAOC Seismic Design Maps
Long (1.0 sec) Design Spectral Response, S_{D1} *(g)*	0.773	ASCE 7-16, Section 11.4.5, SEAOC Seismic Design Maps
Seismic Design Category (Risk Category I, II or II)	D	ASCE 7-16, Section 11.6, SEAOC Seismic Design Maps
Geometric Mean Peak Ground Acceleration (PGA_M) (g)	0.9	ASCE 7-16, Section 11.8.3, SEAOC Seismic Design Maps

CBC = California Building Code
MCE = Maximum Considered Earthquake
g = gravitational acceleration (9.81 meters per second^2 = 32.2 feet per second^2)
sec = second

7.2.2 Shallow Foundations

Shallow continuous and isolated spread foundations that will support load bearing walls shall be designed as follows:

1. The base of all shallow foundations should bear on firm, competent non-expansive native soil, or non-expansive engineered fill compacted consistent with the earthwork recommendations of Section 7.1.
2. Continuous strip foundations should be constructed with the following dimensions:
   a. Minimum Width = 12 Inches
   b. Minimum Embedment Depth below the lowest adjacent exterior surface grade as shown in Table 7.2.2-1.
3. The bearing capacities to be used for structural design of shallow foundations embedded in either non-expansive native soil or non-expansive engineered fill are presented in Table 7.2.2-1.
   - The calculated factor of safety for allowable bearing pressures including live plus dead loads is 3.0 for all foundation embedment depths.
   - The allowable bearing pressure capacities were increased by a factor of 1.33 to include wind or seismic short-term loads.
   - The project structural engineer of record should review the FS and confirm that it is not less than the over-strength factor for this structure.

Table 7.2.2-1, Foundation Bearing Pressures for Shallow Foundations

Minimum Foundation Embedment Depth (in)	Maximum Ultimate Bearing Pressures For Live + Dead Loads (psf)	Maximum Allowable Bearing Pressures For Live + Dead Loads (psf)	Maximum Allowable Bearing Pressures For Live + Dead + Wind or Seismic Loads (psf)	Allowable Safety Factor (Ultimate/Total) (dim.)
12	6,000	2,000	2,660	3.0
18	7,500	2,500	3,325	3.0
24	9,000	3,000	3,990	3.0

psf = pounds per square foot
in = inches
dim = dimensionless

4. Foundation lateral resistance may be computed from passive pressure along the side of the foundation and sliding friction/cohesion resistance along the foundation base; however, the larger of the two resistance forces should be reduced by 50 percent when combining these two forces. The passive pressure can be assumed to be equal to an equivalent fluid pressure (EFP) per foot of depth. The passive pressure force and sliding friction coefficient for computing lateral resistance are as follows:
   a. Passive pressure = 225 (H), pounds per square foot (psf), where H = foundation embedment depth (feet) below lowest adjacent soil surface.
   b. Foundation bottom sliding friction coefficient = 0.30 (dimensionless).

5. Minimum steel reinforcement for continuous strip foundations should consist of four No. 4 bars with two bar placed near the top and two bar placed near the bottom of each foundation or as designated by a California licensed structural engineer.
6. The concrete should have a minimum 3,000 pounds per square inch (psi) compressive break strength after 28 days of curing, have a water-to-cement ratio from 0.40 to 0.50, and should be placed with minimum and maximum slumps of 4 and 6 inches, respectively. Since water is often added to uncured concrete to increase workability, it is important that strict quality control measures be employed during placement of the foundation concrete to ensure that the water-to-cement ratio is not altered prior to or during placement.
7. Concrete coverage over steel reinforcements should be a minimum of 3 inches as recommended by the American Concrete Institute (ACI).
8. Prior to placing concrete in any foundation excavations, the contractor shall remove all loose soil, rock, wood debris or other deleterious materials from the foundation excavations.
9. Foundation excavations should be saturated prior to placing concrete to aid the concrete curing process; however, concrete should not be placed in standing water.
10. Total settlement of individual foundations will vary depending on the plan dimensions of the foundation and actual structural loading. Based on the anticipated foundation dimensions and loads, we estimate that the total post-construction settlement of foundations designed and constructed in accordance with the recommendations will be on the order of 1/2 inch. Differential settlement between similarly loaded, adjacent foundations is expected to be about 1/4 inch, provided the foundations are founded into similar materials (e.g., all on competent and firm engineered fill, native soil, or rock).
11. Prior to placing concrete in any foundation excavation, the project geotechnical engineer or his/her field representative should observe the excavations to document that the following requirements are achieved: minimum foundation dimensions, minimum reinforcement steel placement and dimensions, removal of all loose soil, rock, wood debris or other deleterious materials, and that firm and competent native or engineered fill soil is exposed along the entire foundation excavation bottom. Strict adherence to these requirements is paramount to the satisfactory behavior of a building foundation. Minor deviations from these requirements can cause the foundations to undergo minor to severe amounts of settlement which can result in cracks developing in the foundation and adjacent structural members, such as concrete slab-on-grade floors.

7.2.3 Retaining Walls Entirely Above the Groundwater Table

A California licensed professional engineer should design all retaining walls situated above the groundwater table with drained backfill using the following geotechnical engineering design criteria:

1. The retaining wall recommendations for static loading conditions are based on Rankine earth pressure theory published by W.J.M. Rankine (1857). The retaining wall recommendations for seismic loading conditions are based on the published work by Geraili and Sitar, *Seismic Earth Pressures on Retaining Structures in Cohesionless Soils*, (2013).

2. Retaining walls should be founded on firm native soils or engineered fill consistent with the requirements of Section 7.1.

3. The retaining wall should be designed using the geotechnical engineering design parameters presented in Table 7.2.3-1.

4. The retaining wall backfill soil should be free draining material that meets or exceeds the material requirements of and is placed and compacted consistent with the requirements of Section 7.2.4.

5. The static lateral earth pressures exerted on the retaining walls may be assumed to be equal to an equivalent fluid pressure per foot of depth below the top of the wall. The lateral pressures presented in the table below are ultimate values and, therefore, do not include a safety factor, and assumes a free draining backfill (no hydrostatic forces acting on the wall) and no surcharge loads applied within a distance of 0.50H, where H equals the total vertical wall height.

6. The retaining wall backfill slope shall have a horizontal slope gradient for a minimum horizontal distance of 0.50H, where H equals the total vertical wall height. If a steeper backfill slope ratio is desired, then NV5 should be notified and contracted to perform additional retaining wall designs.

7. The retaining wall foundation excavations should be saturated prior to placing concrete to aid the concrete curing process. However, concrete should not be placed in standing water.

Table 7.2.3-1, Design Parameters for Retaining Walls

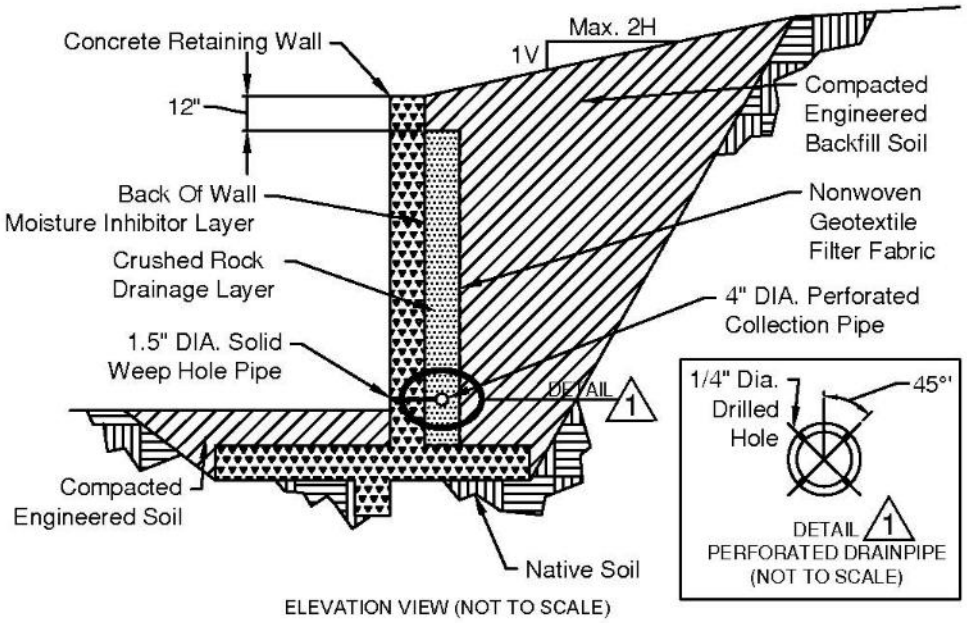
Design Parameters for Retaining Walls		
Loading Conditions	**Static Loads On Retaining Wall With Horizontal Backfill Slope**	**Seismic Load On Retaining Wall With Horizontal Backfill Slope**
Wall Active Condition Pressures (psf)/ft (1)	50 (H) (5)	-
Wall Passive Condition Pressures (psf)/ft (2)	225 (H)	-
Wall At-Rest Condition Pressures (psf)/ft (3)	70 (H)	-
Wall Seismic Load (Active Condition) (plf) (1)	-	14 (H^2)
Wall Seismic Load (Passive Condition) (plf) (2)	-	14 (H^2)
Wall Seismic Load (At-Rest Condition) (plf) (3)	-	31 (H^2)
P_{active} Force Located Above Foundation Base	0.33 (H)	-
$P_{passive}$ Force Located Above Foundation Base	0.33 (H)	-
$P_{at\text{-}rest}$ Force Located Above Foundation Base	0.33 (H)	-
$P_{earthquake}$ Force Located Above Foundation Base	-	0.33(H)
Maximum Allowable Foundation Bearing Capacity (psf), (Live + Dead Loads)	2,500	2,500
Maximum Allowable Foundation Bearing Capacity (psf) (Live + Dead + Wind or Seismic Loads)	3,325	3,325
Minimum Foundation Embedment Depth (in)	18	18
Foundation Bottom Friction Coefficient (dim.) (4)	0.30	0.30

Notes:
(1) The active pressure condition applies to a retaining wall with an unrestrained top (deflection allowed).
(2) The passive pressure condition applies to a retaining wall with soil resistance at the base. If passive pressures are used, then NV5 recommends that the top 1.0 feet of soil weight be ignored.
(3) The At-Rest pressure condition applies to a retaining wall with the top restrained (no deflection allowed).
(4) If the design horizontal resistance force acting on the wall foundation is computed by combining both the sliding friction force and passive soil pressure force, then the larger of the two forces should be reduced by 50 percent.
(5) H = The distance to a point in the backfill soil where the pressure is desired. The H distance is measured from the top of the wall for active and at-rest conditions and from one foot below the soil height at the toe of the wall for the passive condition (See Note 2 for passive condition).
psf = pounds per square foot
plf = pounds per lineal foot

7.2.4 Retaining Wall Backfill

Place and compact all retaining wall backfill and drainage layer materials as described below. NV5 did not review the final improvement plans for the site. If sub-structure retaining walls for below grade rooms, basements, garages, etc., are designed for this project, then these structures should also incorporate a water proofing sealant as described below. The water proofing sealant products should be installed by a qualified waterproofing contractor according to the manufacturer's directions. A typical retaining wall and backfill material zones figure is shown below.

CANTILEVER RETAINING WALL AND BACKFILL MATERIALS



1. **Waterproofing:** Waterproofing materials should be installed behind retaining walls prior to backfilling if retaining walls will be constructed for below grade rooms, basements, garages, elevator shafts, etc. The waterproofing materials should be installed by a qualified waterproofing contractor according to the manufacturer's directions.

2. **Drainage Layer:** A drainage layer should be placed between the wall and backfill material to prevent buildup of hydrostatic pressures behind the wall. Additionally, care should be taken during placement of the drainage layer materials so as not to crush, tear, or damage the waterproofing materials. The drainage layer can be constructed from drain rock, geosynthetic drain nets or a combination of both as described below.

    a. **Caltrans Class II Permeable Material Method:** Place a minimum 12-inch thick layer of Caltrans Class II Permeable Material directly against the wall or waterproofing system (as described below) without a geotextile wrapping to separate the backfill soil from the wall. The drainage material should extend from the wall bottom to within 12 inches of the wall top.

    b. **Geotextile Wrapped Drain Rock Method:** Place a minimum 12-inch-thick layer of drain rock wrapped in a geotextile filter fabric directly against the wall or waterproofing system (as described below) to separate the backfill soil from the wall. The drain rock should extend from the wall bottom to within 12 inches of the wall top. A minimum 6-ounce per square yard (oz/sy) non-woven geotextile fabric, such as Mirafi 140N manufactured by Tencate Geosynthetics or equivalent should be used.

c. **Geosynthetic Composite Drainnet (Geonet) Method:** Place a geosynthetic composite drain-net (geonet) directly against the wall or waterproofing system (as described below) to separate the backfill soil from the wall. The composite geonet should extend from the wall bottom to within 12 inches of the wall top. A geosynthetic composite drainnet such as Hydroduct 200 or Hydroduct 220 distributed by Grace Construction Products or equivalent should be used.

3. **Drainage Layer Collection and Discharge Pipes:** A minimum 4-inch diameter schedule 40, polyvinylchloride (PVC) perforated drainpipe should be placed at the wall base inside the geotextile wrapped drain rock or wrapped by the composite geonet. ¼–inch diameter perforations should be drilled into the pipe. The perforations should be oriented in cross section view at 90 degrees to one another and along the pipe length on 6-inch centers. The pipe should be placed such that the perforations are oriented 45 degrees from the vertical. A minimum of 3 inches of drain rock should be placed below the perforated PVC pipe. The pipe should direct water away from the wall by gravity with a minimum 1 percent slope. The pipe should collect groundwater collected by the drainage layer discharged to the surface at the end of the wall or through weep-hole penetrations through the wall.

4. **Backfill Placement and Compaction Equipment:** Heavy conventional motorized compaction equipment should not be used directly adjacent to a retaining wall unless the wall is designed with sufficient steel reinforcements and/or bracing to resist the additional lateral pressures. Compaction of backfill materials within 5 feet of the retaining wall should be accomplished by lightweight, hand-operated, walk-behind, vibratory equipment. Additionally, care should be taken during placement of the general backfill materials so as not to crush, tear or damage the waterproofing and/or drainage layer materials.

