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Community Development
Tom Humphrey, AICP
Community Development Director

STAFF REPORT
July 7, 2015

AGENDA ITEMs: File No. 14004

Consideration of a Transit Oriented Development (TOD) preliminary master plan on 18.91 acres in the Eastside TOD district. The project site is located east of Gebhard Road and north of Beebe Road, and is identified on the Jackson County Assessor's Map as 37S 2W 02 Tax Lots 2700 and 2701. The project site is within the LMR—Low Mix Residential (2.69 acres) and MMR—Medium Mix Residential (16.22 acres) zoning districts. **Applicant:** People's Bank of Commerce; **Agent:** Tony Weller, CES|NW.

STAFF SOURCE:

Don Burt, Planning Manager
Stephanie Holtey, Community Planner II

BACKGROUND:

Section 17.66.030 requires all development over two (2) acres located within a TOD to prepare a master development plan. The applicant is proposing the White Hawk Master Plan ("Preliminary Master Plan"), a 324 unit residential development, including a 4.22 acre public park, on 18.91 acres within the Eastside Transit Oriented Development District (ETOD) (Attachment "A").

As the first master plan in the ETOD, the land use and circulation patterns established will influence development on surrounding properties. Of primary significance to the ETOD area is the southerly extension of Gebhard Road to provide north/south connectivity between Wilson Road and East Pine Street per the City's Transportation System Plan (TSP). The City is currently conducting a study to identify a route that will minimize landowner impacts within the ETOD, including White Hawk; however, the final alignment has not been determined (see Agenda Item VI-A, Gebhard Road Route Analysis).

PROJECT DESCRIPTION:

The Master Plan provides a mix of three housing types on lands zoned MMR and a public park on lands zoned LMR as illustrated below.

Table 1. Housing, Density and Open Space

		Housing		Open Space	
Housing Type	**No. Units**	**Net Acres**	**Net Density**	**OS Required**	**OS Proposed**
Duplexes	16	1.09	-	6,400	0
Townhouses	20	1.22	-	8,000	0
Apartments	288	9.45	-	172,800	80,300
Public Park	0	4.22	-		183,772
TOTAL	**324**	**15.98**	**20.28**	**187,200**	**264,072**

The proposal is within the minimum and maximum density allowed on the site (202 units – 457 units). The Building Design Plan (Attachment "C", Exhibits "9-12") proposes an attractive neo-traditional design that is architecturally consistent with the building design standards required in the TOD. Proposed parking for each housing type meets the minimum parking standards in the TOD.

Recreation and open space amenities include a community building, swimming pool and landscaped courtyards, as well as a 4.22 acre public park. As illustrated in Table 1, parks and open space area requirements are based upon housing types. The proposal provides ample park and open space areas per the TOD requirements. It is the applicant's objective to implement development of the master plan in 2 to four phases over a 5-year period. Phasing will be determined based on market conditions.

Primary access to the Master Plan area is provided from both Beebe Road and Gebhard Road via proposed White Hawk Way and Beebe Park Drive. Additional circulation includes two minor local streets, public sidewalks, minor pedestrian accessways and a network of private parking lot/driveways surrounding the apartment structures.

ISSUES:

A review of the Preliminary Master Plan identified three (3) major issues that must be addressed prior to approval of the Preliminary Master Plan, and four (4) minor issues that shall be addressed prior to approval of the final master plan.

Major Issues

1. **Contaminated Soils, Proposed Public Park Site**. The Preliminary Master Plan noted the presence of soil contamination in the northeast quadrant of the project site. The extent of the contamination was not made available to the City until a draft Independent Clean-up Report ("Report") was, at the City's request, made available on June 17, 2015. It was the Report's finding that within the northeast quadrant of the project site, which includes the proposed public park site, there was evidence of arsenic and DDT contamination in excess of the State's acceptable risk level. The Report addressed mitigation options that included the Applicant's preferred alternative, including:

    A. A 2-foot topsoil cap on the public park site;

    B. A long-term maintenance plan for the 2-foot topsoil cap remediation: and

    C. A deed restriction to assure the long-term effectiveness of any approved soil remediation plan.

    At this time, based on the limited information regarding mitigation planning, the cost of mitigation and the long-term maintenance commitment required for the proposed park site, the City is not in a position to commit to acceptance of the proposed park site for public use. Further, the timing and cost of the soil mitigation must be coordinated with the proposed phasing plan demonstrating that soil mitigation is feasible and the cost of remediation is reasonably distributed across the proposed project phases.

    Resolution: Based on insufficient information on the extent of soil remediation and therefore the uncertainty of the City's willingness to accept the park site at this time, it is Staff's recommendation that the Planning Commission continue the public hearing on the Preliminary Master Plan to a date specific allowing the applicant adequate time to either:

    A. Provide an updated Environmental Plan (Exhibit 2) that addresses soil remediation, specifically addressing the type of mitigation proposed; including mitigation costs, mitigation timing as part of the overall development project, long-term maintenance requirements and costs, and the deed restriction language and area/lots subject to the deed restriction. The revised Environmental Plan must be coordinated with and acceptable to the City; or

B. Modify the Preliminary Master Plan to eliminate the public park proposal. It will still be necessary for the applicant to modify the Environmental Element prior to Final Master Plan approval to provide sufficient detail for the City to determine the feasibility of proposed mitigation measures, as well as the Preliminary Master Plan addressing the alternative use of the park site.

2. **Transportation System Plan (TSP).** The applicant's findings do not address the City's TSP, particularly as pertains to the southerly extension of Gebhard Road. The applicant has prepared a plan addressing neighborhood circulation (Exhibit 7), but neither the proposed neighborhood circulation plan, nor the Preliminary Master Plan narrative address the TSP and the future extension of Gebhard Road. The City is currently preparing a study identifying a preferred route (Agenda Item VI-1). It is the City's objective to have a general consensus on the preferred Gebhard Road route based on discussions on Agenda Item VI-1 at the July 7, 2015 Planning Commission.

   Resolution: Prior to approval of the Preliminary Master Plan the applicant shall address the TSP, and revise the Preliminary Master Plan narrative to address a southerly route for Gebhard Road, as part of the Neighborhood Circulation Plan including the extent and timing of improvements; or include in revised findings an argument against the City's pending preferred Gebhard Road alignment.

3. **Shallow Well Mitigation.** As part of the applicant's Environmental Plan they address potential impacts[1] of the project on shallow wells in the general project area (Appendix "B"). According to the report, low permeability soils could be dewatered during construction of planned sewers in the master plan area. The applicant's report notes that over the long term, pipe leakage and longitudinal flow along the pipes could lower water table levels and impact shallow wells in the vicinity of the project site. Although the report states that the potential impacts are not likely to occur, the following mitigation options were suggested:

   A. Coordinate with the landowner of a 13-foot deep irrigation well located 270 feet from the project site to determine if it is still in service and monitor the well's water levels during construction;

   B. Reduce the permeability of the sewer trench backfill by adding 5 percent (dry weight) bentonite to the backfill in plugs at the low end of each segment; and

   C. Provide quality control during construction to assure the sewer lines have a tight seal and will not leak.

   The potential impacts to adjacent wells are a concern because the same impacts identified in the applicant's report occurred following construction of the Beebe Road storm sewer line in 1997. Long-term reduction in the water table depth and subsequent loss of water and subsidence impacted farming operations and caused property damages in the vicinity of the White Hawk site.[2]

   Resolution: Prior to approval of the Preliminary Master Plan amend the Environmental Plan narrative to include the APEX report, the well mapping, and proposed vs. possible mitigation measures.

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[1] Apex Report dated April 14, 2015.
[2] Beebe Road Storm Drain Dewatering Liability and Settlement Brochure, Schroeder Law Offices, PC.

Minor Issues

4. **Phasing Plan: Internal Street Network.** The Phasing Plan needs to clearly delineate the location and timing of development phases in relation to street improvements, including soil remediation, park development and transfer, and right-of-way dedication to the City. The Applicant's Findings provide for up to four (4) development phases, including two phases for the apartments, and two phases for the duplexes and townhouses. The location of each phase and the associated public improvements needs to be coordinated with the transportation plan (Exhibit 7), site plan (Exhibit 4), and partition plat (File No. 14016). Further instruction in the master plan narrative (Attachment "B") will need to describe how the public improvements will be staged as part of the tentative partition plat process.

   Resolution: As a condition of the Preliminary Master Plan, the applicant will be required to amend the Transportation and Circulation Plan (Exhibit 7) and Site Plan (Exhibit 4), including the narrative (Attachment "B"), to delineate the phases of development and associated public and private street improvements. The narrative needs to address how the street improvements will be made as part of the land division process.

5. **Hamrick – Beebe Road Signalization.** Currently the Beebe Road/Hamrick Road intersection provides an acceptable level of service (LOS D). However, the applicant's Transportation Impact Analysis (TIA) shows that the proposed development, at build-out, would generate 2,274 average daily trips (ADT), which would reduce the level of service to unacceptable levels (LOS F) warranting intersection signalization. At this point the TIA does not identify at what point project traffic will cause an unacceptable level of service.

   Resolution: Prior to approval of the Preliminary Master Plan the applicant shall provide an updated TIA based on the proposed development phasing plan. The updated TIA will need to include the final traffic impacts relative to each phase of development, at what point the Beebe and Hamrick Road intersection will warrant signalization and the percentage allocation of signalization cost to the project.

6. **Disposition and Development Agreement (DDA).** Prior to approval of a Final Master Plan a DDA between the Developer and the City will be necessary to establish the roles, responsibilities, timing and financial assurances relative to all proposed public improvements, including: 1) Internal street network; 2) Beebe and Hamrick Road signalization; 3) Beebe and Gebhard Road Improvements; 4) Soil Remediation; and, 5) Proposed Public Park.

   Resolution. As a condition of the Preliminary Master Plan the Applicant will be required to complete a DDA with the City prior to approval of the Final Master Plan.

Final Master Plan. Although not an issue the need for a final Master Plan needs to be understood. The Applicant has noted in the findings that the application currently under consideration is for a preliminary master plan approval. As noted above there are a number of issues that need to be further addressed before either the Preliminary Master Plan or a final master plan can be approved. Physical development of the site that requires a land division or site plan and architectural review will be prohibited prior to approval of the Final Master Plan in accordance with Section 17.66.030(A)(1-3).

SUMMARY OF RESOLUTIONS AND RECOMMENDED PRELIMINARY MASTER PLAN AMENDMENTS:

At this time staff is not recommending approval of the Preliminary Master Plan until the following amendments to the Plan have been completed, accepted by the City, and presented to the Planning Commission at the August 4, 2015 meeting or date specific as agreed to by the applicant:

1. To justify use of the proposed park as a public park, the Applicant shall amend the Environmental Plan (Exhibit 2) to provide a soil remediation plan coordinated with and acceptable to the City. Submittal of this information may be deferred as a condition of Preliminary Master Plan approval if the applicant elects to propose alternative use for the site. At a minimum the Environmental Plan and Preliminary Master Plan narrative (Attachment "B") shall include the following:
    a. A soil remediation plan addressing mitigation measures, timing and cost;
    b. Long-term maintenance requirements, including timing and costs; and,
    c. Language for the required deed restriction and area/lots subject to the deed restriction.

2. The Transportation and Circulation Plan (Exhibit 7) and Preliminary Master Plan Narrative (Attachment "B") shall be amended to address the Transportation System Plan (TSP) relative to the southerly extension of Gebhard Road per the preferred Gebhard Road route identified by the Planning Commission at the July 7, 2015 meeting, or workable alternative(s), including the extent and timing of improvements.

3. The Environmental Plan narrative (Attachment "B") shall be amended to include the proposed shallow well mitigation measures, per the APEX report (Appendix "B"). Well data shall be provided as part of the Environmental Plan (Exhibit 2).

4. A Development Phasing Plan for each anticipated phase of development, including location and timing of associated public and private street improvements relative to the land division process, shall be set forth in the Preliminary Master Plan narrative, and illustrated on the Site Plan (Exhibit 4), the Transportation and Circulation Plan (Exhibit 7) and tentative plat (File No. 14016).

5. An updated Traffic Impact Analysis shall be provided that identifies the final traffic impacts for each phase of development, including when the Beebe/Hamrick Road Intersection would warrant signalization and the associated percentage cost allocation to the project.

The recommended Preliminary Master Plan amendments are the minimum necessary to resolve the major issues identified in this Staff Report. This does not preclude staff's ability to further condition the Preliminary Master Plan.

ATTACHMENTS:

Attachment "A" – Site Location Map
Attachment "B" – Master Plan Narrative
Attachment "C" – Master Plan Exhibits

Exhibit 1	Cover Sheet
Exhibit 2	Existing Conditions/Environmental Plan
Exhibit 3	Preliminary Partition Plat
Exhibit 4	Site Plan
Exhibit 5	Master Utility Plan
Exhibit 6	Adjacent Land Use Plan
Exhibit 7	Transportation and Circulation Plan
Exhibit 8	Recreation and Open Space Plan
Exhibit 9	Building Design, Duplexes
Exhibit 10	Building Design, Rowhouses
Exhibit 11	Building Design, Apartments
Exhibit 12	Building Design, Community Building

Attachment "D" – Master Plan Appendices

Appendix A	Preliminary Traffic Analysis

Appendix B Shallow Well Mitigation Report
Appendix C Preliminary Stormwater Management Plan
Appendix D Draft Soil Mitigation Report
Attachment "E" – Applicant's Findings

ACTION:

Consider the White Hawk Preliminary Master Plan application and:

1) Continue the public hearing to a date specific to allow applicant adequate time to update exhibits per the Staff Report dated July 7, 2015; or

2) Close the public hearing and a) approve; b) approve with conditions; or c) deny the application directing staff to prepare appropriate findings supporting the decision for consideration at the August 7, 2015 Planning Commission meeting.

RECOMMENDATION:

Continue the public hearing for the White Hawk Preliminary Master Plan application to a date specific agreed to by the applicant as necessary to update the Preliminary Master Plan exhibits per the Staff Report dated July 7, 2015.