5. **Backfill Materials and Compaction:** The backfill material should be free draining and classified by the USCS as a coarse-grained material (i.e., GP, GW, GC, GM, SP, SW, SC, and SM). Materials classified by the USCS as a fine-grained material (i.e., CL, CH, ML, or MH) should not be used as retaining wall backfill. The retaining wall backfill material placed between the drainage layer and temporary cut-slope should be moisture conditioned to between ± 3 percentage points of the ASTM D1557 optimum moisture content and then compacted to a minimum of 90 percent and a maximum of 95 percent of the ASTM D1557 maximum dry density.

7.2.5 Concrete Slab-On-Grade Interior Floors, Sidewalk and Patio Construction

In general, NV5 recommends that subgrade elevations on which the concrete slab-on-grade floors are constructed be a minimum of 6 inches above the elevation of the surrounding parking lots, driveways, and landscaped areas. Elevating the building will reduce the potential for subsurface water to enter beneath the concrete slab-on-grade floors and exterior surfaces and underground utility trenches.

The concrete slab-on-grade building floors, patios, and sidewalk areas should be evaluated by a California-licensed professional engineer for expected live and dead loads to determine if the minimum slab thickness and steel reinforcement recommendations presented in this report should be increased or redesigned.

NV5 recommends using the guideline procedures, methods and material properties that are presented in the following ASTM and ACI documents for construction of concrete slab-on-grade floors:

- ACI 302.1R-15, Guide for Concrete Floor and Slab Construction, reported by ACI Committee 302.
- ASTM E1643-18a, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- ASTM E1745-17, Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
- ASTM F710-19, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

The interior building concrete slab-on-grade floor and exterior slab-on-grade concrete components are described below from top to bottom. If static or intermittent live floor loads greater than 250 psf are anticipated, then a California-licensed professional engineer should design the necessary concrete slab-on-grade floor thickness and steel reinforcements.

7.2.5.1 Interior Floors

1. Minimum 4-Inch-Thick Concrete Slab: The concrete slab should be installed with a minimum 3,000 psi compressive strength after 28 days of curing. NV5 recommends that the concrete design use a water-to-cement ratio between 0.40 and 0.45 and should be placed with minimum and maximum slumps of 3 and 5 inches, respectively. The concrete mix design is the responsibility of the concrete supplier.

2. Steel Reinforcement: Reinforcement should be used to improve the load-carrying capacity, to reduce cracking caused by shrinkage during curing and from both differential and repeated loadings. It should be understood that it is nearly impossible to prevent all cracks from development in concrete slabs; in other words, it should be expected that some cracking will occur in all concrete slabs no matter how well they are reinforced. Concrete slabs that will be subjected to heavy loads should be designed with steel reinforcements by a California-licensed professional engineer.

   Rebar: As a minimum, use No. 3 rebar (ASTM A615/A 615M-18e1 Grade 60), tied and placed with 18-inch centers in both directions (perpendicular) and supported on concrete “dobies” to position the rebar in the center of the slab during concrete pouring. NV5 does not recommend that the steel reinforcements of the concrete slab-on-grade floor be tied into the perimeter or interior continuous strip foundations or interior isolated column foundations. In other words, we recommend that the concrete slab-on-grade floors be constructed as independent structural members so that they can move (float) independently from the foundation structures.

3. Underslab Vapor-Moisture Retarder Membrane: The underslab retarder membrane should be placed in areas with moisture sensitive floor coverings as a floor component that will minimize transmission of both liquid water and water vapor transmission through the concrete slab-on-grade floor. NV5 recommends using at a minimum a Class A (ASTM E1745-17), minimum 10-mil-thick, plastic, vapor-moisture, retarder membrane material such as Stego Wrap® underslab vapor retarder membranes or equivalents. Additionally, the following materials are recommended: Stego® Tape and Stego® Mastic or equivalents to seal membrane joints and any utility penetrations.

Regardless of the type of moisture-vapor retarder membrane used moisture can wick up through a concrete slab-on-grade floor. Excessive moisture transmission through a concrete slab floor can cause adhesion loss, warping and peeling of resilient floor coverings, deterioration of adhesive, seam separation, formation of air pockets, mineral deposition beneath flooring, odor and both fungi and mold growth. Slabs can be tested for water transmissivity in areas that are moisture sensitive. Commercial sealants, polymer additives to the concrete at the batch plant, entrained air, flyash, and a reduced water-to-content ratio can be incorporated into the concrete slab-on-grade floor mix design to reduce its permeability and water-vapor transmissivity properties. A waterproofing consultant should be contacted to provide detailed recommendations if moisture sensitive flooring materials will be installed on the concrete slab-on-grade floors.

4. Minimum 4-Inch-Thick Crushed Rock or Class II Aggregate Base Rock Layer: Interior floors should be underlain by clean crushed rock. Crushed rock should be mechanically consolidated under the observation of NV5. The crushed rock should be washed to produce a particle size distribution of 100 percent (by dry weight) passing the ¾ inch sieve and 5 percent passing the No. 4 sieve and 0 to 3 percent passing the No. 200 sieve. An alternative rock material for slab-on-grade concrete surfaces would include AB rock meeting the specification of Caltrans Class II AB. AB rock layers should be placed and compacted to a minimum of 95 percent of the ASTM D1557 dry density with a moisture content of ± 3 percentage points of the ASTM D1557 optimum moisture content. Just prior to pouring the concrete slab, the rock layer should be moistened to a saturated surface dry (SSD) condition. This measure will reduce the potential for water to be withdrawn from the bottom of the concrete slab while it is curing and will help minimize the development of shrinkage cracks.

   If the current property owner elects to eliminate the crushed rock or AB rock layer beneath the interior concrete slabs-on-grade for economic reasons, then there will be an inherent greater risk assumed by the developer for the development of both shrinkage and bearing-related cracks in the associated slabs.

5. Subgrade Soil Preparation: All concrete slab-on-grade subgrade soil should be prepared and compacted consistent with the recommendations of Section 7.1. The top 12 inches of the non-expansive soil should be compacted to a minimum of 90 percent of the ASTM D1557 dry density with a moisture content within ± 3 percentage points of the ASTM D1557 optimum moisture content.
6. Crack Control: Crack control grooves should be installed during placement or saw cuts should be made in accordance with the ACI and Portland Cement Association (PCA) specifications. Generally, NV5 recommends that expansion joints be provided between the slab and perimeter footings, and that crack control grooves or saw cuts are installed on 10-foot-centers in both directions (perpendicular).
7. Field Observations: All concrete slab-on-grade surfaces and installed steel reinforcements should be observed and inspected by an NV5 construction monitor prior to pouring concrete.
8. Field Curing of Concrete: Prior to applying construction loads, all exposed concrete slab-on-grade floors should be moisture cured for a minimum of 7 days following placement of the concrete. If concrete is placed during the hot summer months when the ambient air temperatures may be as low as 50 to 60 degrees Fahrenheit (°F) in the early morning and in excess of 90 °F in the afternoon, then the contractor may need to implement special curing measures to reduce the

development of shrinkage cracks. The concrete contractor is responsible for determining the appropriate curing process to be applied to the slab-on-grade floor.

7.2.5.2 Exterior Sidewalks and Patios

1. Minimum 4-Inch-Thick Concrete Slab: should be installed with a minimum 2,500 psi compressive strength after 28 days of curing. NV5 recommends that the concrete design uses a water to cement ratio between 0.40 and 0.45 and should be placed with minimum and maximum slumps of 4 and 6 inches, respectively. The concrete mix design is the responsibility of the concrete supplier.
2. Concrete Slabs in Contact With Isolated Concrete Foundations: NV5 does not recommend that concrete slab-on-grade floors be placed in direct contact with the top surface of isolated column concrete foundations. Our experience is that during curing period of the concrete slab-on-grade floor a significant thermal gradient may develop between the portions of the slab placed directly on the typically more massive isolated column concrete foundations and the portions of the slab placed over a vapor-moisture retarder membrane and crushed rock layers. The development of adverse thermal gradients may cause the development of significant orthogonal and/or circular shrinkage cracks around the isolated column foundations.
3. Steel Reinforcement: should be used to improve the load carrying capacity and to reduce cracking caused by shrinkage during curing and from both differential and repeated loadings. It should be understood that it is nearly impossible to prevent all cracks from development in concrete slabs; in other words, it should be expected that some cracking will occur in all concrete slabs no matter how well they are reinforced or cured. Concrete slabs that will be subjected to heavy loads should be designed with steel reinforcements by a California licensed professional engineer.

   If the current property owner (developer) elects to eliminate the steel reinforcements from the exterior concrete slabs-on-grade for economic reasons, then there will be an inherent greater risk assumed by the developer for the development of both shrinkage and bearing related cracks in the associated slabs.
4. Minimum 4-Inch-Thick Crushed Rock Layer: Exterior concrete slabs-on-grade should be underlain by clean crushed rock. Crushed rock should be mechanically consolidated under the observation of NV5. The crushed rock should be washed to produce a particle size distribution of 100 percent (by dry weight) passing the ¾ inch sieve and 5 percent passing the No. 4 sieve and 0 to 3 percent passing the No. 200 sieve. An alternative rock material for slab-on-grade concrete surfaces would include AB rock meeting the specification of Caltrans Class II AB. AB rock layers should be placed and compacted to a minimum of 95 percent of the ASTM D1557 dry density with a moisture content of ± 3 percentage points of the ASTM D1557 optimum moisture content. Just prior to pouring the concrete slab, the rock layer should be moistened to a SSD condition. This measure will reduce the potential for water to be withdrawn from the bottom of the concrete slab while it is curing and will help minimize the development of shrinkage cracks.

   If the current property owner elects to eliminate the crushed rock or AB rock layer beneath the interior concrete slabs-on-grade for economic reasons, then there will be an inherent greater risk assumed by the developer for the development of both shrinkage and bearing-related cracks in the associated slabs.

5. Subgrade Soil Preparation: All concrete slab-on-grade subgrade soil should be prepared and compacted consistent with the recommendations of Section 7.1. The top 12 inches of the non-expansive soil should be compacted to a minimum of 90 percent of the ASTM D1557 dry density with a moisture content within ± 3 percentage points of the ASTM D1557 optimum moisture content.
6. Crack Control: Crack control grooves should be installed during placement or saw cuts should be made in accordance with the ACI and PCA specifications. Generally, NV5 recommends that expansion joints be provided between the slab and perimeter footings, and that crack control grooves or saw cuts are installed on 10-foot-centers in both directions (perpendicular).
7. Field Observations; All concrete slab-on-grade surfaces and installed steel reinforcements should be observed and inspected by an NV5 construction monitor prior to pouring concrete.

7.2.6 Rigid Concrete Pavement for Heavy Truck Traffic Areas and Fire Lanes

The rigid concrete pavement components are described below from top to bottom. If static or intermittent live floor loads greater than 250 psf are anticipated, then a California-licensed professional engineer should design the necessary concrete slab-on-grade floor thickness and steel reinforcements.

1. The recommended modulus of subgrade value of 150 kips/cubic foot should be used if the site subgrade is prepared in accordance with the recommendations presented in Section 7.1 above.
2. Minimum 6-Inch-Thick Concrete Slab: The rigid concrete pavement should be installed with a minimum 3,500 pounds psi compressive strength after 28 days of curing. NV5 recommends that the concrete design uses a water-to-cement ratio between 0.40 and 0.45 and should be placed with minimum and maximum slumps of 4 and 6 inches, respectively. The concrete mix design is the responsibility of the concrete supplier.
3. Steel Reinforcements: The rigid concrete pavement sections should include steel reinforcement to improve the load carrying capacity and to minimize cracking caused by shrinkage during curing and from both differential and repeated loadings. It should be understood that it is nearly impossible to prevent all cracks from development in concrete slabs; in other words, it should be expected that some cracking will occur in all concrete slabs no matter how well they are reinforced. Rigid concrete pavement that will be subjected to heavy loads should be designed with steel reinforcements by a California-licensed professional engineer.

   If the owner elects to eliminate the steel reinforcements from the exterior concrete slabs-on-grade for economic reasons, then there will be an inherent greater risk assumed by the developer for the development of both shrinkage and bearing related cracks in the associated slabs.
4. Steel Rebar: Use No. 4 steel rebar (ASTM A615/A615M-18e1 Grade 60 reinforcement), tied and placed with 18-inch centers in both directions (perpendicular) and supported on concrete “dobies” to position the rebar in the center of the slab during concrete pouring.
5. Minimum 6-Inch Caltrans Class II AB Layer: The rigid concrete pavement should be underlain by Class II AB placed and compacted to a minimum of 95 percent of the ASTM D1557 dry density with a moisture content of ± 3 percentage points of the ASTM D1557 optimum moisture content.

6. Subgrade Soil Preparation: The subgrade soil below the rigid concrete pavement sections designed for vehicle traffic should be prepared and compacted consistent with the recommendations of Section 7.1. The top 12 inches of the non-expansive soil should be compacted to a minimum of 95 percent of the ASTM D1557 dry density with a relatively uniform moisture content of 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content.
7. Crack Control Grooves: The rigid concrete pavement should include crack control and expansion joint grooves installed during placement or saw cuts should be made in accordance with the ACI and PCA specifications. Generally, NV5 recommends that expansion joints be provided between the slab and perimeter footings, and that crack control grooves or saw cuts are installed on no greater than 10-foot-centers in both directions (perpendicular).
8. Field Observations: Field observations should be made by an NV5 construction monitor of all concrete slab-on-grade subgrade surfaces and installed steel reinforcements prior to placing concrete.

7.2.7 Flexible Pavement

NV5 used the Caltrans Highway Design Manual to develop several AC and AB rock pavement design alternatives to allow for different traffic loading conditions. NV5 used a Traffic Index (TI) of 4 to 8 which represents typical vehicle traffic for residential streets, collector streets, industrial/commercial streets, minor arterial streets, major arterial streets, and truck route arterial streets. The actual TI for the project pavement areas should be determined in accordance with Chapter 600 of the Caltrans Highway Design Manual.