CENTRAL POINT

ATTACHMENT "A"

White Hawk Master Plan

Location Map

Legend

Eastside TOD

Tax Lots

File No. 14004 - White Hawk Master Plan
Created: June 22, 2015
Central Point Community Development Department

Attachment "B"

White Hawk Master Plan Narrative

WHITE HAWK MASTER PLAN

DESIGN GUIDELINES

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April 27, 2015

REGISTERED ARCHITECT
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WHITE HAWK TRANSIT ORIENTED DEVELOPMENT MASTER PLAN

1. INTRODUCTION/ OVERVIEW OF DESIGN GUIDELINES

The White Hawk Transit Oriented Development Master Plan is intended to guide the development of an 18.91 acre parcel of land in the City of Central Point. This Master Plan provides the necessary information to demonstrate the satisfaction of all applicable approval criteria by defining the character and nature of the development. The objective is to create a livable, transit supportive neighborhood extension of the City of Central Point. The plan demonstrates several tools for smart growth, including: mixed housing types, pedestrian oriented neighborhood structure, connectivity, convenient recreation and open space, and connections to future transit.

White Hawk represents approximately 23% of the entire ETOD District (approximately 82 acres) of Central Point, and we understand that a number of design guidelines, goals and standards may be established with this first major project in the ETOD District. We have prepared our master plan after several conversations and reviews with Central Point Staff, review of Twin Creeks TOD, review of Central Point TOD Standards and from our TOD projects and experiences in Oregon, Washington, Colorado, and Arizona. This Master Plan is for an entirely residential portion of mixed densities for this portion of the ETOD. As the first project in this ETOD, we are proposing as a "centerpiece" of the development, a park that is central to the entire ETOD District that will serve as a central organizing feature for all the surrounding neighborhoods. We anticipate that surrounding properties and future projects can add to the area of the park and add improvements to complete their open space requirements. All future residents of the entire ETOD District will be able to walk to the public park within five minutes or less, as it is within a quarter mile or less walking distance. The circulation structure of our project and how it expands to the remaining areas of the ETOD are guided by the park location and prominence as the organizing feature of this ETOD. The park open space is intended to provide a variety of outdoor recreation amenities. Because the density of this development and the ETOD as a whole will be higher than other areas of the region, large central open spaces for active recreation become very important.

a.) Duration of the Master Plan

We anticipate the "apartment" section of the plan to be the first to be constructed and it may be constructed in one phase of 288 units, or two or three phases. It will depend on the market demand, vacancy rates and the developer's market studies for absorption. If a total of three phases of apartments, the master plan would take approximately five years for the complete construction. The duplexes and rowhouses may be developed in one or two phases, most likely within a five year duration. The final phasing plan will be determined by consumer and developer interest during and following the approval process of this plan. Marketing of the plan cannot begin in earnest until approvals are in process.

b.) Site Location Map (See Drawings)

c.) Land Use and Minimum, and Maximum Residential Densities Proposed

The total site area is 18.91 acres and has two residential densities assigned, a 2.61 net acre LMR zone and a 13.13 net acre MMR zone. For the master plan we have mixed the densities across the entire site. The total maximum density allowed is 451 units and the minimum

density required is 174 units. The master plan is for 324 units maximum density, which equals 72% of the maximum allowed. The plan is composed of 288 apartment units on 13.13 acres and a combination of 36 duplex and rowhouse units on 2.6 net acres. (See White Hawk Density Analysis Chart)

d.) Identification of Other Approved Master Plans Within the Project Area; (100 Feet)
There are no other approved master plans within the project area.

2.) SITE ANALYSIS MAP AND NARRATIVE
The existing site is a vacant flat site with frontage on Beebe Road and Gebhard Road.

a.) Adjacent Land Use Plan
To the east of the site a new church has been recently constructed and fronts on Beebe Road. The remainder of the area is vacant except for an existing residence. The area to the east is also part of the ETOD and zoned LMR. The White Hawk Master Plan proposes a new north south public road to separate the two properties. About a "third" of the east boundary will front on the proposed "Park." Across Beebe to the south is mostly vacant properties zoned MMR and can be developed to apartment densities like that proposed for White Hawk. Across Gebhard Road to the west is county property and has existing single family residences fronting on Gebhard.

Landscaping and new road construction for Gebhard will preserve livability of the existing residences and/or raise the values for future development. To the north of White Hawk is MMR and LMR zoned property in the ETOD. The White Hawk Plan proposes a shared access road along the property line and proposes park frontage to maintain livability and to "join" the other future developments to the featured central park.

3.) TRANSPORTATION AND CIRCULATION PLAN
A transportation impact analysis (TIA) has been completed by Southern Oregon Transportation Engineering LLC and is attached to this Master Plan.

The transportation plan has been organized around a network of transportation options that accommodate autos, yet respects pedestrians and the form of the neighborhoods, and public open space. The overall form is a grid street pattern that will extend to the underdeveloped parcels of the ETOD to the east and north (See Neighborhood Diagram). The grid street pattern will disperse traffic and allow autos numerous routes and park cars most efficiently.

Based on our analysis of the Neighborhood Diagram, the White Hawk Plan incorporates two major public streets, a north-south street along the easterly border and an east-west street through the middle of the site, both designed to extend to the future development parcels. Both streets anticipate parking. We envision a planter strip and sidewalk along all street sections. The proposed street sections are modeled after existing City of Central Point standard sections (See Street Sections).

To serve the "apartment project" we have designed the "building blocks" to emulate "city blocks" with parking in front as in a city street. These private drives will have planter strips, sidewalks and street trees like the public streets to appear more as an "urban streetscape." The entries to these private drives will have a textured material change from the public street to the private street to

signal the difference. Turning radii have been designed to meet fire truck and emergency vehicle standards.

We envision the future transit connection to be a bus connection at the southeast and southwest corner of the "civic" designation on the ETOD map. The bus could continue on a north-south route through the ETOD. All properties and densities are within a five minute (quarter mile) walk of this transit route. The highest density on the White Hawk site is within 500 feet of the anticipated transit stop.

Section 17.67.040 Circulation and Access Standards

On Site Pedestrian and Bicycle Circulation

1. Pedestrian routes are provided through the common courtyards that separate the apartment buildings to supplement the public right-of-way.
2. Direct pedestrian paths efficiently serve entrance breezeways for the apartment buildings. The duplexes and rowhouses have direct connections to their front doors as well.
3. Curb extensions are proposed at each intersection to minimize the "street crossing."
4. Pedestrian street lighting and signage are proposed.
5. Parking areas and streets are defined by distinctive landscaping to achieve interest and variety.

4. SITE PLAN

The neighborhood form of the site plan has been designed to interact with a sensibly designed overall land use pattern and an integrated, multi-modal circulation system which forms the White Hawk quadrant of the 82 acre ETOD. The White Hawk 18.91 acres contains the highest density designation for the ETOD, so the open space circulation framework and parking solutions have been designed to accommodate a density of a net of approximately 21 units per acre, combining all housing types. The proposed framework is strengthened and enhanced by a number of community design features which further define the character of the urban structure of White Hawk and the surrounding ETOD. The neighborhoods are envisioned to be connected by a network of pedestrian oriented streetscapes and public open spaces. (See "Overall Neighborhood Diagram"). The traditional grid street pattern will disperse traffic and allows autos numerous routes i.e., a "Main Street" design, the most efficient way to park increased densities. Bicycle and pedestrian pathway system is envisioned to link all neighborhoods. We envision the most practical and efficient future transit service to be bus service located at the southeast and southwest corners of the "civic" designated portion of the ETOD to serve the most riders conveniently.

The landscaping at entry areas into White Hawk will complement high quality design and construction of architecture, incorporating specialty landscape treatments of yards with streetscape and pedestrian detailing of fences, signs and walls. Lower density areas are envisioned to have casual landscape character that will become increasingly formal and structured as one moves toward more urban, higher density neighborhoods.

Street trees will be typically large broad canopied trees for the lower density neighborhoods and narrower, more columnar trees are proposed for higher density areas. Typically the streets will be lined with trees planted at 30 feet on center.

The proposed street lighting will also reinforce the character of each neighborhood. Decorative

light fixtures will be proposed that will be mounted at heights that respect the pedestrian scale of the open spaces. Pedestrian streetlights will not exceed 20 feet in height arterials and collectors and 16 feet along local streets.

Parking

1a. The surface parking lots are being designed to appear as "private streets with parking" and also serve to create the appearance of a "gridded street pattern" establishing a pedestrian "block pattern."

1b. The parking is not located between a "front façade" of a building and a public street.

1c. The off-street parking is located along the "access ways."

1d. No parking lot or garage is located within 20 feet of a street corner.

2. Design

a. All perimeter and landscaped areas have protective curbs along the edges. Trees are inset in planter strips to provide adequate protection from car doors and bumpers.

b. The parking design utilizes a two foot bumper overhang for additional landscape and will consist of ground cover plants.

c. All vehicle areas will be paved.

d. All parking areas will be striped to City of Central Point parking dimension standards.

e. The parking has been designed to emulate a "Main Street" design, by dividing the large apartment site into approximately 270 feet by 260 feet "blocks", a city block dimension similar to many communities.

f. Parking has been made part of the overall "Streetscape" in a "grid pattern".

3. Additional Standards for LMR, MMR, and HMR Zones

a. Parking is not located to the side of buildings as the site design is a "grid pattern" street system.

b. Alleys are being used for the rowhouses to bring vehicle access to the back of the site.

4. Parking Structures

No parking structures are proposed, and are not cost effective for projects of this density.

Landscaping

1. Perimeter Screening and Planting

a. Tall landscaping will be used in the interior courtyards to preserve privacy for the individual units. Landscape at the perimeter of buildings will be used to keep people away from getting close to bedroom windows and to see out of units to help visually patrol immediate areas.

b. Parking areas will be significantly landscaped to separate it from the living units. Trash enclosures will be constructed of masonry, landscaped and screened around the perimeter. We anticipate two trash enclosures of approximately 8x10 for a project of 288 units of apartments but it will be ultimately decided by the local trash hauler.

2. Parking Lot Landscaping and Screening

a.i. Trees will be planted on the parking perimeter spaced at 30 feet on center.

ii. Shrubs and ground cover will be planted in the landscaped area.

iii. Each tree will be located in a minimum four foot by four foot minimum planting area.

iv. Shrub and ground cover beds will be three feet wide minimum.

v. Trees and shrubs will be fully protected from damage by vehicles.

b. Surface parking areas shall provide perimeter parking lot landscaping adjacent to a street and meet one of the following standards.
   i. We will provide a five foot wide planting strip between the right-of-way and the parking area.

c. The White Hawk Plan does not have any gaps in a buildings frontage on a pedestrian street that are adjacent to off-street parking areas and which exceed 65 feet in length.

d. Parking Area Interior Landscaping
   i. The White Hawk Plan will comply with (B) Standard 2 and provide one tree for every four parking spaces in a tree planting area that has a minimum dimension of four feet.
   ii. Development Standards for Parking Area Interior Landscaping
      (A) All landscaping must comply with applicable standards. Trees and shrubs must be fully protected from potential damage by vehicles.
      (B) Interior parking area landscaping must be dispersed throughout the parking area. Some trees may be grouped, but the groups must be dispersed.
      (C) Perimeter landscaping may not substitute for interior landscaping. However, interior landscaping may join perimeter landscaping as long as it extends four feet or more into the parking area from the perimeter landscape line.
      (D) Parking areas that are thirty feet or less in width may locate their interior landscaping around the edges of the parking area. Interior landscaping placed along an edge is in addition to any required perimeter landscaping.

3. Landscaping Near Buildings
   Landscaping will be used as border plantings for the buildings, taller materials will be used to mark and emphasize entries to buildings and courtyards. Hedge materials and ground covers will be used to screen and soften parking areas.

4. Service Areas
   Service areas for storage and trash enclosures will be enclosed and screened with six foot minimum height masonry and/or wood or cementitious siding to match adjacent buildings. Landscape materials will be used to soften the utility structures.

5. Street Trees
   Street trees will be planted along both sides of public and private streets, a minimum of two feet from the back of curb, placed 20 to 40 feet on center, depending on species, with an average of 30 feet on center. Tree species will be chosen from the City of Central Point approved street tree list.

Lighting

1a. A minimum average light level of 1.2 footcandles will be provided at urban spaces and Sidewalks, through the use of building wall lights and pole lights.

b. " LED" lighting is proposed for general exterior lighting for energy efficiency.

c. Maximum lighting levels will not exceed six footcandles at any intersection or 1.5 foot-candles at any intersection or 1.5 footcandles in parking areas.

2. Fixture Design in Public Rights-of-Way

a. Pedestrian scale street lighting not exceeding 16 feet in height will be provided along all streets.

b. Pedestrial street lights no taller than 20 feet will be provided along arterials and collectors.

3. On-Site Lighting
   a. Accessways through parking lots will be lighted with fixtures no taller than 20 feet and will not exceed 1.5 footcandles.
   b. All Exterior lighting of buildings, signs, walkways, and parking lots will be lit with "cut-off" fixtures to avoid casting light on nearby properties.
   c. Fixture heights and lighting levels will be chosen to provide adequate illumination at entryways, building entrances, walkways and parking lots for safety.
   d. Additional pedestrian-oriented site lighting, utilizing bollard lighting and pedestrian sealed pole lighting will be provided at alleys and off-street bike and pedestrian pathways.
   e. Additional lighting will be provided to light each housing unit entry, breezeway entries, project signage and specialized landscape fixtures.

Signs

1. White Hawk will comply with all city sign regulations. An entry monument sign of masonry or stone will mark the main entries off Gebhard and Beebe Roads. In addition to standard city street signs, the only other signage will be building number signage and individual address signage.
   a. The types of signage will be limited to those described in the city sign code.
   b. All signs in the ETOD district will comply with the TOD design standards.
   c. No decorative exterior murals are envisioned for White Hawk.
   d. White Hawk has no commercial uses, so commercial type signage will not be utilized.
   e. Blade signs directing pedestrians will be used on a limited basis throughout the project.

2. Sign Requirements
   White Hawk signage will comply with the "Sign Type" code requirements defined in the code exhibit table for the LMR and MMR Zones.
   a. White Hawk has no HMR Zones.
   b. White Hawk has no HMR Zones

3. Sign Materials
   a. Free standing signs in White Hawk will have a stone or brick base.
   b. White Hawk signage and supporting structural elements will be constructed of metal or stone with wood or metal informational lettering.
   c. White Hawk sign lettering will not exceed 16 inches maximum height. Most lettering will be in the eight inch to 12 inch range. House addresses will be four to six inch numerals.
   d. Sign illumination will be conventional lighting, no neon lighting is anticipated.