Previous laboratory testing performed on soil samples similar to the anticipated pavement subgrade soils within the proposed pavement improvements indicate these materials generally possess an R-Value of 10. The actual subsurface soil conditions exposed at the finished subgrade surface of the proposed pavement areas may be different from this R-Value based on site grades, or the use of imported fill materials. The actual finished subgrade materials should be evaluated during construction to confirm the design recommendations below. Please note that the Caltrans design method requires that the maximum R-Value of the subgrade soil not exceed 50.

NV5 assumed that the pavement layers will be constructed with Class 2 Aggregate Base Rock (Minimum R-Value = 78) and Type A Asphalt Concrete in accordance with the requirements of Section 26 of the Caltrans Standard Specifications. Table 7.2.7-1 presents the AC pavement design sections for varying TI's. NV5 recommends that the AB rock layer be constructed with a minimum thickness of 6-inches for constructability issues and to achieve a higher level of confidence that the road will achieve the expected service life.

Table 7.2.7-1, Flexible Pavement Design

Parameters	Design Values				
Traffic Description (approximate)	Light Automobiles	Light to Medium Autos and Trucks	Medium to Heavy Trucks	Heavy Trucks	Very Heavy Trucks
Traffic Index (TI)	4	5	6	7	8
Design R-Values Class II AB Rock Subgrade Soil	 78 12	 78 12	 78 12	 78 12	 78 12
AC Thickness (inch)(1)	2.5	3.0	3.5	4.0	5.0
AB Rock Thickness (inch)(2) (95% Relative Compaction)	7.0	10.0	12.0	14.0	16.0
Subgrade Soil Thickness (inch) (95% Relative Compaction)	12.0	12.0	12.0	12.0	12.0

Notes:
(1) The asphalt concrete thickness includes the Caltrans safety factor.
(2) NV5 recommends that the minimum thickness of AB rock should be 6 inches regardless of what the Caltrans design method indicates. This minimum thickness is necessary for constructability issues and will increase the level of confidence that the roads will achieve the expected service life.

The subgrade soil and AB rock should be placed and compacted as described below.

1. The subgrade soil to a depth of 12 inches from the finished grade surface should be compacted to a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density with a moisture content of 2 to 4 percentage points of the ASTM D1557 optimum moisture content. The compacted sub-grade soil shall be graded to achieve the design grades and tolerances.
2. The stability of the compacted subgrade soil should be evaluated by wheel rolling prior to placing the overlying AB rock layer. Wheel rolling should be performed with a fully loaded water truck with tire pressures between 60 and 95 psi. The subgrade soil surface should exhibit only minor deflections as the wheel load passes by. Any unstable areas should be reworked and then retested for percent relative compaction and percent moisture content and then proof rolled again. This process should be repeated until the area appears to be relatively stable.
3. The Caltrans Class II AB rock should be compacted to a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density with a moisture content of ± 3 percentage points of the ASTM D1557 optimum moisture content.
4. The stability of the compacted AB rock should be evaluated by wheel rolling prior to placing the overlying AC layer. Wheel rolling should be performed with a fully loaded water truck with tire pressures between 60 and 95 psi. The AB rock surface should exhibit only minor deflections as the wheel load passes by. Any unstable areas should be reworked and then retested for percent relative compaction and percent moisture content and then proof rolled again. This process should be repeated until the area appears to be relatively stable.
5. Concrete cut-off curbs should be constructed around all landscaped areas that are adjacent to AC paved driveways and parking areas. The curbs should extend to a minimum depth of 8 inches into the underlying subgrade soil. The extended curbs will reduce migration of irrigation and rain waters originating in the landscaped areas from entering the AB rock materials underlying the AC pavement material. This design is intended to minimize failures of the paved areas due to saturation of the underlying AB rock and subgrade soils.

8.0 REFERENCES

American Society of Civil Engineers, 2016. *Minimum Design Loads for Buildings and Other Structures* (ASCE 7-16).

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Jennings, C.W., and Strand, R.G., 1960. *Geologic Map of California: Ukiah Sheet, 1:250,000*. California Division of Mines and Geology.

Rankine, W.J.M., 1857, *On the Stability of Loose Earth*, Philosophical Transactions of the Royal Society, London, Vol. 147.

United States Geological Survey, 2022. *Ukiah Quadrangle, California-Mendocino Co*. 7.5 Minute Series (Topographic).

9.0 LIMITATIONS

The following limitations apply to the findings, conclusions and recommendations presented in this report:

1. This report should not be relied upon without review by NV5 if a period of 24 months elapses between the issuance report date shown above and the date when construction commences.
2. NV5's professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in Northern California. No warranties are either expressed or implied.
3. NV5 provided engineering services for the site project consistent with the work scope and contract agreement presented in the proposal and agreed to by the client. The findings, conclusions and recommendations presented in this report apply to the conditions existing when NV5 performed the services and are intended only for the client, purposes, locations, timeframes and project parameters described herein. NV5 is not responsible for the impacts of any changes in environmental standards, practices or regulations subsequent to completing the services. NV5 does not warrant the accuracy of information supplied by others, or the use of segregated portions of this report. This report is solely for the use of the client unless noted otherwise. Any reliance on this report by a third party is at the party's sole risk.
4. If changes are made to the nature or design of the project as described in this report, then the conclusions and recommendations presented in this report should be considered invalid by all parties. The validity of the conclusions and recommendations presented in this report can only be made by NV5; therefore, NV5 should be allowed to review all project changes and prepare written responses with regards to their impacts on the conclusions and recommendations. However, additional fieldwork and laboratory testing may be required for NV5 to develop any modifications to the recommendations. The cost to review project changes and perform additional fieldwork and laboratory testing necessary to modify the recommendations is beyond the scope-of-services presented in this report. Any additional work will be performed only after receipt of an approved scope-of-work, budget and written authorization to proceed.
5. The analyses, conclusions and recommendations presented in this report are based on the site conditions as they existed at the time NV5 performed the surface and subsurface field investigations. NV5 has assumed that the subsurface soil and groundwater conditions encountered at the location of the exploratory excavations are generally representative of the subsurface conditions throughout the entire project site; however, if the actual subsurface conditions encountered during construction are different than those described in this report, then NV5 should be notified immediately so that we can review these differences and, if necessary, modify the recommendations.
6. The elevation or depth to the groundwater table underlying the project site may differ with time and location; therefore, the depth to the groundwater table encountered in the exploratory excavations is only representative of the specific time and location where it was observed.
7. The project site map shows approximate exploratory excavation locations as determined by pacing distances from identifiable site features; therefore, their locations should not be relied upon as being exact nor located with the accuracy of a California-licensed land surveyor.
8. NV5's geotechnical investigation scope-of-services did not include an evaluation of the project site for the presence of hazardous materials. Although NV5 did not observe the presence of

hazardous materials at the time of the field investigation, all project personnel should be careful and take the necessary precautions in the event hazardous materials are encountered during construction.

9. NV5's geotechnical investigation scope-of-services did not include an evaluation of the project site for the presence of mold nor for the future potential development of mold at the project site. If an evaluation of the presence of mold and/or for the future potential development of mold at the site is desired, then the property owner should contact a consulting firm specializing in these types of investigations. NV5 does not perform mold evaluation investigations.
10. NV5's experience and that of the civil engineering profession clearly indicates that during the construction phase of a project the risks of costly design, construction and maintenance problems can be significantly reduced by retaining a design geotechnical engineering firm to review the project plans and specifications and to provide geotechnical engineering CQA observation and testing services. Upon your request NV5 will prepare a CQA geotechnical engineering services proposal that will present a work scope, a tentative schedule and fee estimate for your consideration and authorization. If NV5 is not retained to provide geotechnical engineering CQA services during the construction phase of the project, then NV5 will not be responsible for geotechnical engineering CQA services provided by others nor any aspect of the project that fails to meet your or a third party's expectations in the future.

APPENDIX A:

Exploratory Trench Logs

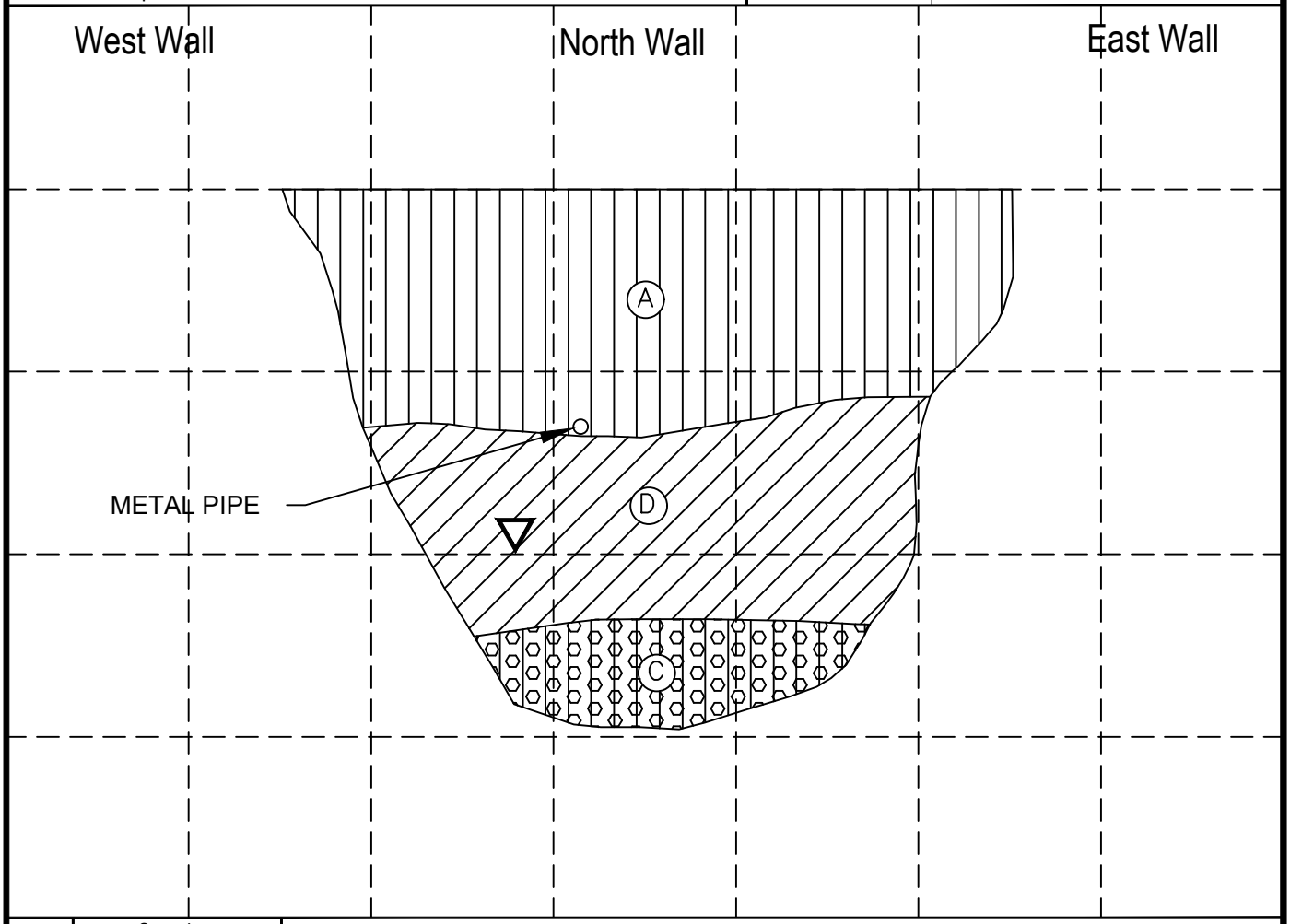
NV5
48 BELLARMINE CT., STE 40
CHICO, CALIFORNIA 95928
PHONE: (530) 894-2487
www.NV5.com

Exploratory Trench Log

Trench No.
T22-1

Project Name: Acorn Valley Plaza	
Project No.: 71222.00.001 Task No.: 001	
Location: E. Gobbi Street and Village Circle, Ukiah, California	
Logged By: Dominic J. Potestio Date Logged: 04-26-22	
Backhoe Company: NV5	
Backhoe Type: Kubota U35-4 Excavator with 18-inch bucket	
Backfill Description: Loose Excavated Soils	

Ground Water Information		
Date:	04-26-22	
Time (24 Hr. Clock):	14:20	
Depth bgs (ft):	4.0 (Perched)	
Trench Elev.:	600.00 Ft. AMSL	
Trench Bearing:	Azimuth Compass = 90 Degrees	
Scale:	1 In. = 2 Ft.	



Unit No.	Sample Depth(Ft)	Sample No.	Soil And/Or Rock Material Descriptions SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsel Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsel Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.
A			(ML) CLAYEY SILT WITH SAND (FILL); Fld. Est.: 50% Low Plasticity Clay and Silt Fines, 15% Fine Sand, and 35% Angular Rock Fragments; Brown (10YR, 5/3); Stiff to Firm; Moist.
D			(CL) SILTY CLAY; Fld. Est.: 70% Low Plasticity Clay and Silt Fines, 20% Gravels and Angular Rock Fragments, and 10% Fine Sand; Dark Grayish Brown (10YR, 4/2); Very Soft; Organic Laden. Perched Groundwater at 4.0 Feet.
C			(GM) SILTY GRAVEL WITH SAND; Fld. Est.: 50% Rounded Gravels and Angular Rock Fragments, 30% Low Plasticity Clay and Silt Fines, and 20% Fine Sand; Dark Yellowish Brown (10YR, 3/4); Dense; Wet. Pocket Penetrometer Test at 5.5 Feet = 3.0 TSF.