4. Prohibited Signs
   White Hawk has no interest in having any of the listed "Prohibited Signs" in the project.

Recreation and Open Space Plan

A large park is proposed as a central organizing feature for the neighborhoods. All future residents will be able to walk to the future park as it is a five minute or less walk (plus or minus quarter mile). This is a unique opportunity to have a project area large enough to "pool" the open space requirements to provide a large park area with the first project in the ETOD to accommodate active and passive recreation. This project proposes a park, very

centrally located to the entire 82 acre ETOD. It would be beneficial for surrounding parcels to add to it with their "open space" requirements, either by dedicating and adding land and/or providing "payment in lieu" for improvements. The park is a magnificent "centerpiece" for the entire ETOD. This size park can accommodate a ballpark, or soccer field, passive areas, a tennis court and a music venue all on one site. (See Neighborhood Plan)

The open space is intended to provide a variety of outdoor and recreation amenities. Because the density of this development is higher than other areas, central open spaces for active recreation become very important. White Hawk proposes to dedicate the park as part of their open space requirement. In addition, each of the "apartment blocks" have their own "central commons" each of an individual design that range from 5600 square feet to over 7200 square feet. (See Prototype Courtyard Sketch). The ownership transfer of the park will be assured through an agreement between the developer, DEQ, and the City. The timing of the transfer and improvements has been discussed to happen when building permits for 200 units have been approved to allow for soil remediation plans by DEQ to be accomplished by using soils that come from overall site preparation work on other adjoining phases. The specifics including assurances, timing, roles, etc., associated with the park transfer plan will be part of a development agreement with the City.

Parks and Open Spaces

1. In addition to the large central park, each apartment grouping has a "common Courtyard" ranging in size from 5600 square feet to over 7200 square feet. Each of the rowhouses and duplex units have yards ranging in size from a minimum of 400 square feet to 600 square feet.
2. White Hawk has 36 units of duplex and rowhouse units required to contribute 400 square feet of open space per unit. (36 units x 400 sq. ft. = 14,400 sq. ft. required).

Parks and Open Space Design

1. The central park will include at least one combination garbage/recycling bin and a drinking fountain with White Hawk improvements and two benches and a children's play structure including a swing and a slide.
2. White Hawk has 288 apartment units, a children's play structure will be provided in the park.

Building Design Plan

The architectural character proposed for White Hawk will reflect the region's local climate, history, building practice and materials in a current traditional manner. The architecture will be characterized by being: pedestrian friendly, sensible building forms and massing, articulation, defined entries, quality, durable materials and continuity between neighborhoods of varying densities. (See Preliminary Prototype Buildings and Plans).

Three types of housing are proposed for White Hawk:

1.) Rental apartment living.
2.) Duplex, zero lot line single family attached housing for sale and rental.
2.) Two story rowhouses for sale or rental.

Building Design Standards

A. 1.a. The design of all the buildings will employ natural ventilation with generous openable Windows and cross ventilation where possible.

b. Passive heating and cooling is accomplished through meeting the Oregon Energy Code, shading devices, good building practices and good windows.

c. Day lighting will be used to cut down on the lighting load. Nine foot ceiling heights will be common to increase window area and reflectance.

d. Sun shading will be accomplished by use of overhangs, deck structures, trellises and strategically placed deciduous trees.

e. Water conservation measures will include low flow plumbing fixtures, shower flow restrictors and low water use landscape materials. Drip irrigation will be used to the maximum extent as a more efficient irrigation practice.

f. The buildings are very simply composed for cost efficiency and to avoid excessive waste of materials.

g. Many of the "LEED" practices are mentioned above, we have done numerous LEED standard buildings, but most likely will not be pursuing certification for White Hawk. We have found it more cost effective to utilize the LEED principles without the costly documentation and testing to use those funds for better fixtures, windows, insulation and venting.

2. The buildings have been designed to have interesting massing and articulated elevations on all sides for an interesting, safe walking environment.

3. Convenient, safe, direct access is provided to all unit types from "enclosed breezeways" at apartments, and direct garage and front door access for rowhouses and duplexes. A complete gridded pedestrian system and courtyard walkways is provided to provide access from building to building to open spaces and the park, through interesting walks.

4. Except for a few "picture windows," all windows will be operable to selectively provide ventilation depending on the orientation of the building and time of year.

B. Architectural Character

1.a. There is not a consistent architectural pattern in the area as it has very sporadic rural development. The designation of the area as an ETOD puts structure to the area to develop in a more urban character. As we have previously mentioned our intent with the architecture is to draw on local traditions and climatic conditions and develop a current architecture that is appropriate to the area.

b. This project is entirely residential so we have minimal effect on commercial or civic buildings other than our site planning respect for adjacent uses.

c. Again, we are accomplishing a number of these goals and objectives with our residential buildings and have very little impact on future commercial and civic uses.

C. Building Entries

1.a.i. The building entries have been oriented to the street to the maximum extent possible. In this case the "public streets" from the "private streets" will be practically "imperceptible" in the "built form." Many of our entries come off "common court-yards" but does not diminish the pedestrian experience as the buildings are all designed to have "lively elevations" at each exposure.

1.a.ii. The main entrances are connected to the sidewalk with a well-defined pedestrian walkway.

1.b. No building facades in White Hawk are over 200 feet in length.

1.c. All entries fronting a pedestrian access way will be sheltered with a minimum four foot overhang or shelter.

1.d. An exception may be granted in certain cases in that "access is to a courtyard" and identified access ways are provided through a parking lot to directly connect the building complex to the most direct (appropriate) pedestrian route.

2. Commercial and High Mix Residential
White Hawk has no commercial or high mix residential.

3. Residential

a. At White Hawk all main entrances to each primary structure face the street it fronts on, public street or private street. Several buildings have more than one main entrance, but at least one entrance per building faces the street.

b. Attached residential buildings have been designed to have an entrance opening on to the street.

c. The main entrances to the attached residential and apartment buildings have been designed to be prominent, interesting and pedestrian accessible.

d. For attached residential structures, porches are at least eight feet wide and five feet deep and covered by a roof supported by columns for brackets.

e. The front porch will have a roof pitch that matches one of the pitches of the roof when more than one pitch exists to create architectural interest.

f. The porch elevation roof will be different than the main elevation for a more prominent entrance.

g. The front major entrance to the multi-dwelling complexes has added emphasis from "gable towers and decks" that mark the main entrances to the buildings. (See Prototype Building Elevations).

D. <u>Building Facades</u>

1.a. General

White Hawk does not propose any building frontage greater than 30 feet in length Without a "break" identified by a change in façade, decks, entries, etc. due to the Articulation planned for the proposed buildings.

b Monotonous building designs along a street frontage have been avoided by designing all four elevations to be interesting.

c. Trellises, long overhangs, decks, insets, and trees have been incorporated to provide "sun-shading" from the summer sun.

d. Elevations on major buildings have been designed to have "vertical elements" at no greater length than 30 feet to "break down" longer buildings visually to smaller proportions that is more acceptable to the "eye."

e. Living units and a variety of living spaces front different frontages to provide interest. No garages front any major street to emphasize the pedestrian environment.

f. The living units of each building type have living spaces that have surveillance of the street.

g. All White Hawk buildings propose high quality building materials found in the best residential neighborhoods.

h. The exterior walls of all building facades will be of suitable durable building materials as shown on the proposed building prototypes. None of the identified "prohibited building materials" are proposed to be used on any building.

i. The elevations have been designed to have the same materials palette on all four sides

of the building.

j. No parking structures are proposed, nor are they economically feasible at this density.

k. There are no commercial structures on the White Hawk project.

l. Attractive, articulated elevations have been designed for each street frontage. (see Prototype drawings.)

2. Commercial and High Mix Residential/ Commercial
White Hawk has no Commercial or High Mix/Residential/Commercial Zones or development.

3. Residential (Duplexes and Rowhouses

a. Garages are proposed to be two car garages off an alley, the garages will exceed 40% of the horizontal length but the living space above accentuated the elevation to achieve the vitality the code wishes to achieve and provides a realistic parking solution for the building type. The access to the garages and parking is from an alley, not a "frontage street."

b. Building elevations of upper stories of apartment buildings facing pedestrian routes shall have articulated detailing including windows, balconies, dormers and trellises.

E. Roofs

1. Commercial and High Mix Residential/Commercial
White Hawk has no Commercial and High Mix Residential Commercial.

2. Residential

a. No flat roofs are proposed.

b. No flat roofs with parapets are proposed.

c. We have proposed 8:12 roofs at the most visible elevations on the large apartment buildings filled in with 4:12 "saddles" to "emphasize" the vertical elements of the buildings and minimize large unnecessary energy wasteful roof areas. The 4:12 "saddles" break down large buildings to appear as 3 separate smaller buildings for a more appropriate residential scale.

d. Roof shapes have been designed to emphasize important building masses and have been integrated into the total building design to present visually interesting articulated masses and elevations, and to break down the "apparent scale" into smaller proportions.

F. Exterior Building Lighting

1. Commercial and High Mix Residential/Commercial
White Hawk has no commercial and high mix residential/commercial.

2. Residential

a. Only lighting necessary for safety and ADA requirements will be proposed for the project for energy efficiency and operations costs reasons.

b. Porch and entry lights will be provided at each residential unit as a practical safety and identity necessity. Most likely these fixtures will be compact fluorescents or LED.

c. No exterior lighting will exceed 100 watts per fixture, in any residential area.

G. Service Zones

1. Trash and mail collection and distribution can be planned for convenient and efficient use after discussion with local mail providers and trash haulers.

2. No mechanical equipment (HVAC) is required for the apartment units as they will be heated with small electrical units and may be air conditioned with PTAC units or a minisplit system.
3. Wall mounted AC units will be designed as part of the wall of the unit or screened behind proposed decks. The only ground mounted units would be at the rowhouse or duplex units and space exists in the yards for necessary pads.
4. Screening materials and landscape screens will be "architectural extensions" of the principal materials of the buildings.

H. Parking Structures

There are no parking structures in White Hawk. Parking structures will not appear until densities are 100 units per acre and greater density in our experience in urban areas.

Transit Plan

We are not aware of an adopted "transit plan" for this ETOD area, however due to the Definition and vision of the area, we have "proposed" for discussion and analysis a couple of "future transit stops and routes" probably by bus service for this ETOD district. These suggestions are our initial reactions and are open for discussion and change by the greater community. We applaud the forward thinking of the community to accommodate a coordinated "transit plan."

Attachment "C"

Master Plan Exhibits

EXHIBIT "1"

PRELIMINARY PLANS FOR

WHITE HAWK (ETOD)

MASTER PLAN & PARTITION PLAT

CENTRAL POINT, OREGON

37 2W 02, TAXLOTS 2700 & 2701

VICINITY MAP
N.T.S.

OWNER

PEOPLE'S BANK OF COMMERCE
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PH: (541) 774-7656

PLANNER, SURVEYOR & CIVIL ENGINEER

CES|NW, INC.
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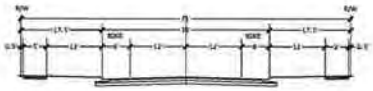
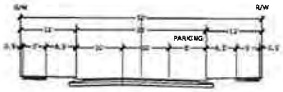
TIGARD, OR 97223
503-968-6655

ARCHITECT

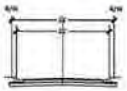
TAHRAN ARCHITECTURE & PLANNING LLC
2333 SW STEPHENSON ST.
PORTLAND, OR 97219
503-539-8802



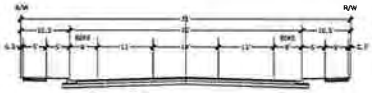
GEBHARD ROAD
(INTERIM ST-20)



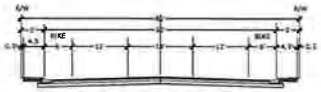
PARK STREET
(ST-10)



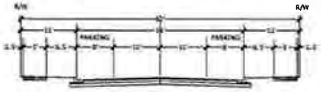
ALLEY
(ST-42)



GEBHARD ROAD
(NEAR BEEBE ST-21)



BEEBE ROAD
(RETROFIT ST-21)

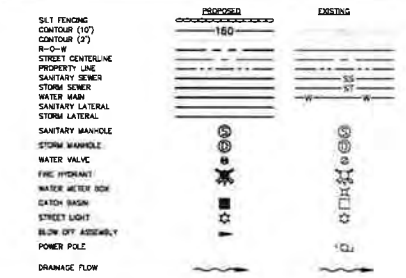


WHITE HAWK WAY,
BEEBE PARK LANE &
NORTH (ST-15)

WHITE HAWK DENSITY ANALYSIS

Allowable Density	LMR	MMR	Totals
Gross Area	118092	705734	823826
Gebhard Dedication		16087	16087
Interior ROW Ded		111152	111829
Net Area	118092	578215	696130
Min Density/AC	6	13	
Min Density	16	159	175
Max Density/AC	11	12	
Max Density	33	625	658
Proposed Density			
Duplexes	0	16	16
Townhomes	0	20	20
Apartments	0	288	288
Total Proposed Density	0	324	324

SYMBOLS LEGEND



SHEET LEGEND

NUMBER	DESCRIPTION
C0	TITLE SHEET
C1	EXISTING CONDITIONS/ENVIRONMENTAL PLAN
C2	PRELIMINARY PARTITION PLAT
C3	SITE PLAN
C4	MASTER UTILITY PLAN
C5	ADJACENT LAND USE PLAN
C6	TRANSPORTATION & CIRCULATION PLAN
C7	RECREATION & OPEN SPACE PLAN

ATTENTION:
Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through 952-001-0090. You may obtain copies of the rules by calling the center. (Note: The telephone number for the Oregon Utility Notification Center is (503) 232-1987).

APRIL 29, 2015

EXHIBIT "2"

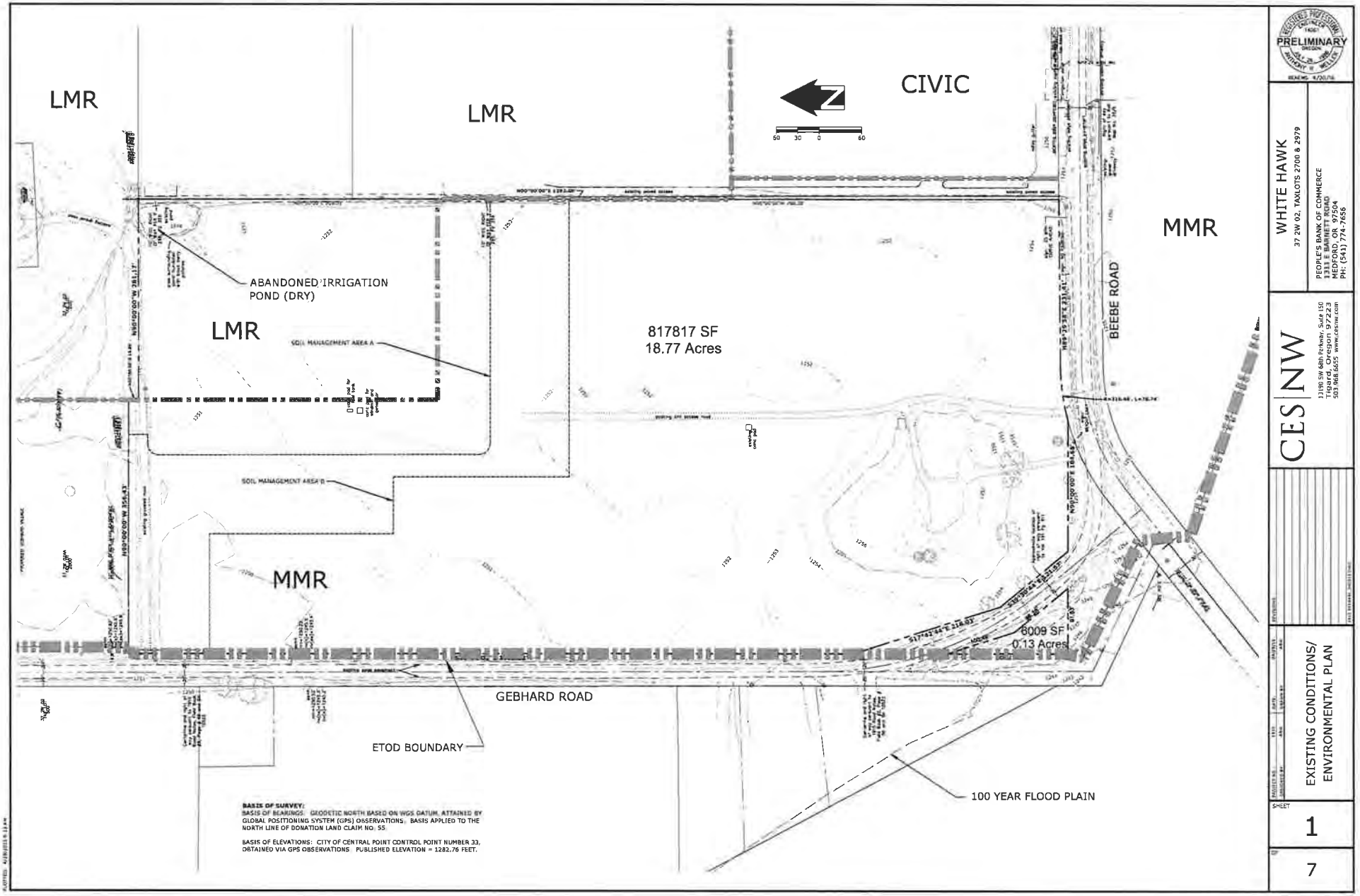
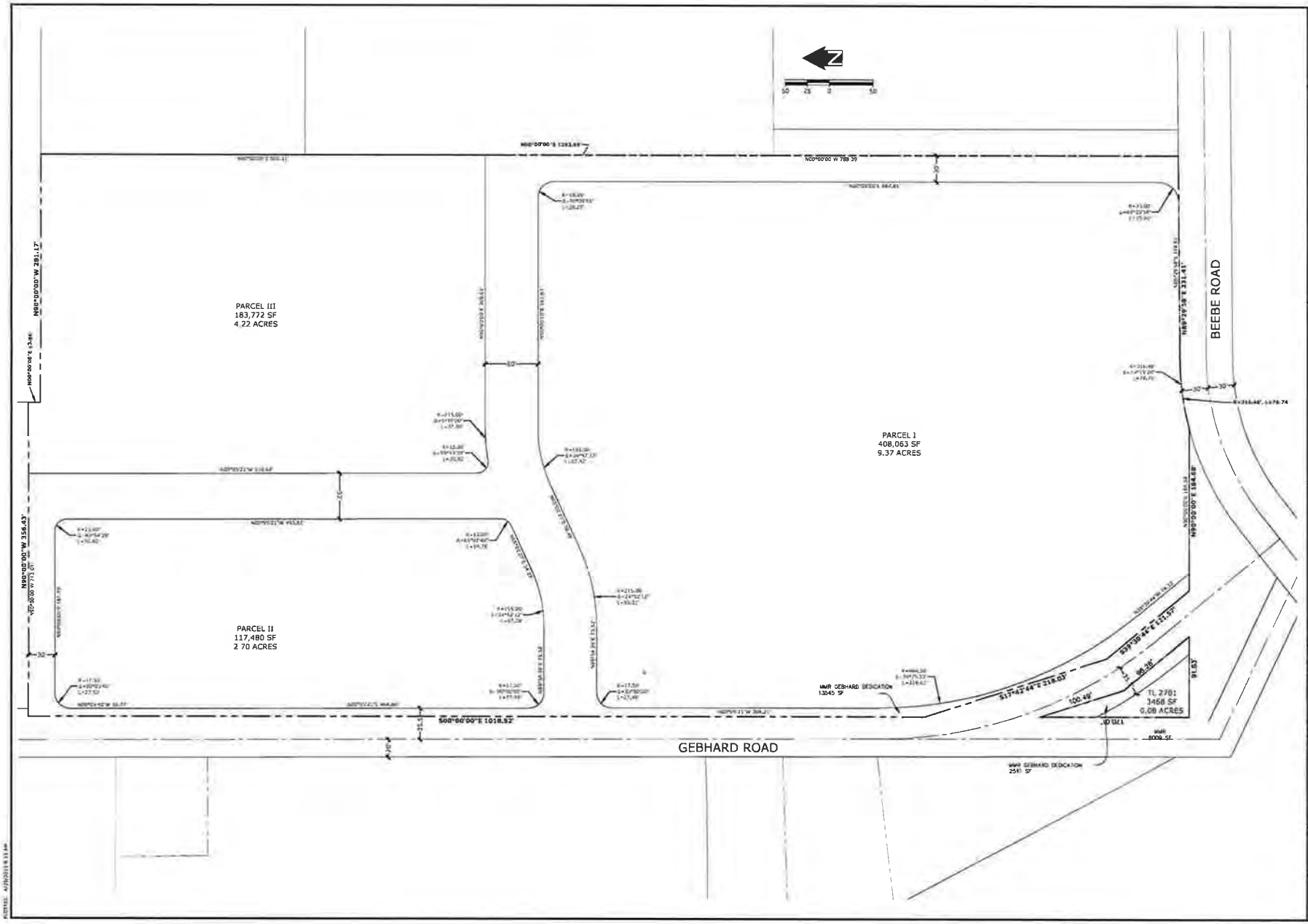

LMR
LMR
CIVIC
MMR
LMR
MMR
ABANDONED IRRIGATION POND (DRY)
SOIL MANAGEMENT AREA A
SOIL MANAGEMENT AREA B
817817 SF
18.77 Acres
BEEBE ROAD
6009 SF
0.13 Acres
GEBHARD ROAD
ETOD BOUNDARY
100 YEAR FLOOD PLAIN
50 30 0 60
BASIS OF SURVEY:
BASIS OF BEARINGS: GEODETIC NORTH BASED ON WGS DATUM, ATTAINED BY GLOBAL POSITIONING SYSTEM (GPS) OBSERVATIONS. BASIS APPLIED TO THE NORTH LINE OF DONATION LAND CLAIM NO. 55.
BASIS OF ELEVATIONS: CITY OF CENTRAL POINT CONTROL POINT NUMBER 33, OBTAINED VIA GPS OBSERVATIONS. PUBLISHED ELEVATION = 1282.76 FEET.
PRELIMINARY
WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979
PEOPLE'S BANK OF COMMERCE
1311 E BARNETT ROAD
MEDFORD, OR 97504
PH: (541) 774-7658
CES NW
11190 SW 68th Parkway, Suite 150
Tigard, Oregon 97223
503.968.6655 www.cesnw.com
EXISTING CONDITIONS/ ENVIRONMENTAL PLAN
SHEET
1
7

EXHIBIT "3"



PRELIMINARY
DRAWN: 8/20/15

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

PEOPLE'S BANK OF COMMERCE
1311 E BARNETT ROAD
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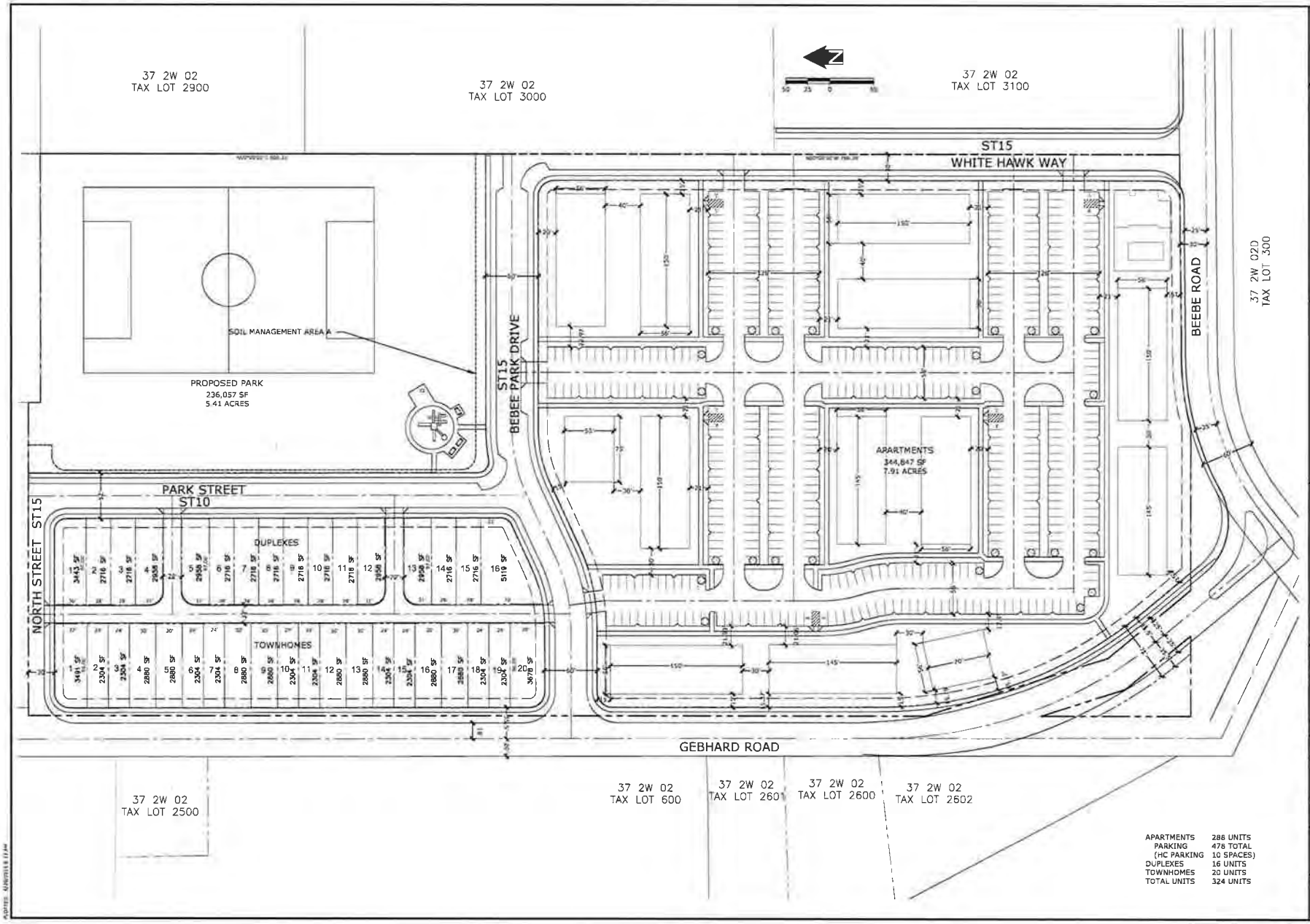
PRELIMINARY PARTITION PLAT

SHEET 2
OF 7

EXHIBIT "4"