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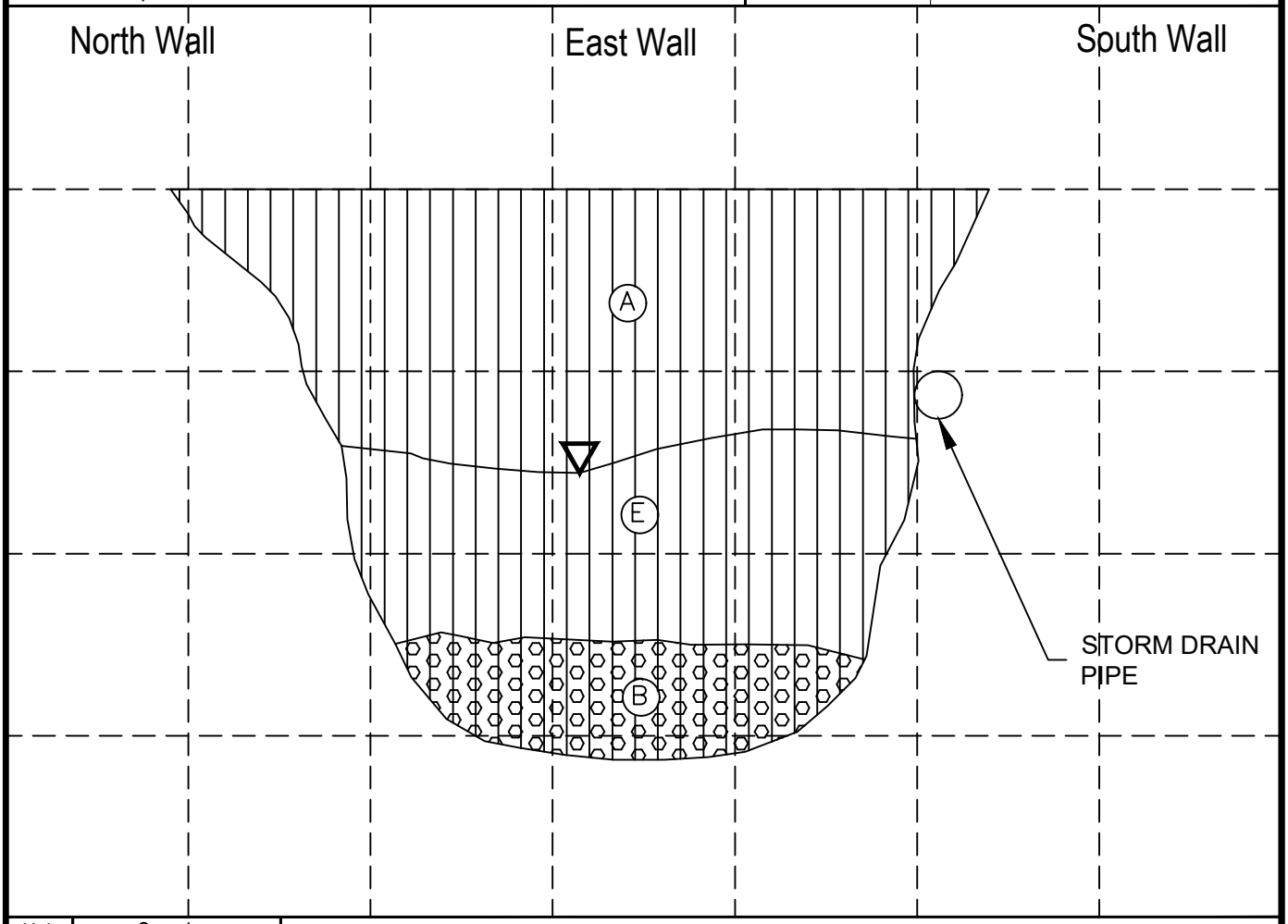
Exploratory Trench Log

Trench No.
T22-2

Project Name: Acorn Valley Plaza	Ground Water Information		
Project No.: 71222.00.001 Task No.: 001	Date:	04-26-22	
Location: E. Gobbi Street and Village Circle, Ukiah, California	Time (24 Hr. Clock):	13:40	
Logged By: Dominic J. Potestio Date Logged: 04-26-22	Depth bgs (ft):	3.0 (Perched)	
Backhoe Company: NV5	Trench Elev.:	600.00 Ft. AMSL	
Backhoe Type: Kubota U35-4 Excavator with 18-inch bucket	Trench Bearing:	Azimuth Compass = 0 Degrees	
Backfill Description: Loose Excavated Soils	Scale:	1 In. = 2 Ft.	



Unit No.	Sample Depth(Ft)	Sample No.	Soil And/Or Rock Material Descriptions SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsel Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsel Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.
A			(ML) CLAYEY SILT WITH SAND (FILL); Fld. Est.: 50% Low Plasticity Clay and Silt Fines, 35% Angular Rock Fragments, and 15% Fine Sand; Brown (10YR, 5/2); Stiff; Moist.
E			(ML) CLAYEY SILT; Fld. Est.: 80% Low Plasticity Clay and Silt Fines, 10% Gravel, and 10% Fine Sand; Dark Grayish Brown (10YR, 4/2); Soft; Wet; Organic Laden. Perched Groundwater at 3.0 Feet.
B			(GM) SILTY GRAVEL; Fld. Est.: 55% Rounded Gravels and Angular Rock Fragments, 20% Low Plasticity Clay and Silt Fines, and 25% Fine to Medium Sand; Dark Yellowish Brown (10YR, 4/4); Dense to Very Dense; Moist.

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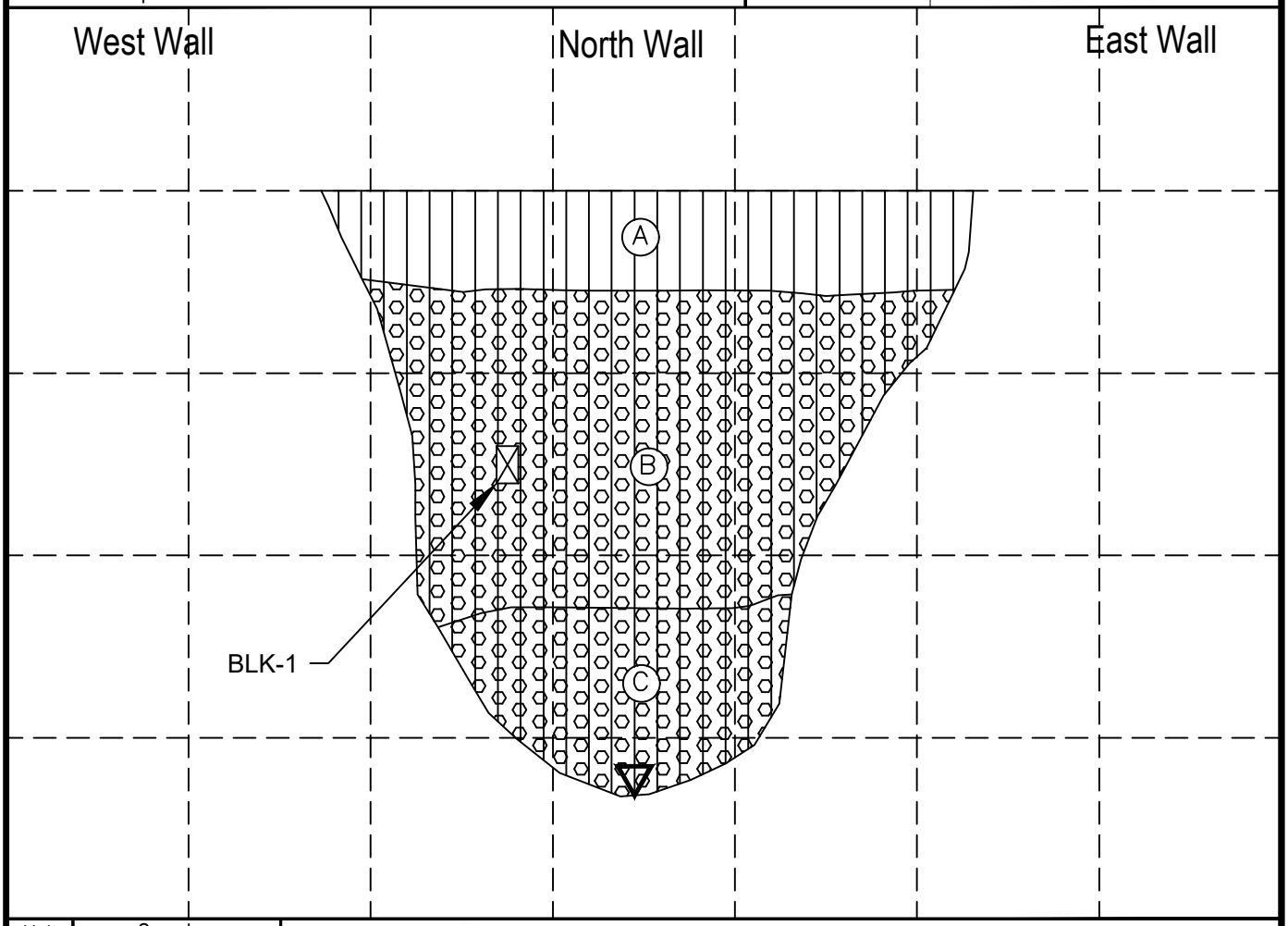
Exploratory Trench Log

Trench No.
T22-3

Project Name: Acorn Valley Plaza	Ground Water Information		
Project No.: 71222.00.001 Task No.: 001	Date:	04-26-22	
Location: E. Gobbi Street and Village Circle, Ukiah, California	Time (24 Hr. Clock):	10:20	
Logged By: Dominic J. Potestio Date Logged: 04-26-22	Depth bgs (ft):	6.5 (Perched)	
Backhoe Company: NV5	Trench Elev.:	600.00 Ft. AMSL	
Backhoe Type: Kubota U35-4 Excavator with 18-inch bucket	Trench Bearing:	Azimuth Compass = 90 Degrees	
Backfill Description: Loose Excavated Soils	Scale:	1 In. = 2 Ft.	



Unit No.	Sample Depth(Ft)	Sample No.	Soil And/Or Rock Material Descriptions SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsel Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsel Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.
A			(ML) CLAYEY SILT WITH SAND (FILL); Fld. Est.: 50% Low Plasticity Clay and Silt Fines, 35% Angular Rock Fragments, and 15% Fine Sand; Brown (10YR, 5/2); Stiff; Moist.
B	1.5-3	BLK-1	(GM) SILTY GRAVEL WITH SAND; Fld. Est.: 25% Rounded Gravels and Angular Rock Fragments, 45% Low Plasticity Clay and Silt Fines, and 30% Fine to Medium Sand; Dark Yellowish Brown (10YR, 4/4); Dense; Moist. Pocket Penetrometer Test at 1.5, 2.5, and 3.5 Feet = 4.5 TSF.
C			(GM) SANDY GRAVEL WITH SILT; Fld. Est.: 65% Angular and Rounded Gravels and Cobbles, 15% Low Plasticity Clay and Silt Fines, and 20% Fine to Medium Sand; Dark Yellowish Brown (10YR, 4/2); Very Dense; Wet. Groundwater Encountered at 6.5 Feet Below Ground Surface.

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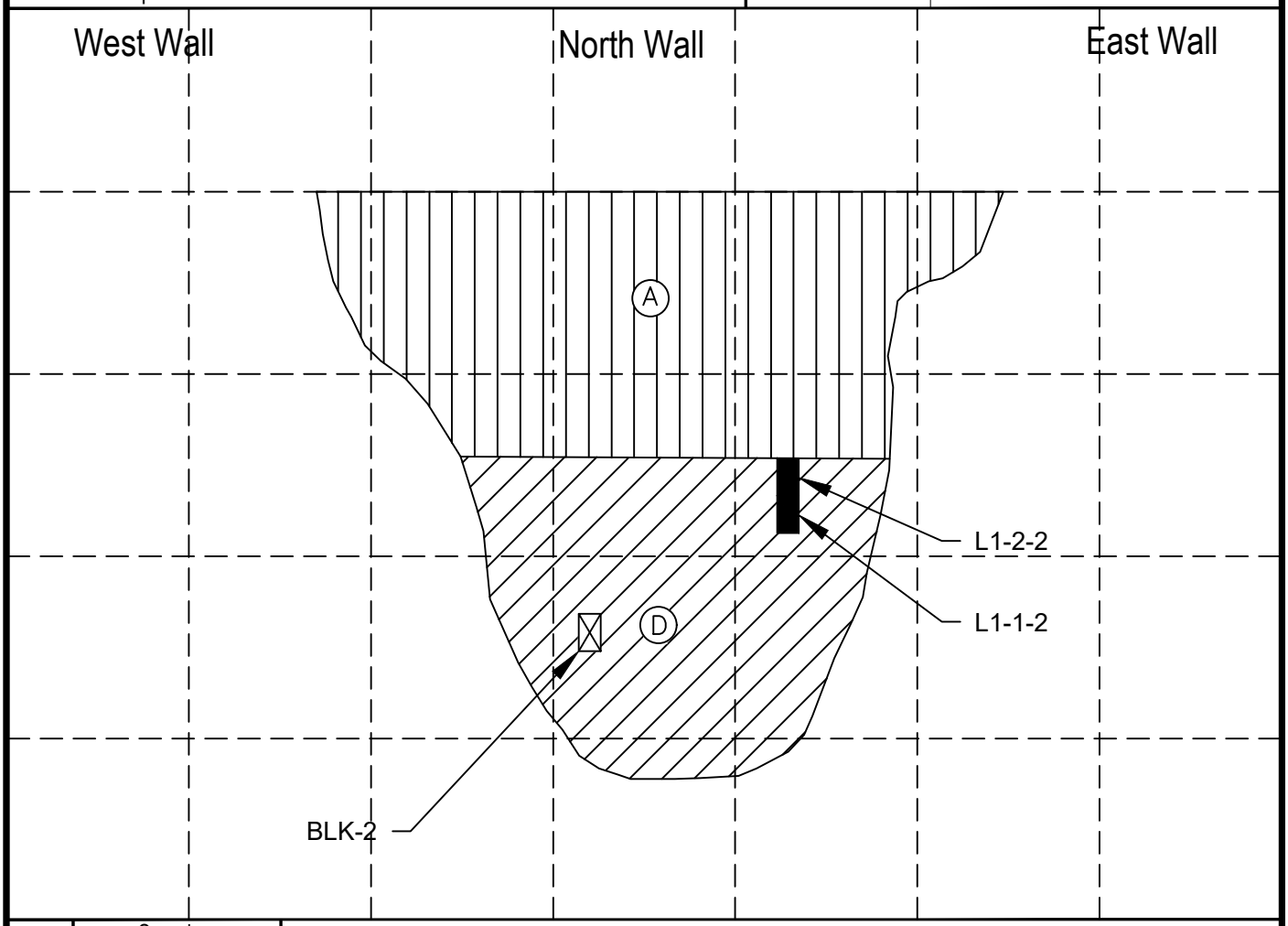
Exploratory Trench Log

Trench No.
T22-4

Project Name: Acorn Valley Plaza	Ground Water Information		
Project No.: 71222.00.001 Task No.: 001	Date:	04-26-22	
Location: E. Gobbi Street and Village Circle, Ukiah, California	Time (24 Hr. Clock):		
Logged By: Dominic J. Potestio Date Logged: 04-26-22	Depth bgs (ft):	N/A	
Backhoe Company: NV5	Trench Elev.:	600.00 Ft. AMSL	
Backhoe Type: Kubota U35-4 Excavator with 18-inch bucket	Trench Bearing:	Azimuth Compass = 90 Degrees	
Backfill Description: Loose Excavated Soils	Scale:	1 In. = 2 Ft.	