PRELIMINARY

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

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SITE PLAN

SHEET 3
OF 7

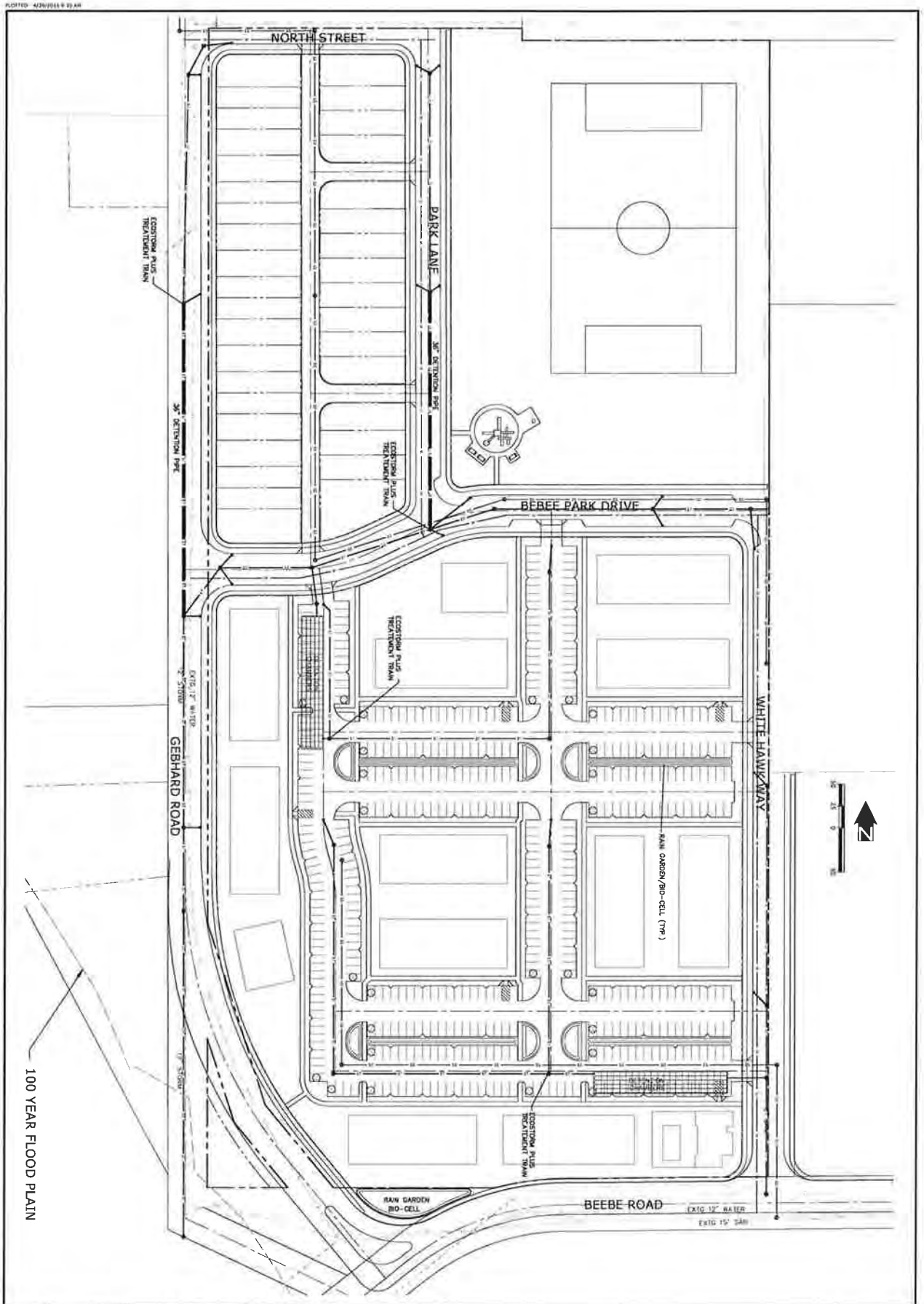
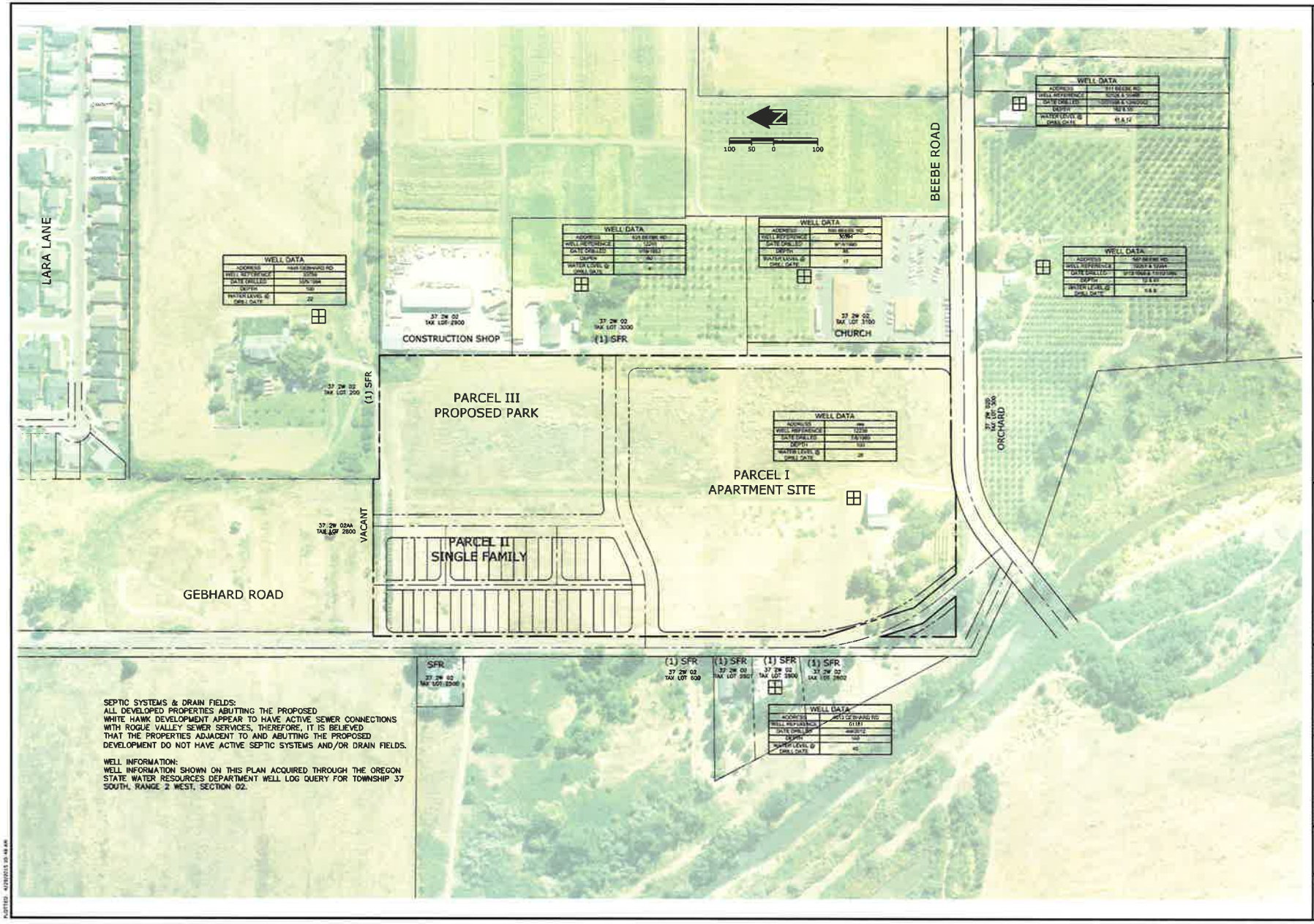


EXHIBIT "5"

7	4	MASTER UTILITY PLAN	CES|NW 13190 SW 68th Parkway, Suite 150 Tigard, Oregon 97223 503.968.6655 www.cesnw.com	WHITE HAWK 37 2W 02, TAXLOTS 2700 & 2979 PEOPLE'S BANK OF COMMERCE 1311 E BARNETT ROAD MEDFORD, OR 97504 PH: (541) 774-7656

PRELIMINARY

EXHIBIT "6"



PRELIMINARY
RENEWS: 6/30/16

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

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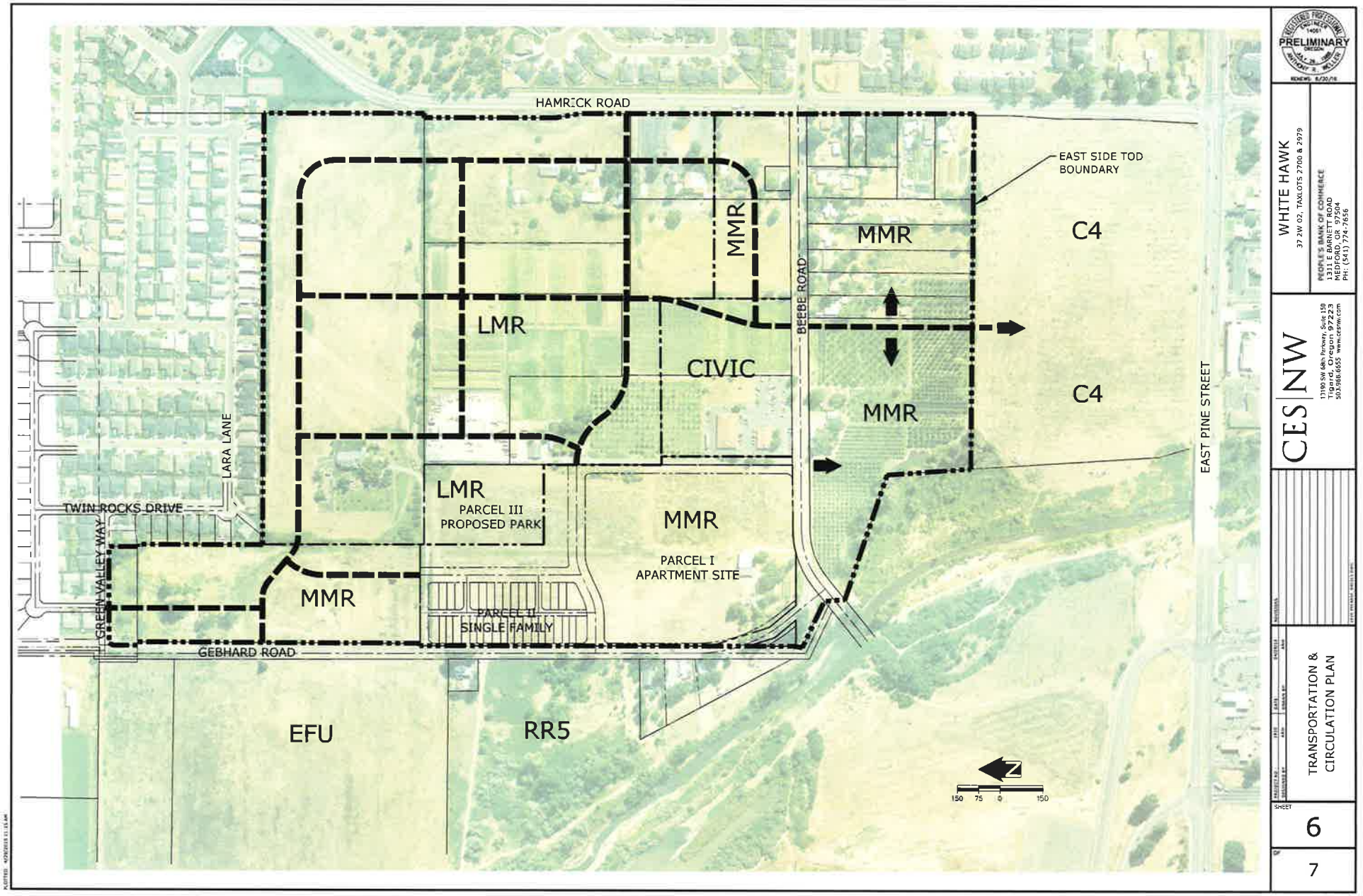
503.968.6655 www.cesnw.com

ADJACENT LAND UES PLAN
(SITE ANALYSIS)

SHEET 5
OF 7

EXHIBIT "7"



PRELIMINARY

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

PEOPLE'S BANK OF COMMERCE
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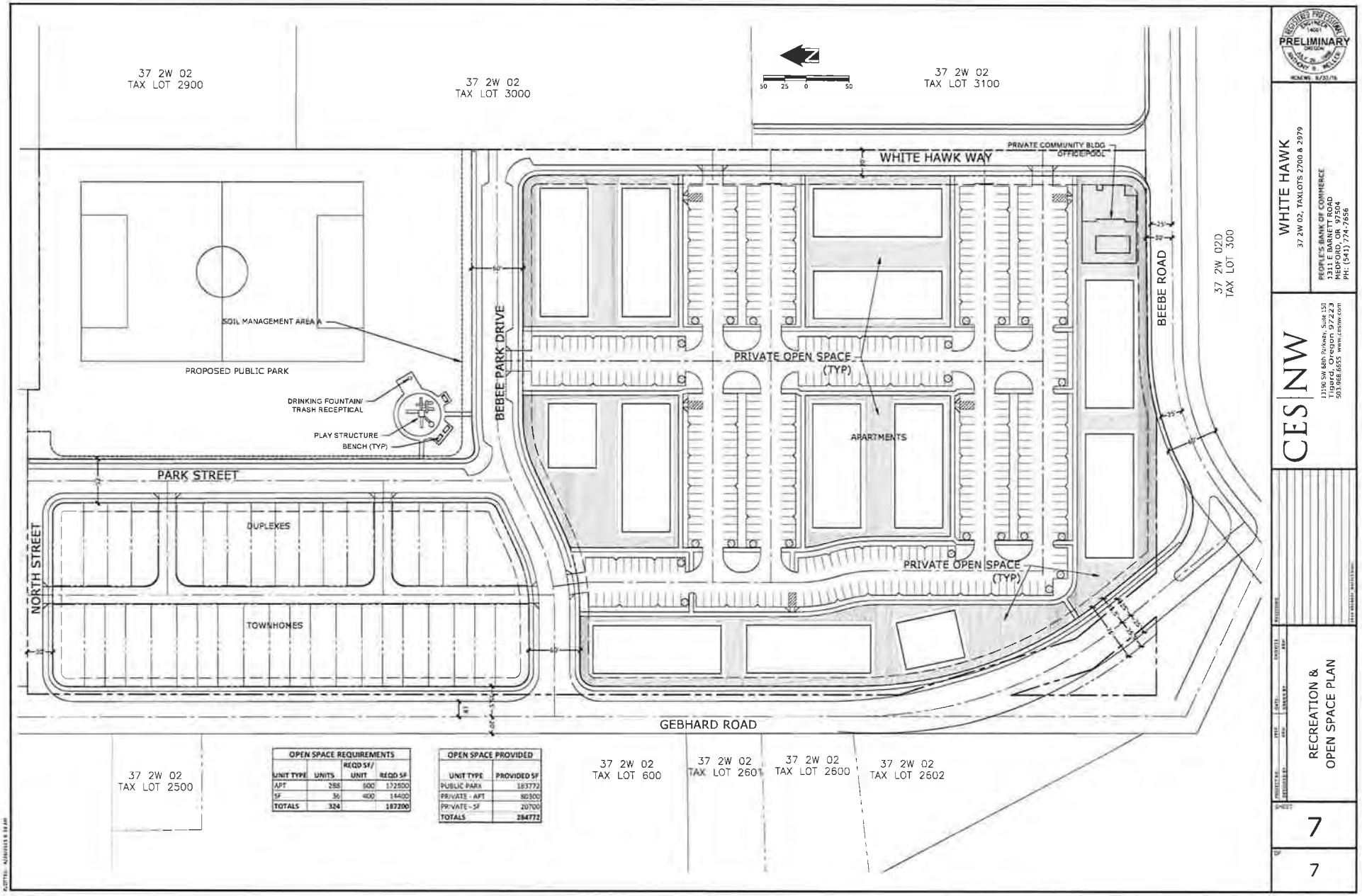
503.968.6655 www.cesnw.com

TRANSPORTATION & CIRCULATION PLAN

SHEET 6
OF 7

EXHIBIT "8"



OPEN SPACE REQUIREMENTS			
UNIT TYPE	UNITS	REQD SF/ UNIT	REQD SF
APT	288	600	172800
SF	36	400	14400
TOTALS	324		187200

OPEN SPACE PROVIDED	
UNIT TYPE	PROVIDED SF
PUBLIC PARK	183772
PRIVATE - APT	80300
PRIVATE - SF	20700
TOTALS	284772

PRELIMINARY

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

PEOPLE'S BANK OF COMMERCE
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MEDFORD, OR 97504
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1190 SW 68th Parkway, Suite 150
Tigard, Oregon 97223
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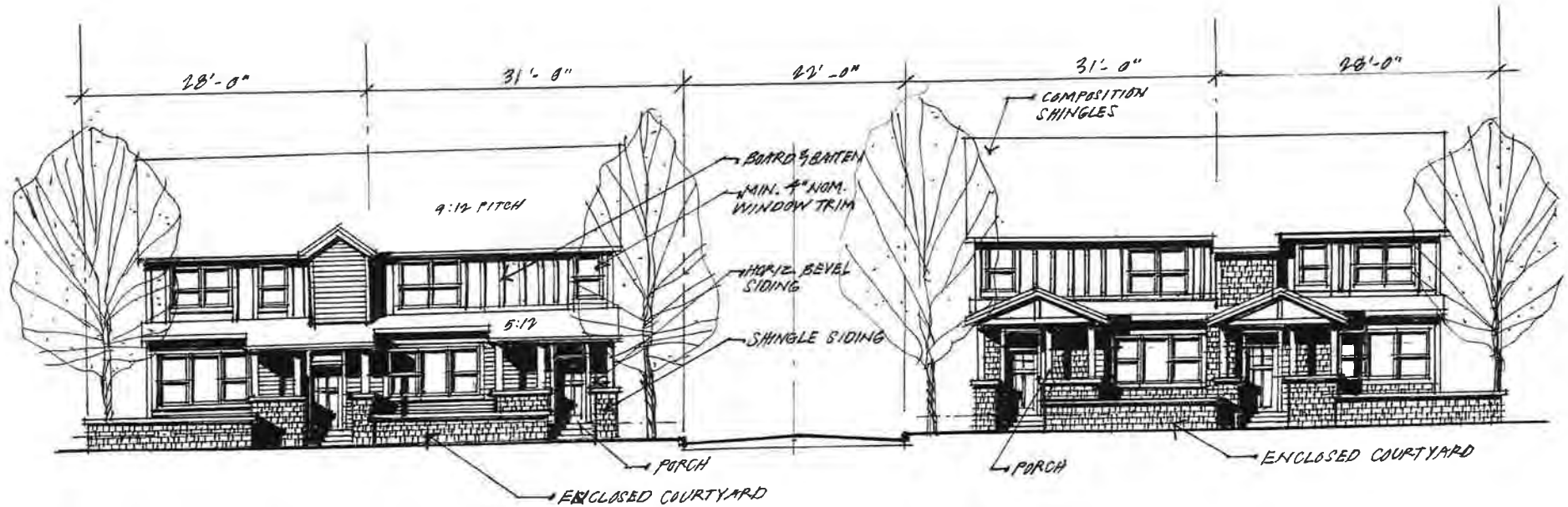
RECREATION &
OPEN SPACE PLAN

SHEET 7
OF 7

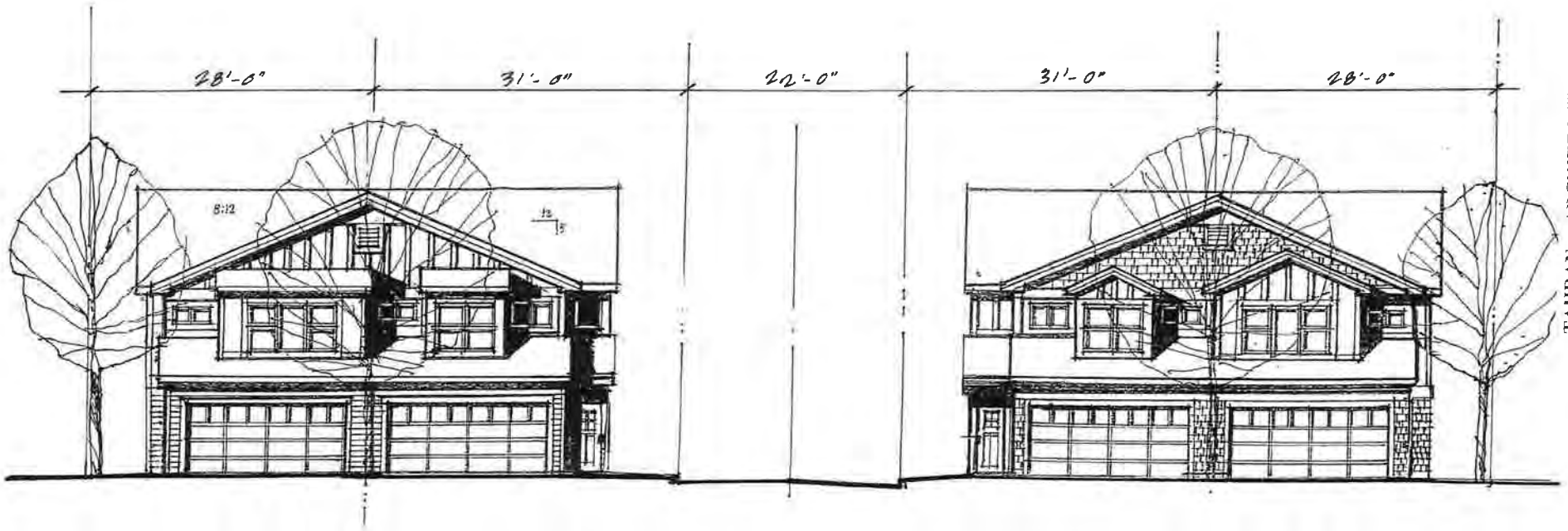
EXHIBIT "9"



PARK STREET ELEVATIONS
DUPLEXES
1" = 10'-0"

REGISTERED ARCHITECT
RALPH G. TAHRAN
PORTLAND, OREGON
2399
STATE OF OREGON

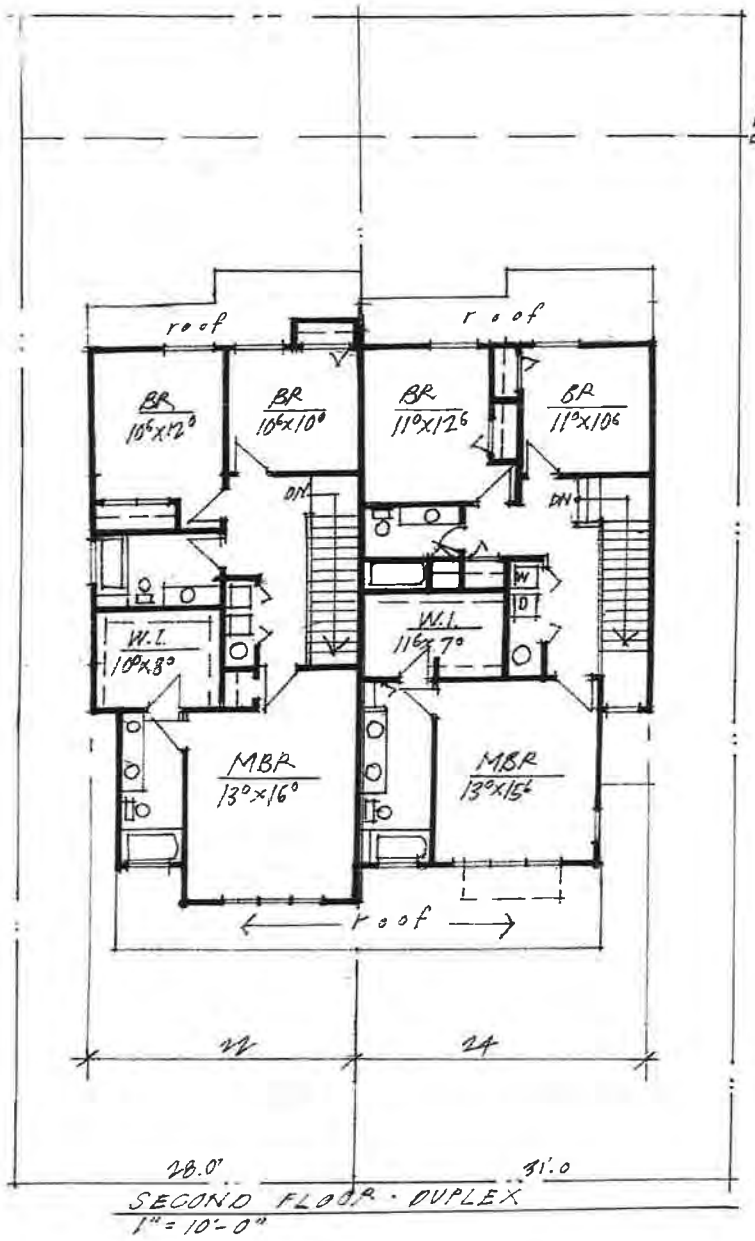
TAHRAN ARCHITECTURE & PLANNING LLC
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net



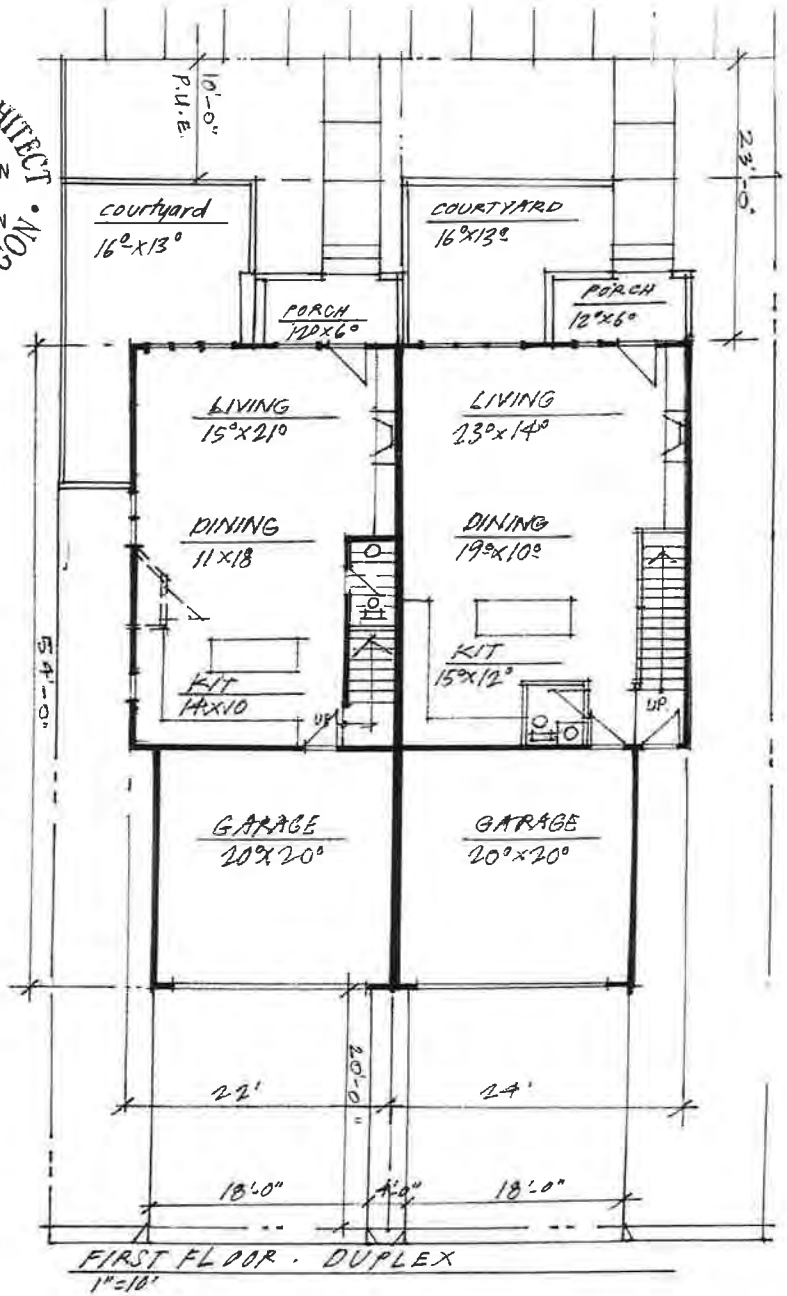
ALLEY ACCESS ELEVATIONS
DUPLEXES
1"=10'-0"

REGISTERED ARCHITECT
RALPH G. TAHRAN
PORTLAND, OREGON
2399
STATE OF OREGON

TAHRAN ARCHITECTURE & PLANNING LLC
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 rahntahran@comcast.net