Unit No.	Sample Depth(Ft)	Sample No.	Soil And/Or Rock Material Descriptions SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsel Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsel Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.
A			(ML) CLAYEY SILT WITH SAND AND GRAVEL (FILL); Fld. Est.: 50% Low Plasticity Clay and Silt Fines, 20% Fine Sand, and 30% Gravel; Brown (10YR, 5/3); Firm; Moist. Asphalt Concrete Rubble up to 12" throughout.
D	3-5 3-4	BLK-2 L1-2-2 L1-1-2	(CL) SILTY CLAY; Fld. Est.: 75% Low Plasticity Clay and Silt Fines and 25% Fine Sand; Brown (10YR, 5/3); Firm; Moist. Pocket Penetrometer Test at 3.5 Feet = 1.5 TSF.

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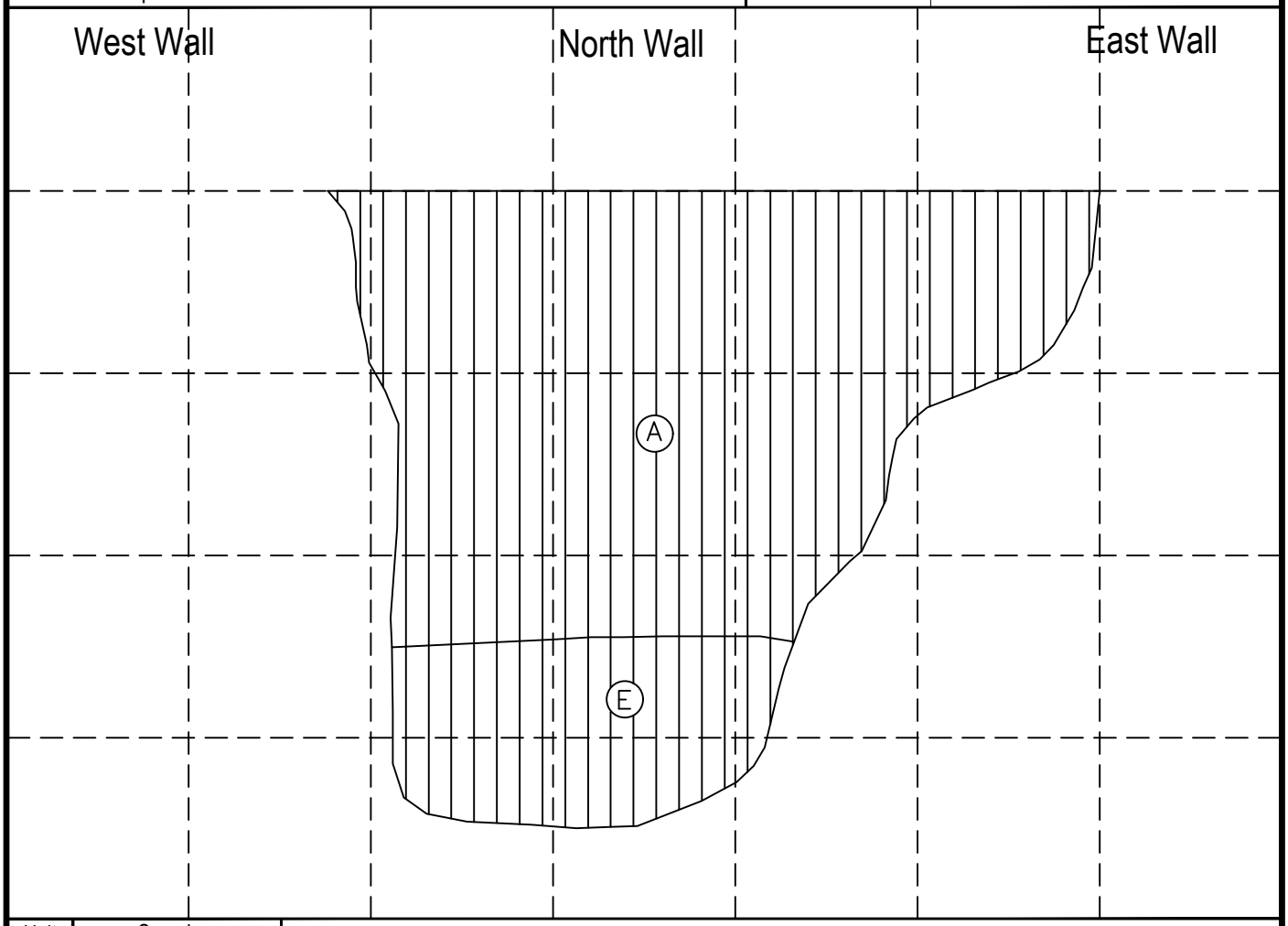
Exploratory Trench Log

Trench No.
T22-5

Project Name: Acorn Valley Plaza	Ground Water Information		
Project No.: 71222.00.001 Task No.: 001	Date:	04-26-22	
Location: E. Gobbi Street and Village Circle, Ukiah, California	Time (24 Hr. Clock):		
Logged By: Dominic J. Potestio Date Logged: 04-26-22	Depth bgs (ft):	N/A	
Backhoe Company: NV5	Trench Elev.:	600.00 Ft. AMSL	
Backhoe Type: Kubota U35-4 Excavator with 18-inch bucket	Trench Bearing:	Azimuth Compass = 90 Degrees	
Backfill Description: Loose Excavated Soils	Scale:	1 In. = 2 Ft.	



Unit No.	Sample Depth(Ft)	Sample No.	Soil And/Or Rock Material Descriptions SOIL: USCS Symbol; Name; Particle Size Gradation %; Munsel Color; Density/Consistency; Moisture; Odor; Organics; Cementation; Texture; Refuse; Etc. ROCK: Unit Name; Lithology; Munsel Color; Cementation; Weathering; Competency; Bedding/Foliation; Fracture/Joint Spacing & Roughness; RQD; Moisture.
A			(ML) CLAYEY SILT WITH SAND (FILL); Fld. Est.: 50% Low Plasticity Clay and Silt Fines, 35% Fine Sand, and 15% Angular Rock Fragments; Brown (10YR, 5/3); Firm; Moist.
E			(ML) CLAYEY SILT; Fld. Est.: 90% Low Plasticity Clay and Silt Fines and 10% Fine Sand; Very Dark Greenish Gray (Gley 1, 3/10Y); Very Stiff; Moist. Pocket Penetrometer Test at 5.5 Feet = 2.5 TSF.

APPENDIX B:

Soil Laboratory Test Results

ATTERBERG INDICES

ASTM D4318

DSA LEA No. 284

DSA File No. N/A

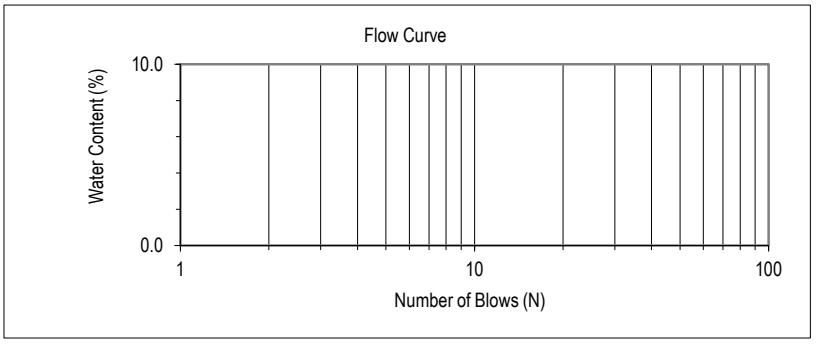
DSA App No. N/A

Project No.	71222.00.001	Project Name	Acorn Valley Plaza			Date:	05/03/22
Sample No.	BLK-1	Boring/Trench	T22-3	Depth, (ft.):	1.5-3'	Tested By:	BJF
Description:	(GM) Silty Gravel with Sand, Dark Yellowish Brown (10YR 4/4)					Checked By:	DJP
Sample Location:						Lab. No.	C22-098

Estimated % of Sample Retained on No. 40 Sieve: Sample Air Dried: yes

Test Method A or B: A

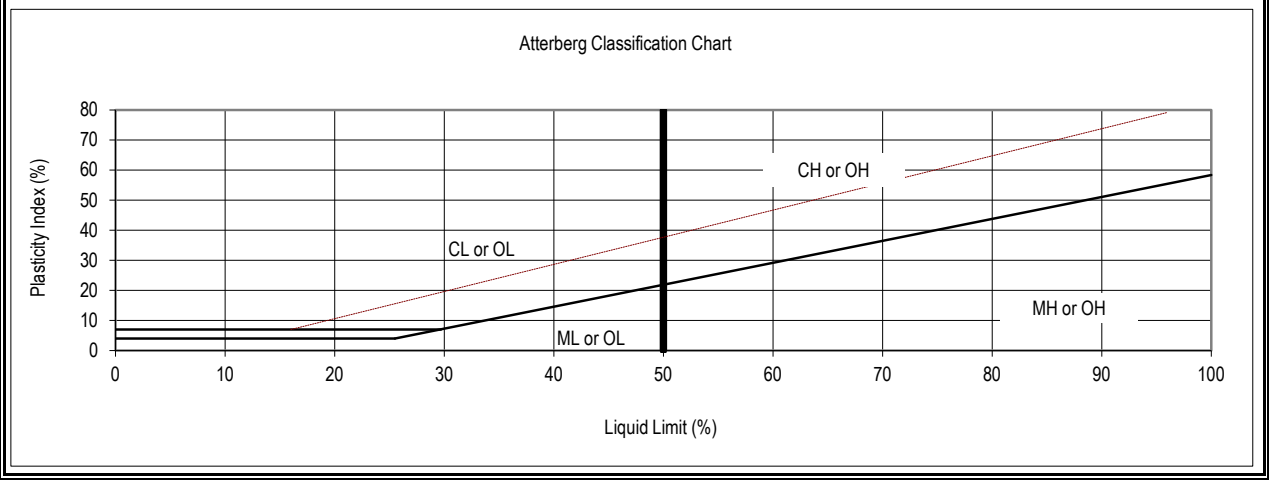
	LIQUID LIMIT:					PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:								
Wt. Pan (gr)								
Wt. Wet Soil + Pan (gr)								
Wt. Dry Soil + Pan (gr)								
Wt. Water (gr)								
Wt. Dry Soil (gr)								
Water Content (%)								
Number of Blows, N								
			LIQUID LIMIT =			PLASTIC LIMIT =		



Plasticity Index =

Non-Plastic ☑

Group Symbol = ML



PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422, C136

DSA File No. N/A

DSA App No. N/A

DSA LEA No. 284

Sieve Only Analysis Worksheet

Project No.	71222.00.001	Project Name:	Acorn Valley Plaza			Date:	05/03/22
Sample No.	BLK-1	Boring/Trench:	T22-3	Depth, (ft.):	1.5-3'	Tested By:	BJF
Description:	(GM) Silty Gravel with Sand, Dark Yellowish Brown (10YR 4/4)					Checked By:	DJP
Sample Location:						Lab. No.	C22-098

Moisture Content Data:			Total Material Sample Data:		
			Pan ID		
			Pan Weight		(gm)
Pan ID			Wet Soil + Pan Wt.	5,064.30	(gm)
Pan Weight		(gm)	Total Wet Weight	5,064.30	(gm)
Wet Soil + Pan		(gm)	Total Dry Weight	5,064.30	(gm)
Dry Soil + Pan		(gm)	Total Dry Wt. >#4 Sieve	1,236.60	(gm)
Water Weight	0.00	(gm)	Total Dry Wt.<#4 Sieve	3,827.70	(gm)
Dry Soil Weight	0.00	(gm)	Total Dry Wt. <#200 Sieve	2,200.42	(gm)
Moisture Content	0.0	(%)	Total Percent <#200 Sieve	43.45	(%)

GRAVEL PORTION SIEVE ANALYSIS
(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter		Wet Weight	Dry Weight			
	Inches	Millimeter	Retained On Sieve	Retained On Sieve	Accum. On Sieve	Passing Sieve	Percent Passing
	(in.)	(mm)	(gm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.40		0.00	0.00	5,064.30	100.0
3 Inch	3.0000	76.20		0.00	0.00	5,064.30	100.0
2 Inch	2.0000	50.80		0.00	0.00	5,064.30	100.0
1.5 Inch	1.5000	38.10		0.00	0.00	5,064.30	100.0
1.0 Inch	1.0000	25.40	106.70	106.70	106.70	4,957.60	97.9
3/4 Inch	0.7500	19.05	151.70	151.70	258.40	4,805.90	94.9
1/2 Inch	0.5000	12.70	172.40	172.40	430.80	4,633.50	91.5
3/8 Inch	0.3750	9.53	167.20	167.20	598.00	4,466.30	88.2
#4	0.1870	4.75	638.60	638.60	1,236.60	3,827.70	75.6
PAN			3,827.70	3,827.70			

SAND PORTION SIEVE ANALYSIS
(Portion Retained On < #4 Sieves)

Representative Sample Data:

			#200 Wash Data:		
Pan ID					
Pan Weight		(gm)	Portion >#200 Sieve:	194.20	(gm)
Wet Soil + Pan	456.80	(gm)	Portion <#200 Sieve:	262.60	(gm)
Wet Soil	456.80	(gm)	Percent <#200 Sieve	57.49	(%)
Dry Soil	456.80	(gm)	Total Wt. <#200 Sieve	2200.42	(gm)

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample Weight Retained	Accum. Grand Total On Sieve	Total Percent Passing
	Inches	Millimeter	Retained On Sieve	Percent Retained			
	(in.)	(mm)	(gm)	(%)	(gm)	(gm)	(%)
#10	0.079	2.000	18	3.94	150.83	1,387.43	72.6
#20	0.033	0.850	13.70	3.00	114.80	1,502.23	70.3
#40	0.017	0.425	8.40	1.84	70.39	1,572.61	68.9
#60	0.010	0.250	9.40	2.06	78.77	1,651.38	67.4
#100	0.006	0.150	40.70	8.91	341.04	1,992.42	60.7
#200	0.003	0.075	104.00	22.77	871.46	2,863.88	43.45
PAN			Discard				

PARTICLE SIZE DISTRIBUTION

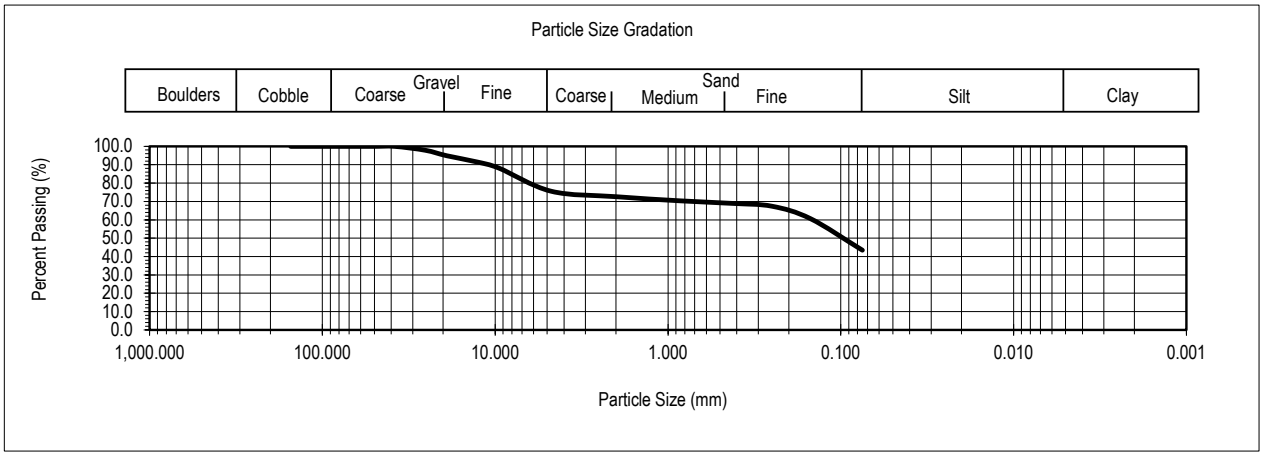
ASTM D422, C136

DSA LEA No.: 284

Project No.	**71222.00.001**	Project Name:	**Acorn Valley Plaza**	Date:	**5/3/2022**
Sample No.	**BLK-1**	Boring/Trench:	**T22-3**	Depth, (ft.): **1.5-3'**	Tested By: **BJF**
Description:	**(GM) Silty Gravel with Sand, Dark Yellowish Brown (10YR 4/4)**				Checked By: **DJP**
Sample Location:					Lab. No. **C22-098**

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	5,064.3	**100.0**
3 Inch	3.0000	76.2	0.00	0.0	5,064.3	**100.0**
2 Inch	2.0000	50.8	0.00	0.0	5,064.3	**100.0**
1.5 Inch	1.5000	38.1	0.00	0.0	5,064.3	**100.0**
1.0 Inch	1.0000	25.4	106.70	106.7	4,957.6	**97.9**
3/4 Inch	0.7500	19.1	151.70	258.4	4,805.9	**94.9**
1/2 Inch	0.5000	12.7	172.40	430.8	4,633.5	**91.5**
3/8 Inch	0.3750	9.5	167.20	598.0	4,466.3	**88.2**
#4	0.1870	4.7500	638.60	1,236.6	3,827.7	**75.6**
#10	0.0790	2.0066	150.83	1,387.4	3,676.9	**72.6**
#20	0.0335	0.8500	114.80	1,502.2	3,562.1	**70.3**
#40	0.0167	0.4250	70.39	1,572.6	3,491.7	**68.9**
#60	0.0098	0.2500	78.77	1,651.4	3,412.9	**67.4**
#100	0.0059	0.1500	341.04	1,992.4	3,071.9	**60.7**
#200	0.0030	0.0750	871.46	2,863.9	2,200.4	**43.4**

Hydrometer



ATTERBERG INDICES

ASTM D4318

DSA LEA No. 284

DSA File No. N/A

DSA App No. N/A

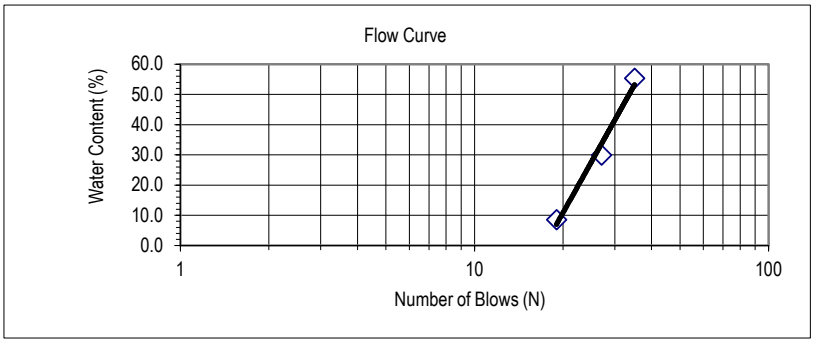
Project No.	71222.00.001	Project Name	Acorn Valley Plaza			Date:	05/03/22
Sample No.	BLK-2	Boring/Trench	T22-4	Depth, (ft.):	3-5'	Tested By:	BJF
Description:	(CL) Silty Clay, Brown (10YR 5/3)					Checked By:	DJP
Sample Location:						Lab. No.	C22-098

Estimated % of Sample Retained on No. 40 Sieve:

Sample Air Dried: yes

Test Method A or B: A

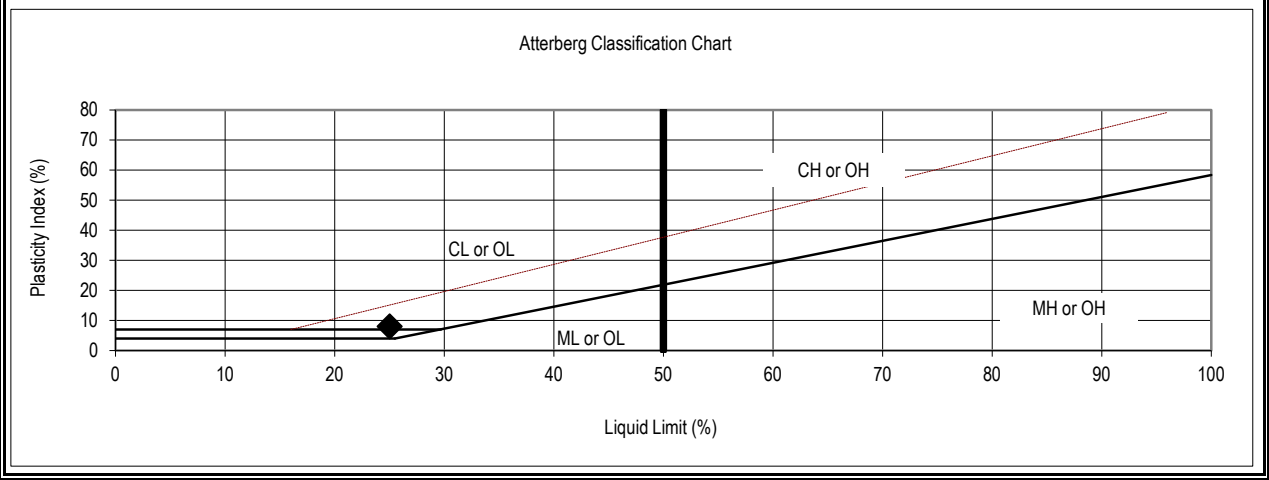
LIQUID LIMIT:						PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	Z	A	X			PL-1	PL-3	PL-4
Wt. Pan (gr)	37.44	38.46	38.22			18.39	18.45	18.42
Wt. Wet Soil + Pan (	55.10	54.56	52.44			21.96	20.47	20.64
Wt. Dry Soil + Pan (	48.81	50.85	51.32			21.44	20.17	20.31
Wt. Water (gr)	6.29	3.71	1.12			0.52	0.30	0.33
Wt. Dry Soil (gr)	11.37	12.39	13.10			3.05	1.72	1.89
Water Content (%)	55.3	29.9	8.5			17.0	17.4	17.5
Number of Blows, N	35	27	19					
				LIQUID LIMIT =	25		PLASTIC LIMIT =	17



Plasticity Index = 8

Non-Plastic ☐

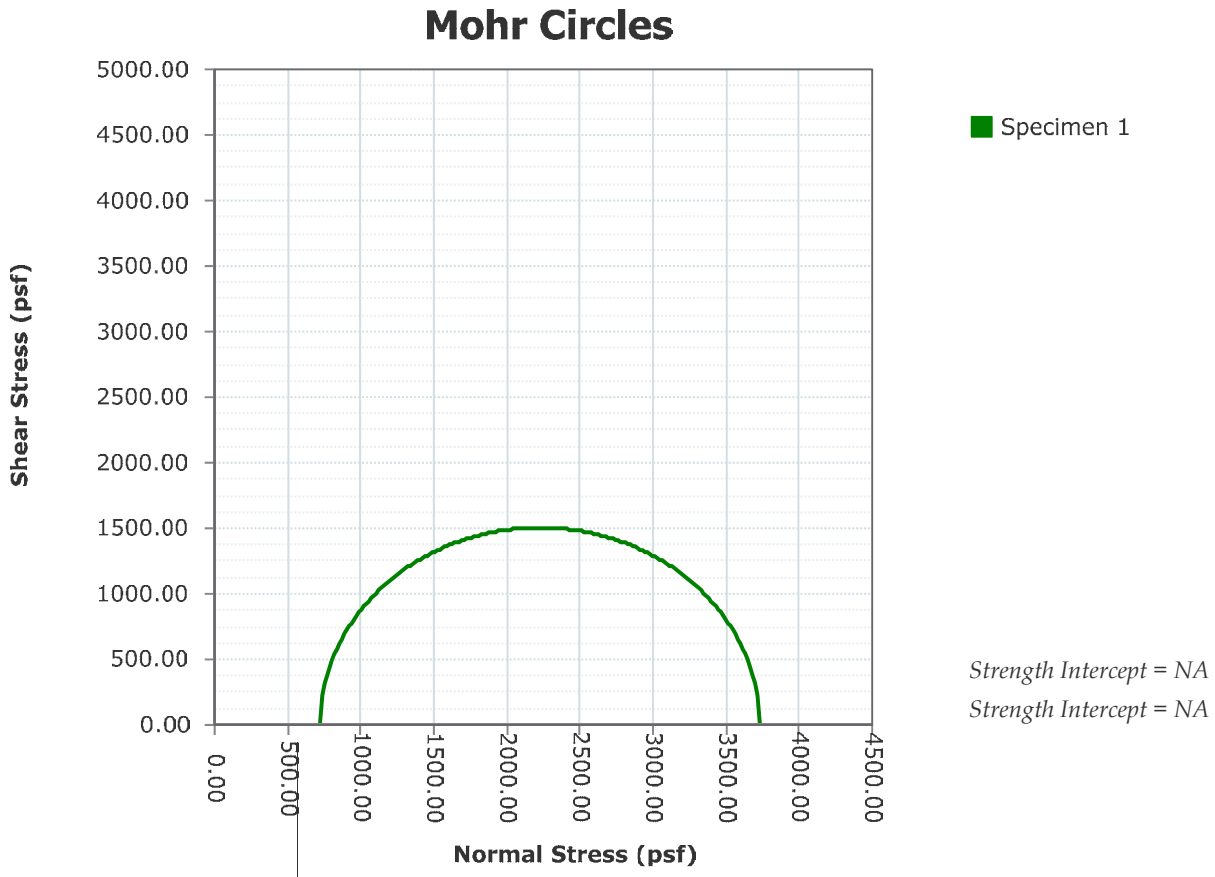
Group Symbol = CL



48 Bellarmine Court, Suite 40
Chico, CA 95928
530-894-2487

Unconsolidated Undrained Test

ASTM D2850



Project:	Acorn Valley Plaza
Project Number:	71222.00.001
Sampling Date:	
Sample Number:	L1-1-2
Sample Depth:	3 ft
Location:	T22-4
Client Name:	Danco
Remarks:	

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Unconsolidated Undrained Test

ASTM D2850

Before Test	Specimen Number 1	2	3	4	5	6	7	8
Membrane Thickness (in)	0.001							
Initial Cell Pressure (psi)	5.0							
Height (in)	5.290							
Diameter (in)	2.410							
Water Content (%)	21.1							
Wet Density (Units)	124.8							
Dry Density (pcf)	103.0							
Degree of Saturation (%)	89.7							
Void Ratio	0.636							
Height To Diameter Ratio	2.195							
Test Data	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Comp. Strength at Failure (psf)	3011.55							
σ1 at Failure (psf)	3731.55							
σ3 at Failure (psf)	720.00							
Rate of Strain (in/min)	0.058190							
Axial Strain at Failure (%)	15.39							
After Test	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Final Water Content (%)	22.0							

Project:	Acorn Valley Plaza
Project Number:	71222.00.001
Sampling Date:	
Sample Number:	L1-1-2
Sample Depth:	3 ft
Location:	T22-4
Location:	
Client Name:	Danco
Project Remarks:	