REGISTERED ARCHITECT
RALPH G. TAHRAN
PORTLAND, OREGON
2399
STATE OF OREGON



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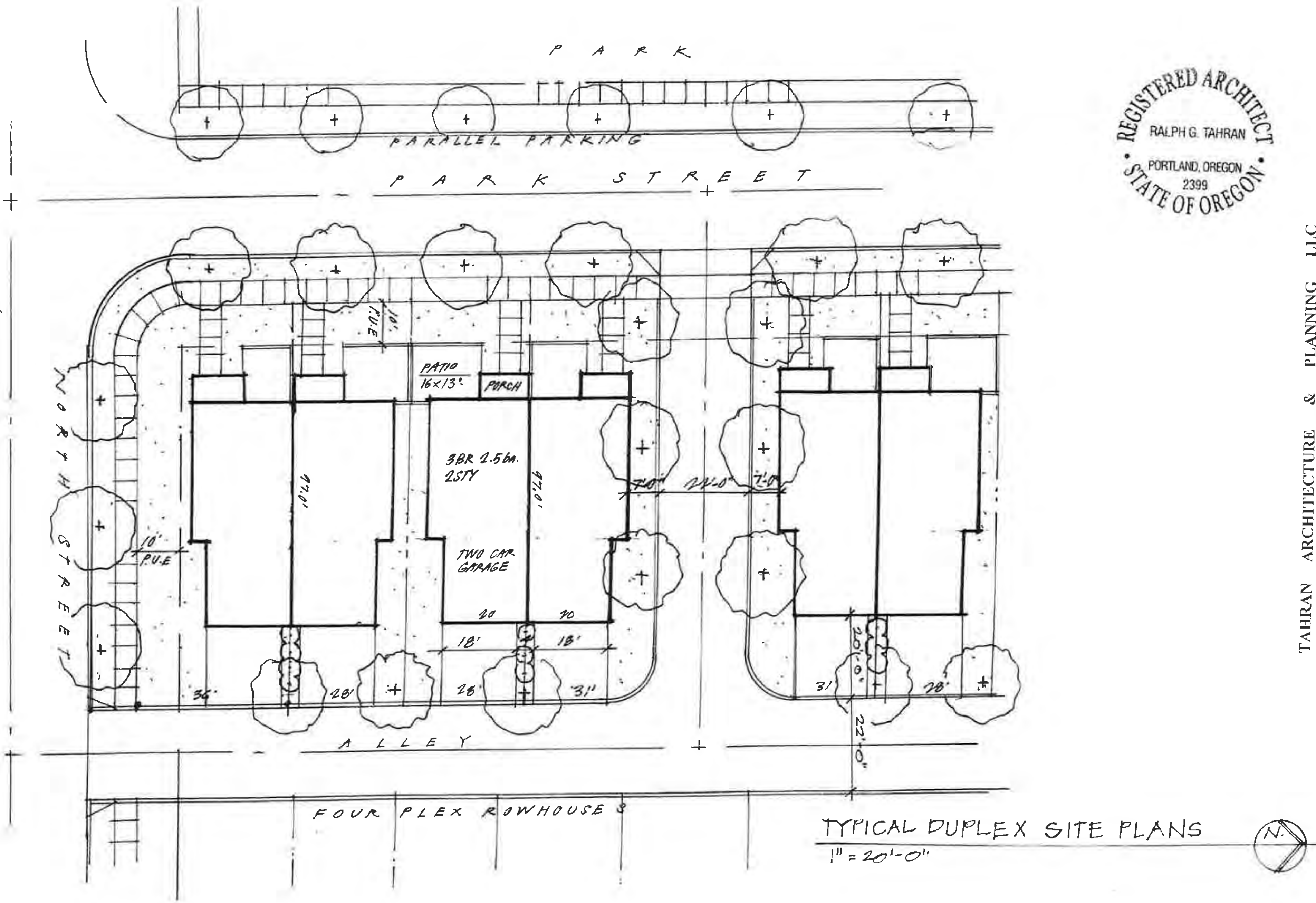
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net



TYPICAL DUPLEX SITE PLANS

1" = 20'-0"

REGISTERED ARCHITECT • RALPH G. TAHRAN • PORTLAND, OREGON • 2399 • STATE OF OREGON

TAHRAN ARCHITECTURE & PLANNING LLC
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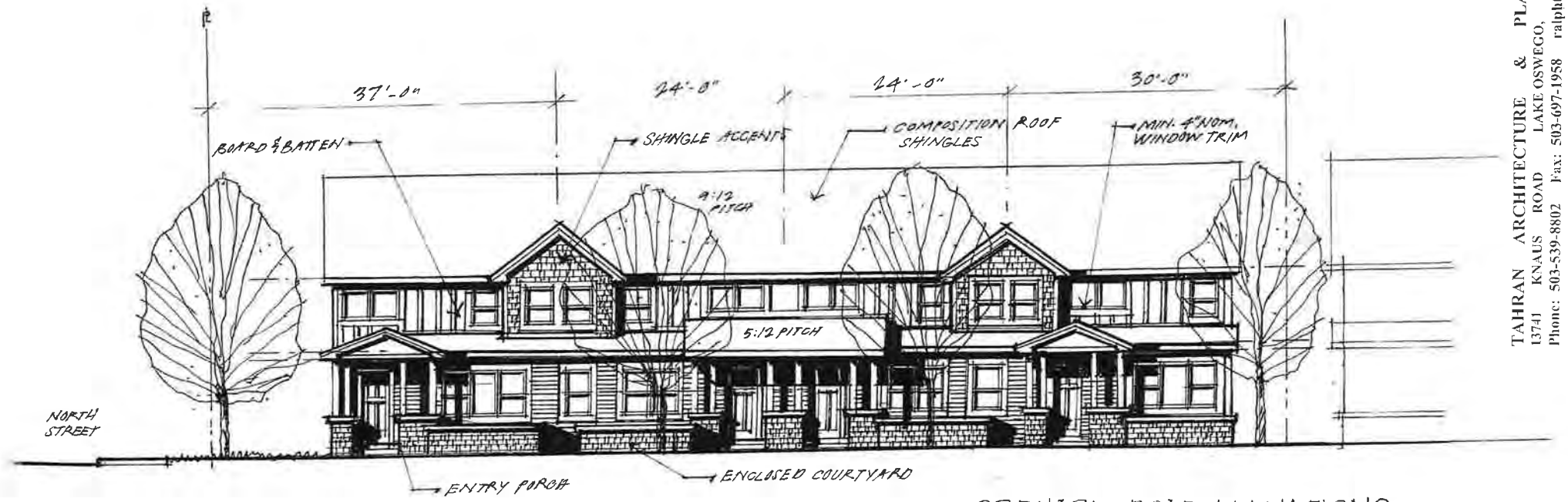
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net

EXHIBIT "10"

REGISTERED ARCHITECT
RALPH G TAHRAN
PORTLAND, OREGON
2399
STATE OF OREGON

TAHRAN ARCHITECTURE & PLANNING LLC
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net



GEBHARD ROAD ELEVATIONS
ROWHOUSES

1" = 10'-0"

REGISTERED ARCHITECT
RALPH G TAHRAN
PORTLAND, OREGON
2399
STATE OF OREGON

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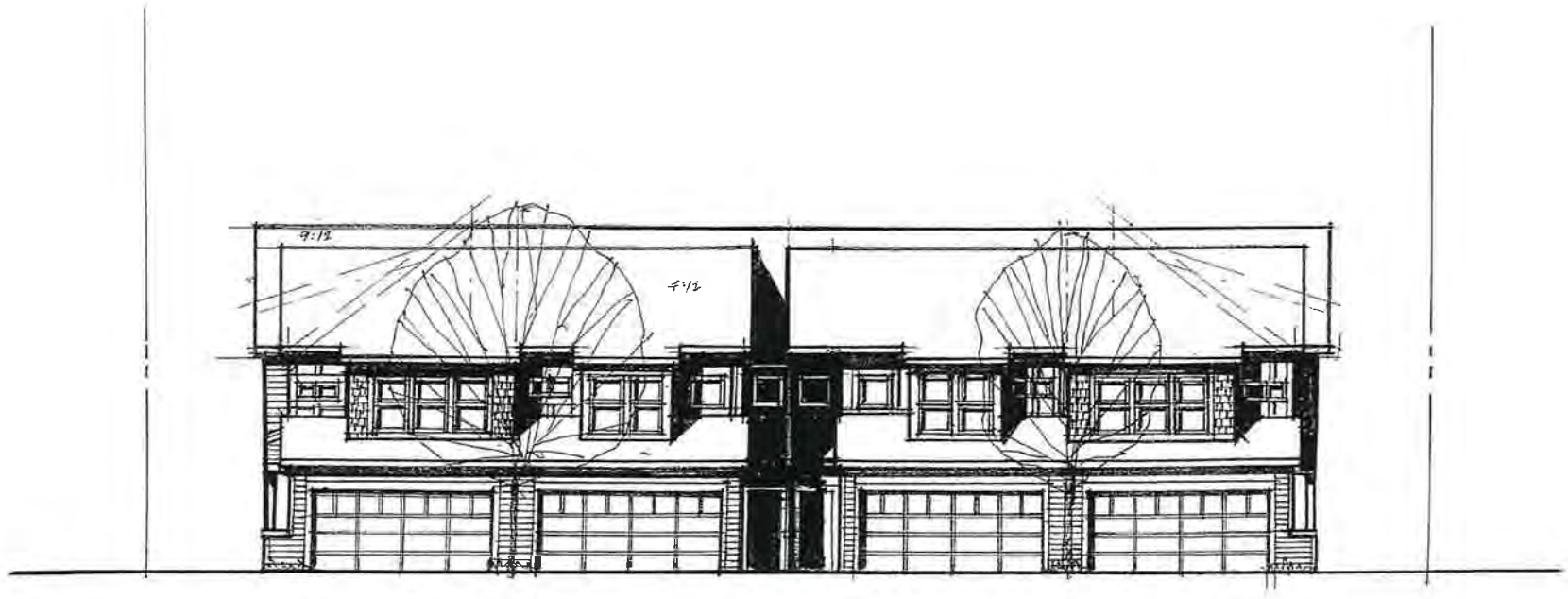
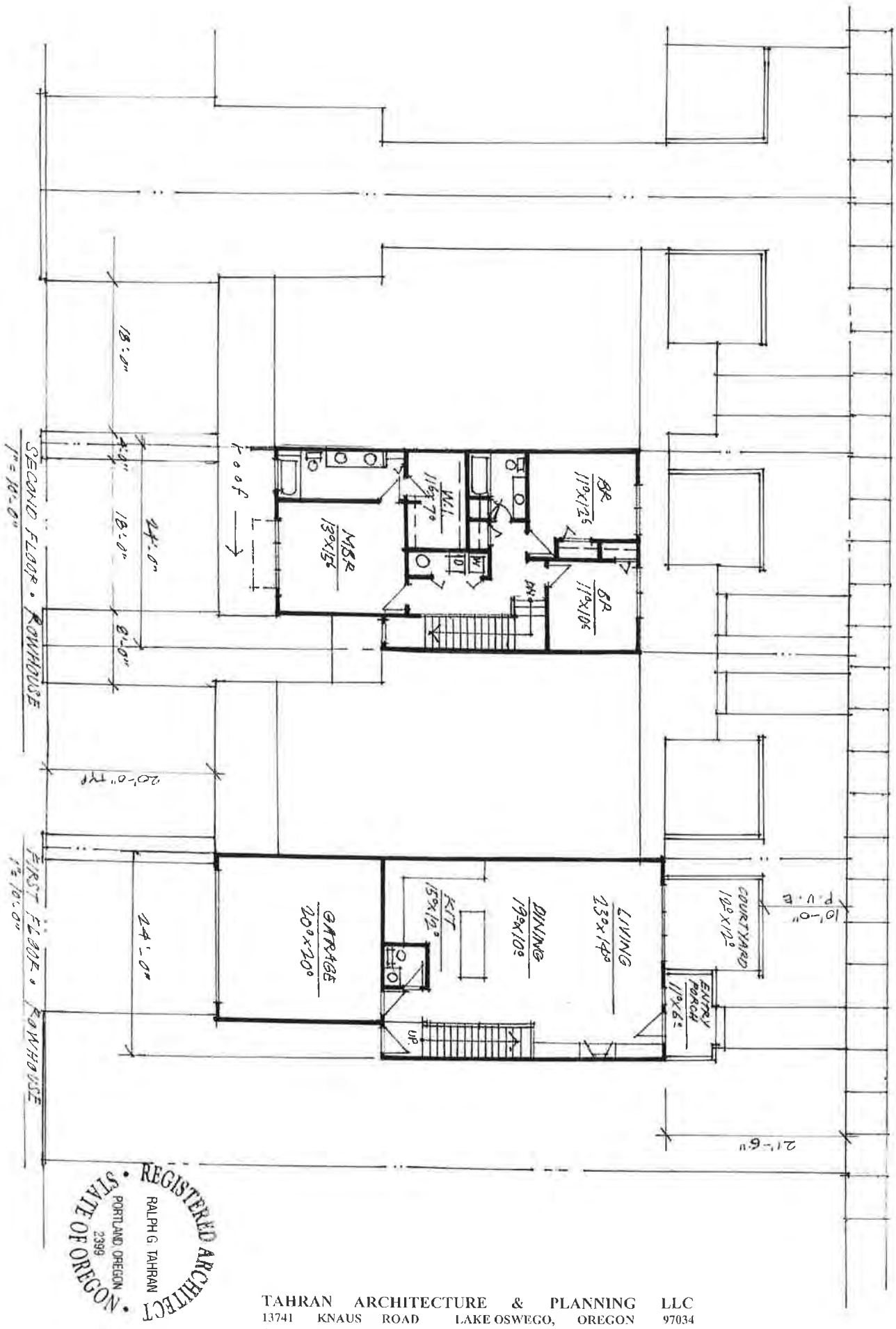
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net



ALLEY ACCESS ELEVATIONS
ROWHOUSES

1"=10'-0"