Specimen 1 Failure Sketch	Specimen 2 Failure Sketch	Specimen 3 Failure Sketch	Specimen 4 Failure Sketch	Specimen 5 Failure Sketch	Specimen 6 Failure Sketch	Specimen 7 Failure Sketch	Specimen 8 Failure Sketch
							

48 Bellarmine Court, Suite 40
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530-894-2487

Unconsolidated Undrained Test

ASTM D2850

Specimen 1

Test Description:	D2850		
Other Associated Tests:			
Device Details:			
Test Specification:			
Test Time:	5/16/2022		
Technician:	BJF	Sampling Method:	Undisturbed
Specimen Code:		Specimen Lab #:	
Specimen Description:			
Specific Gravity:	2.700		
Plastic Limit:	0	Liquid Limit:	0
Height (in):	5.290	Diameter (in):	2.410
Area (in^2):	4.562	Volume (in^3):	24.13
Large Particle:	None		
Moisture Material:	Specimen		
Moist Weight (g):	790.6		
Test Remarks:			

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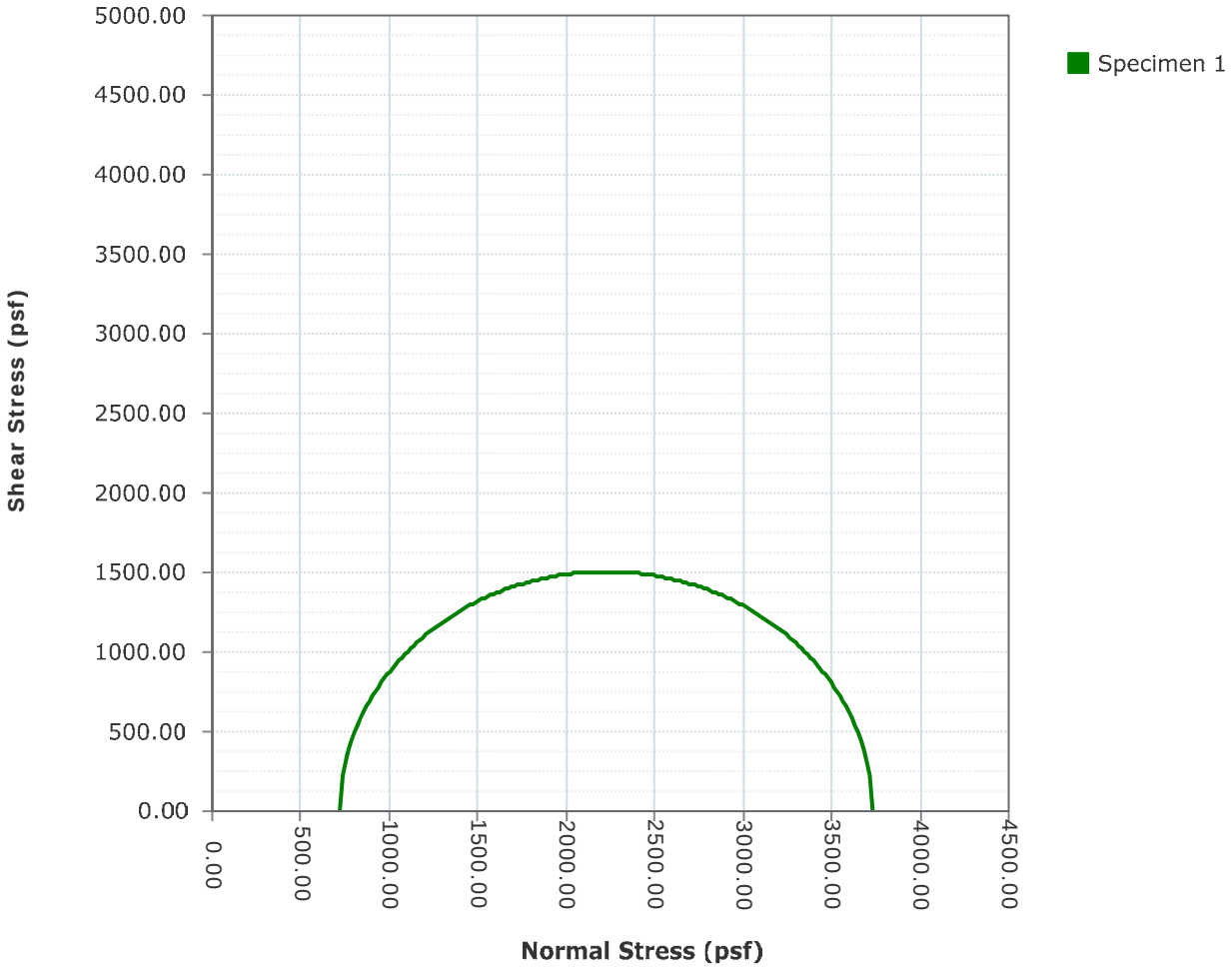
Mohr Circles (Total Stress) Graph

ASTM D2850



Tangent Results	
Strength Intercept (psi)	NA
Friction Angle (°)	NA

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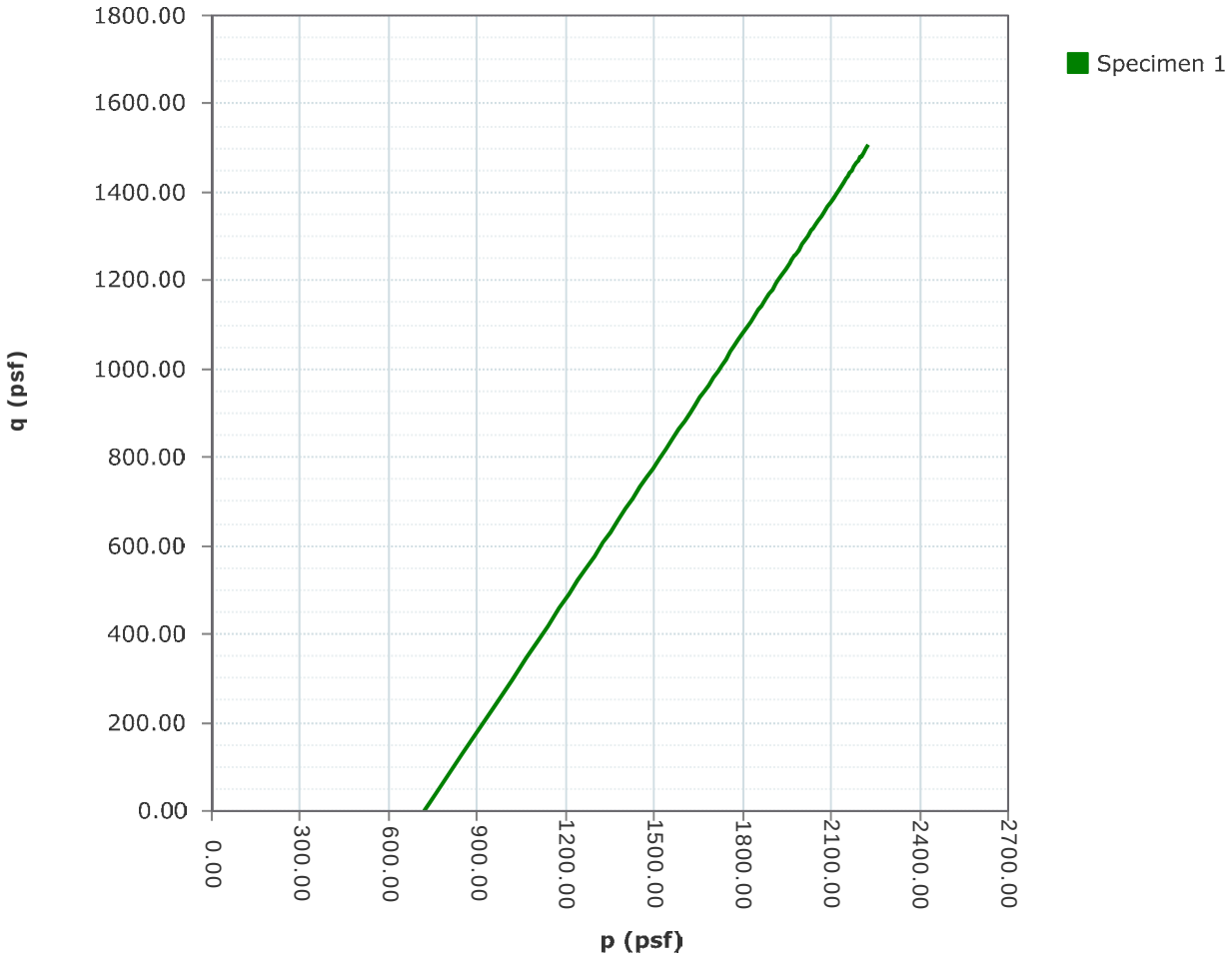
PQ Graph

ASTM D2850



Tangent Results	
Strength Intercept (psi)	NA
Friction Angle (°)	NA

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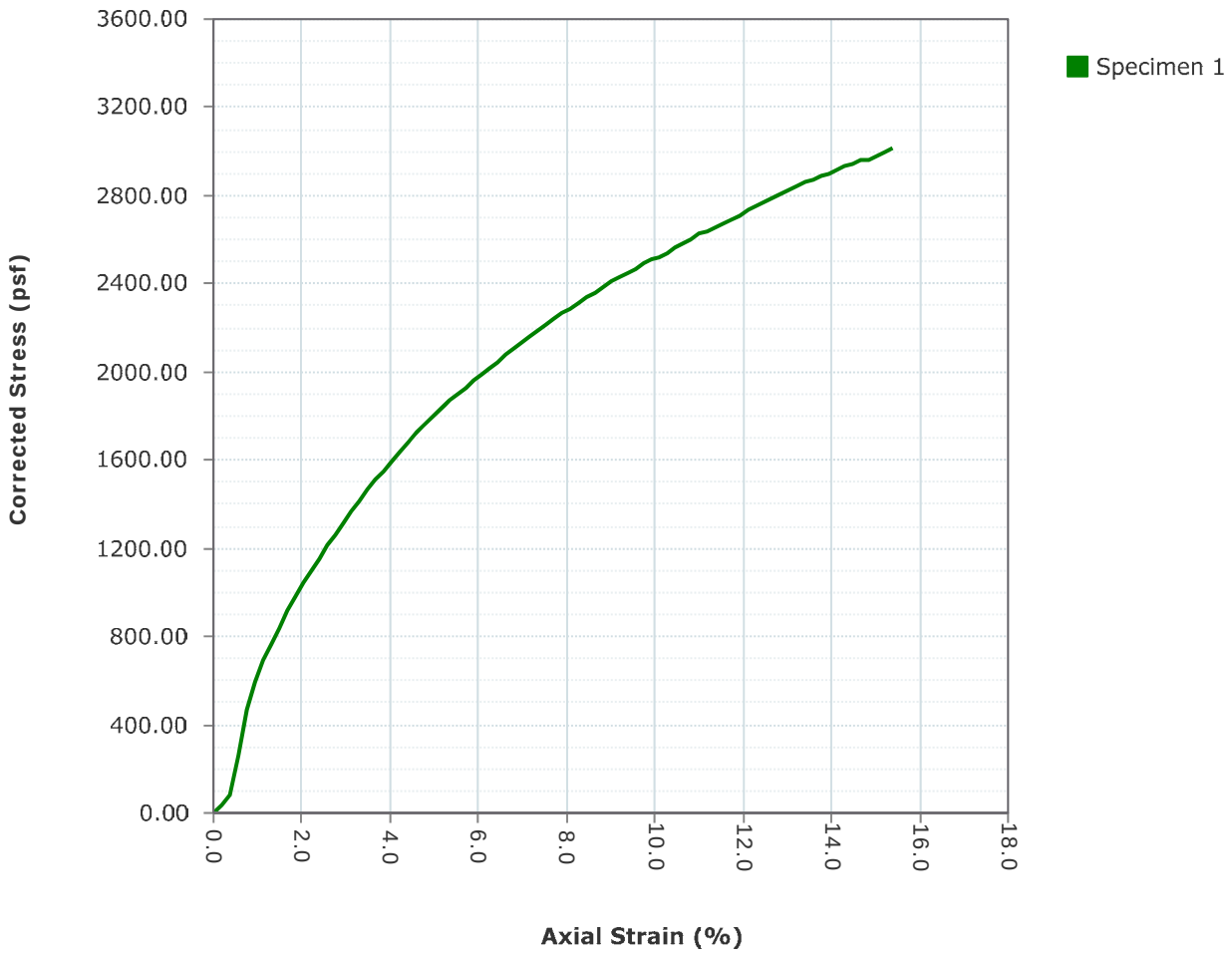
Stress-Strain Graph

ASTM D2850



Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
0	00:00:00	1.4	0.0002	0.0	0.000	4.562	0.0	0.00	0.00	720.00	720.00	1.000	720.00	0.00
1	00:00:10	2.5	0.0100	1.2	0.010	4.570	0.2	36.83	36.68	756.68	720.00	1.051	738.34	18.34
2	00:00:20	4.0	0.0197	2.6	0.019	4.578	0.4	82.00	81.52	801.52	720.00	1.113	760.76	40.76
3	00:00:30	9.7	0.0301	8.3	0.030	4.588	0.6	262.29	260.54	980.54	720.00	1.362	850.27	130.27
4	00:00:40	16.4	0.0400	15.1	0.040	4.596	0.8	475.61	471.67	1,191.67	720.00	1.655	955.84	235.84
5	00:00:50	20.5	0.0499	19.1	0.050	4.605	0.9	603.92	597.80	1,317.80	720.00	1.830	1,018.90	298.90
6	00:01:00	23.6	0.0595	22.2	0.059	4.613	1.1	701.23	692.84	1,412.84	720.00	1.962	1,066.42	346.42
7	00:01:10	26.0	0.0694	24.6	0.069	4.622	1.3	778.10	767.31	1,487.31	720.00	2.066	1,103.66	383.66
8	00:01:20	28.4	0.0790	27.1	0.079	4.631	1.5	854.04	840.62	1,560.62	720.00	2.168	1,140.31	420.31
9	00:01:30	30.9	0.0886	29.5	0.088	4.639	1.7	930.76	914.41	1,634.41	720.00	2.270	1,177.21	457.21
10	00:01:40	33.1	0.0982	31.7	0.098	4.648	1.9	1,001.36	982.81	1,702.81	720.00	2.365	1,211.41	491.41
11	00:01:50	35.0	0.1078	33.6	0.108	4.656	2.0	1,061.69	1,040.09	1,760.09	720.00	2.445	1,240.05	520.05
12	00:02:00	36.9	0.1175	35.5	0.117	4.665	2.2	1,122.00	1,097.13	1,817.13	720.00	2.524	1,268.56	548.56
13	00:02:10	38.9	0.1271	37.5	0.127	4.674	2.4	1,184.40	1,156.01	1,876.01	720.00	2.606	1,298.00	578.00
14	00:02:20	40.8	0.1365	39.4	0.136	4.682	2.6	1,243.54	1,211.51	1,931.51	720.00	2.683	1,325.75	605.75
15	00:02:30	42.5	0.1461	41.2	0.146	4.691	2.8	1,299.26	1,263.44	1,983.44	720.00	2.755	1,351.72	631.72
16	00:02:40	44.2	0.1557	42.8	0.155	4.700	2.9	1,352.10	1,312.37	2,032.37	720.00	2.823	1,376.19	656.19
17	00:02:50	46.0	0.1652	44.6	0.165	4.709	3.1	1,408.63	1,364.71	2,084.71	720.00	2.895	1,402.35	682.35
18	00:03:00	47.7	0.1747	46.3	0.174	4.717	3.3	1,462.55	1,414.33	2,134.33	720.00	2.964	1,427.16	707.16
19	00:03:10	49.4	0.1845	48.0	0.184	4.726	3.5	1,515.37	1,462.60	2,182.60	720.00	3.031	1,451.30	731.30
20	00:03:20	51.0	0.1939	49.7	0.194	4.735	3.7	1,567.74	1,510.34	2,230.34	720.00	3.098	1,475.17	755.17
21	00:03:30	52.5	0.2039	51.1	0.204	4.744	3.8	1,614.03	1,551.89	2,271.89	720.00	3.155	1,495.95	775.95
22	00:03:40	54.0	0.2135	52.6	0.213	4.753	4.0	1,661.03	1,594.06	2,314.06	720.00	3.214	1,517.03	797.03

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
23	00:03:50	55.6	0.2236	54.3	0.223	4.763	4.2	1,712.78	1,640.46	2,360.46	720.00	3.278	1,540.23	820.23
24	00:04:00	57.1	0.2340	55.8	0.234	4.773	4.4	1,760.45	1,682.67	2,402.67	720.00	3.337	1,561.33	841.33
25	00:04:10	58.7	0.2439	57.3	0.244	4.782	4.6	1,809.35	1,726.02	2,446.02	720.00	3.397	1,583.01	863.01
26	00:04:20	60.2	0.2538	58.8	0.254	4.791	4.8	1,856.73	1,767.75	2,487.75	720.00	3.455	1,603.88	883.88
27	00:04:30	61.5	0.2636	60.1	0.263	4.801	5.0	1,898.52	1,804.00	2,524.00	720.00	3.506	1,622.00	902.00
28	00:04:40	62.7	0.2734	61.4	0.273	4.810	5.2	1,936.91	1,836.90	2,556.90	720.00	3.551	1,638.45	918.45
29	00:04:50	63.9	0.2831	62.5	0.283	4.819	5.3	1,973.85	1,868.31	2,588.31	720.00	3.595	1,654.15	934.15
30	00:05:00	65.1	0.2928	63.7	0.293	4.829	5.5	2,011.71	1,900.45	2,620.45	720.00	3.640	1,670.23	950.23
31	00:05:10	66.2	0.3024	64.8	0.302	4.838	5.7	2,046.85	1,929.93	2,649.93	720.00	3.680	1,684.97	964.97
32	00:05:20	67.4	0.3120	66.1	0.312	4.847	5.9	2,085.08	1,962.19	2,682.19	720.00	3.725	1,701.09	981.09
33	00:05:30	68.6	0.3216	67.2	0.321	4.857	6.1	2,121.73	1,992.85	2,712.85	720.00	3.768	1,716.42	996.42
34	00:05:40	69.6	0.3309	68.2	0.331	4.866	6.3	2,153.54	2,018.93	2,738.93	720.00	3.804	1,729.46	1,009.46
35	00:05:50	70.7	0.3406	69.3	0.340	4.875	6.4	2,188.24	2,047.46	2,767.46	720.00	3.844	1,743.73	1,023.73
36	00:06:00	71.8	0.3503	70.4	0.350	4.885	6.6	2,222.40	2,075.34	2,795.34	720.00	3.882	1,757.67	1,037.67
37	00:06:10	72.8	0.3598	71.5	0.360	4.894	6.8	2,256.20	2,102.83	2,822.83	720.00	3.921	1,771.42	1,051.42
38	00:06:20	73.9	0.3693	72.5	0.369	4.904	7.0	2,288.35	2,128.73	2,848.73	720.00	3.957	1,784.36	1,064.36
39	00:06:30	75.0	0.3788	73.6	0.379	4.913	7.2	2,323.28	2,157.01	2,877.01	720.00	3.996	1,798.51	1,078.51
40	00:06:40	76.1	0.3886	74.8	0.388	4.923	7.3	2,360.03	2,186.77	2,906.77	720.00	4.037	1,813.38	1,093.38
41	00:06:50	77.3	0.3983	75.9	0.398	4.933	7.5	2,396.15	2,215.87	2,935.87	720.00	4.078	1,827.94	1,107.94
42	00:07:00	78.3	0.4079	76.9	0.408	4.943	7.7	2,427.41	2,240.34	2,960.34	720.00	4.112	1,840.17	1,120.17
43	00:07:10	79.2	0.4177	77.9	0.417	4.952	7.9	2,458.28	2,264.29	2,984.29	720.00	4.145	1,852.14	1,132.14
44	00:07:20	80.2	0.4277	78.9	0.427	4.963	8.1	2,489.57	2,288.40	3,008.40	720.00	4.178	1,864.20	1,144.20
45	00:07:30	81.2	0.4379	79.8	0.438	4.973	8.3	2,520.45	2,311.93	3,031.93	720.00	4.211	1,875.96	1,155.96

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
46	00:07:40	82.3	0.4477	80.9	0.447	4.983	8.5	2,553.80	2,337.80	3,057.80	720.00	4.247	1,888.90	1,168.90
47	00:07:50	83.3	0.4574	81.9	0.457	4.993	8.6	2,585.71	2,362.23	3,082.23	720.00	4.281	1,901.12	1,181.12
48	00:08:00	84.2	0.4673	82.8	0.467	5.003	8.8	2,613.75	2,382.98	3,102.98	720.00	4.310	1,911.49	1,191.49
49	00:08:10	85.2	0.4771	83.8	0.477	5.014	9.0	2,646.76	2,408.19	3,128.19	720.00	4.345	1,924.09	1,204.09
50	00:08:20	86.1	0.4866	84.8	0.486	5.024	9.2	2,675.98	2,429.93	3,149.93	720.00	4.375	1,934.97	1,214.97
51	00:08:30	87.0	0.4965	85.6	0.496	5.034	9.4	2,702.38	2,448.87	3,168.87	720.00	4.401	1,944.44	1,224.44
52	00:08:40	87.8	0.5061	86.4	0.506	5.044	9.6	2,728.92	2,467.97	3,187.97	720.00	4.428	1,953.99	1,233.99
53	00:08:50	88.8	0.5157	87.4	0.515	5.054	9.7	2,759.33	2,490.49	3,210.49	720.00	4.459	1,965.24	1,245.24
54	00:09:00	89.6	0.5250	88.2	0.525	5.064	9.9	2,784.01	2,507.82	3,227.82	720.00	4.483	1,973.91	1,253.91
55	00:09:10	90.2	0.5344	88.9	0.534	5.074	10.1	2,805.51	2,522.21	3,242.21	720.00	4.503	1,981.11	1,261.11
56	00:09:20	91.1	0.5439	89.7	0.544	5.084	10.3	2,833.17	2,541.99	3,261.99	720.00	4.531	1,991.00	1,271.00
57	00:09:30	92.0	0.5535	90.6	0.553	5.094	10.5	2,861.51	2,562.26	3,282.26	720.00	4.559	2,001.13	1,281.13
58	00:09:40	92.9	0.5629	91.5	0.563	5.105	10.6	2,889.40	2,582.05	3,302.05	720.00	4.586	2,011.03	1,291.03
59	00:09:50	93.8	0.5722	92.4	0.572	5.115	10.8	2,917.50	2,602.07	3,322.07	720.00	4.614	2,021.03	1,301.03
60	00:10:00	94.8	0.5819	93.4	0.582	5.125	11.0	2,947.98	2,623.83	3,343.83	720.00	4.644	2,031.92	1,311.92
61	00:10:10	95.5	0.5918	94.1	0.592	5.136	11.2	2,970.02	2,637.89	3,357.89	720.00	4.664	2,038.94	1,318.94
62	00:10:20	96.3	0.6016	94.9	0.601	5.147	11.4	2,995.63	2,655.11	3,375.11	720.00	4.688	2,047.55	1,327.55
63	00:10:30	97.1	0.6113	95.7	0.611	5.157	11.6	3,022.29	2,673.18	3,393.18	720.00	4.713	2,056.59	1,336.59
64	00:10:40	98.1	0.6213	96.7	0.621	5.168	11.7	3,052.36	2,694.02	3,414.02	720.00	4.742	2,067.01	1,347.01
65	00:10:50	98.9	0.6313	97.5	0.631	5.180	11.9	3,077.97	2,710.77	3,430.77	720.00	4.765	2,075.39	1,355.39
66	00:11:00	100.0	0.6414	98.6	0.641	5.191	12.1	3,112.34	2,735.14	3,455.14	720.00	4.799	2,087.57	1,367.57
67	00:11:10	101.0	0.6511	99.6	0.651	5.202	12.3	3,143.78	2,756.97	3,476.97	720.00	4.829	2,098.48	1,378.48
68	00:11:20	101.9	0.6609	100.5	0.661	5.213	12.5	3,172.20	2,776.06	3,496.06	720.00	4.856	2,108.03	1,388.03

Unconsolidated Undrained Test - Tabulated Data - Specimen 1

ASTM D2850

Index	Elapsed Time (hh:mm:ss)	Load (Lbf)	Disp. (in)	Corrected Load (Lbf)	Corrected Disp. (in)	Corrected Area (in²)	Axial Strain (%)	Stress (psf)	Corrected Compressive Stress (psf)	σ1 (psf)	σ3 (psf)	σ1 — σ3	p (psf)	q (psf)
69	00:11:30	102.7	0.6706	101.3	0.670	5.224	12.7	3,198.76	2,793.38	3,513.38	720.00	4.880	2,116.69	1,396.69
70	00:11:40	103.6	0.6804	102.2	0.680	5.235	12.9	3,225.63	2,810.93	3,530.93	720.00	4.904	2,125.46	1,405.46
71	00:11:50	104.4	0.6900	103.0	0.690	5.246	13.0	3,252.74	2,828.61	3,548.61	720.00	4.929	2,134.30	1,414.30
72	00:12:00	105.2	0.6997	103.9	0.699	5.257	13.2	3,278.41	2,844.91	3,564.91	720.00	4.951	2,142.46	1,422.46
73	00:12:10	106.0	0.7093	104.6	0.709	5.268	13.4	3,303.50	2,860.73	3,580.73	720.00	4.973	2,150.37	1,430.37
74	00:12:20	106.6	0.7189	105.3	0.719	5.279	13.6	3,323.07	2,871.64	3,591.64	720.00	4.988	2,155.82	1,435.82
75	00:12:30	107.4	0.7284	106.0	0.728	5.290	13.8	3,346.25	2,885.67	3,605.67	720.00	5.008	2,162.83	1,442.83
76	00:12:40	108.1	0.7377	106.8	0.737	5.301	13.9	3,370.34	2,900.49	3,620.49	720.00	5.028	2,170.25	1,450.25
77	00:12:50	108.8	0.7471	107.4	0.747	5.312	14.1	3,390.99	2,912.21	3,632.21	720.00	5.045	2,176.10	1,456.11
78	00:13:00	109.7	0.7566	108.3	0.756	5.323	14.3	3,419.53	2,930.63	3,650.63	720.00	5.070	2,185.32	1,465.32
79	00:13:10	110.5	0.7661	109.1	0.766	5.334	14.5	3,443.86	2,945.29	3,665.29	720.00	5.091	2,192.64	1,472.64
80	00:13:20	111.1	0.7756	109.7	0.775	5.345	14.7	3,464.30	2,956.53	3,676.53	720.00	5.106	2,198.26	1,478.26
81	00:13:30	111.7	0.7854	110.3	0.785	5.357	14.8	3,482.04	2,965.23	3,685.23	720.00	5.118	2,202.62	1,482.62
82	00:13:40	112.5	0.7952	111.1	0.795	5.368	15.0	3,508.13	2,980.97	3,700.97	720.00	5.140	2,210.48	1,490.48
83	00:13:50	113.3	0.8049	111.9	0.805	5.380	15.2	3,532.29	2,995.00	3,715.00	720.00	5.160	2,217.50	1,497.50
84	00:13:59	114.1	0.8141	112.7	0.814	5.391	15.4	3,559.13	3,011.55	3,731.55	720.00	5.183	2,225.78	1,505.78

APPENDIX C:

Seismic Design Parameters

Acorn Valley Plaza

Latitude, Longitude: 39.1433, -123.2033

Date	5/3/2022, 4:33:57 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.95	MCE_R ground motion. (for 0.2 second period)
S_1	0.747	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.95	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.3	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.818	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.9	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.224	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.515	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.95	Factored deterministic acceleration value. (0.2 second)
S1RT	0.874	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.995	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.747	Factored deterministic acceleration value. (1.0 second)
PGAd	0.818	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.884	Mapped value of the risk coefficient at short periods
C_{R1}	0.879	Mapped value of the risk coefficient at a period of 1 s

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