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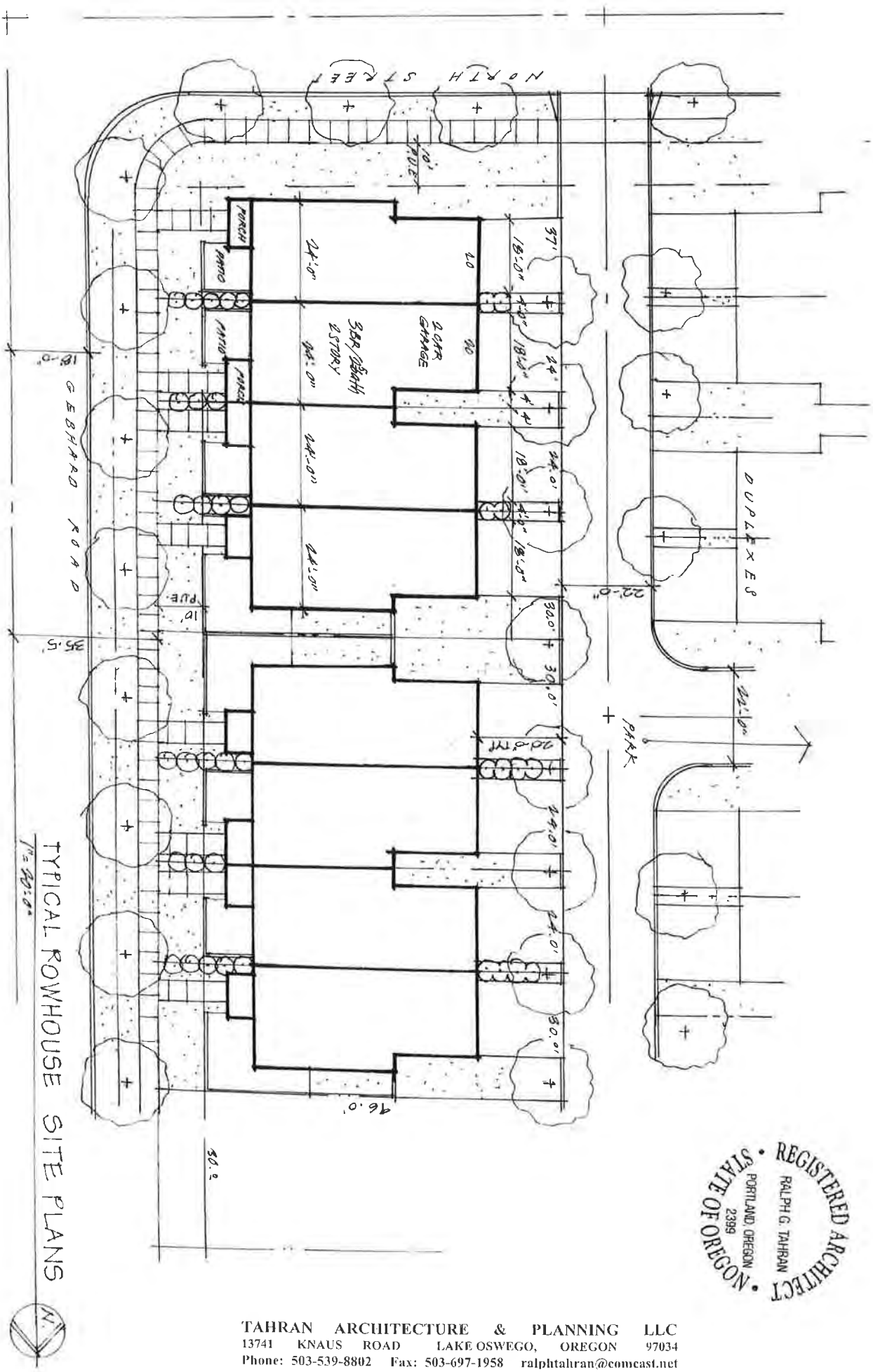

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STATE OF OREGON

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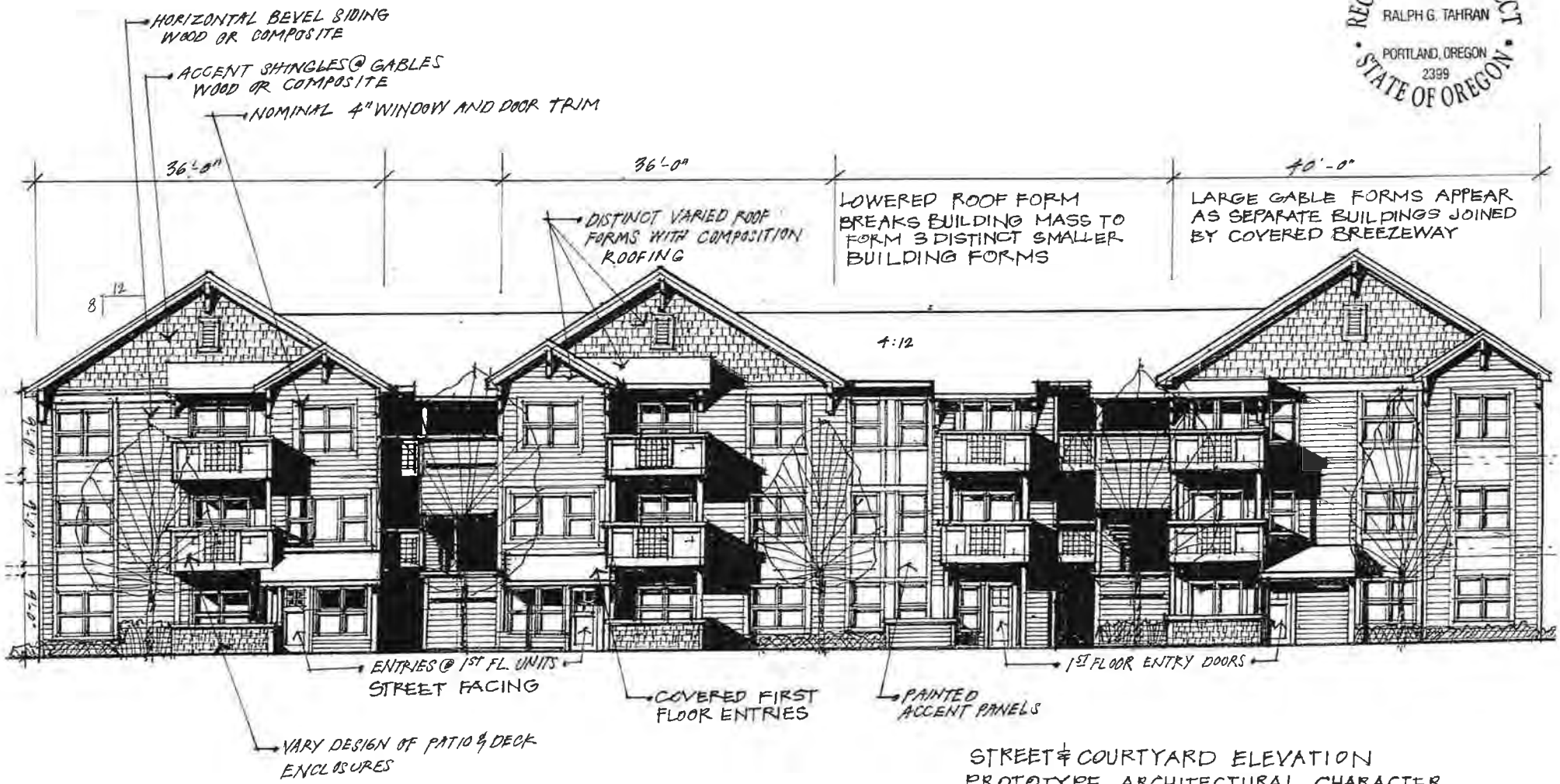
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net

EXHIBIT "11"



REGISTERED ARCHITECT
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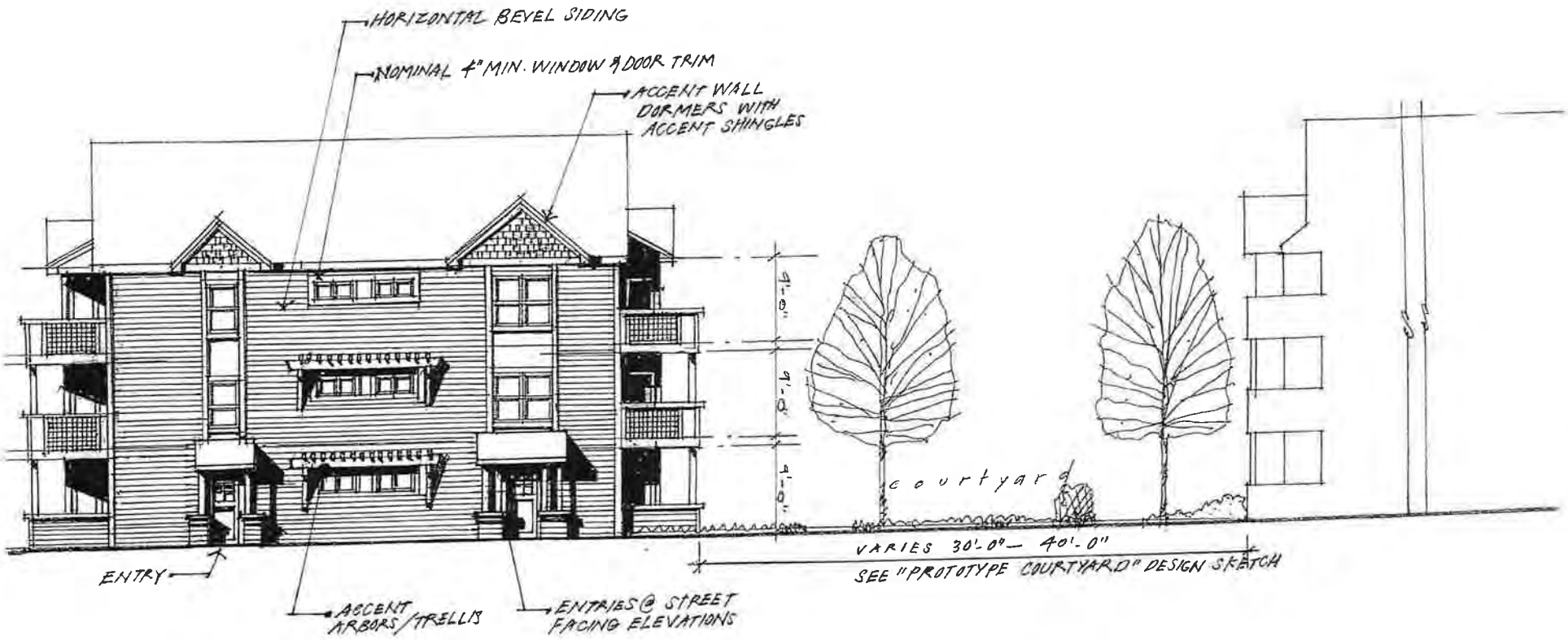
2399
STATE OF OREGON

TAHRAN ARCHITECTURE & PLANNING LLC
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net

STREET & COURTYARD ELEVATION
PROTOTYPE ARCHITECTURAL CHARACTER
24 UNIT APARTMENT BUILDING

1" = 10'-0"



SIDE STREET ELEVATION
PROTOTYPE APARTMENT ARCHITECTURE

1" = 10'-0"

REGISTERED ARCHITECT
RALPH G TAHRAN
PORTLAND, OREGON
2399
STATE OF OREGON

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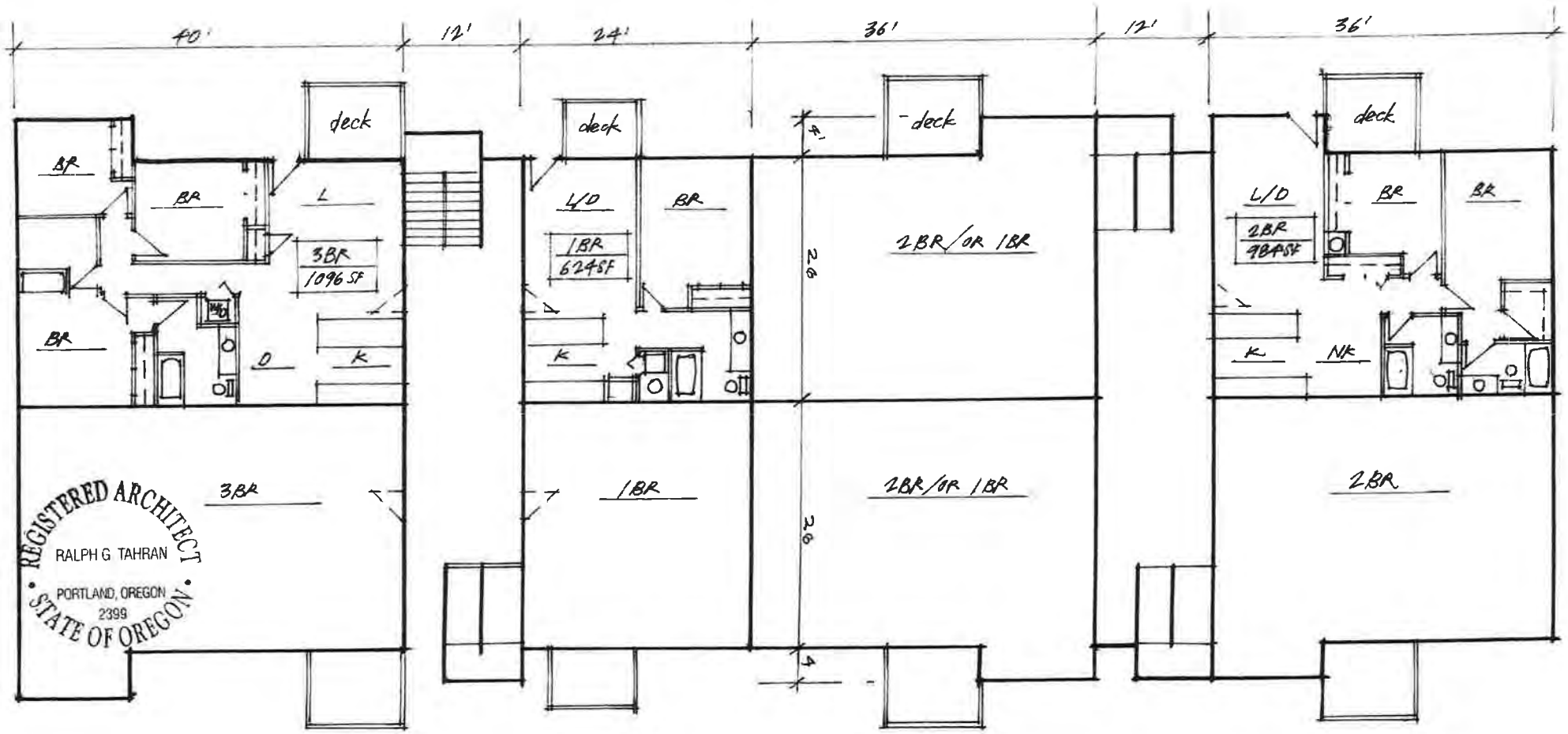
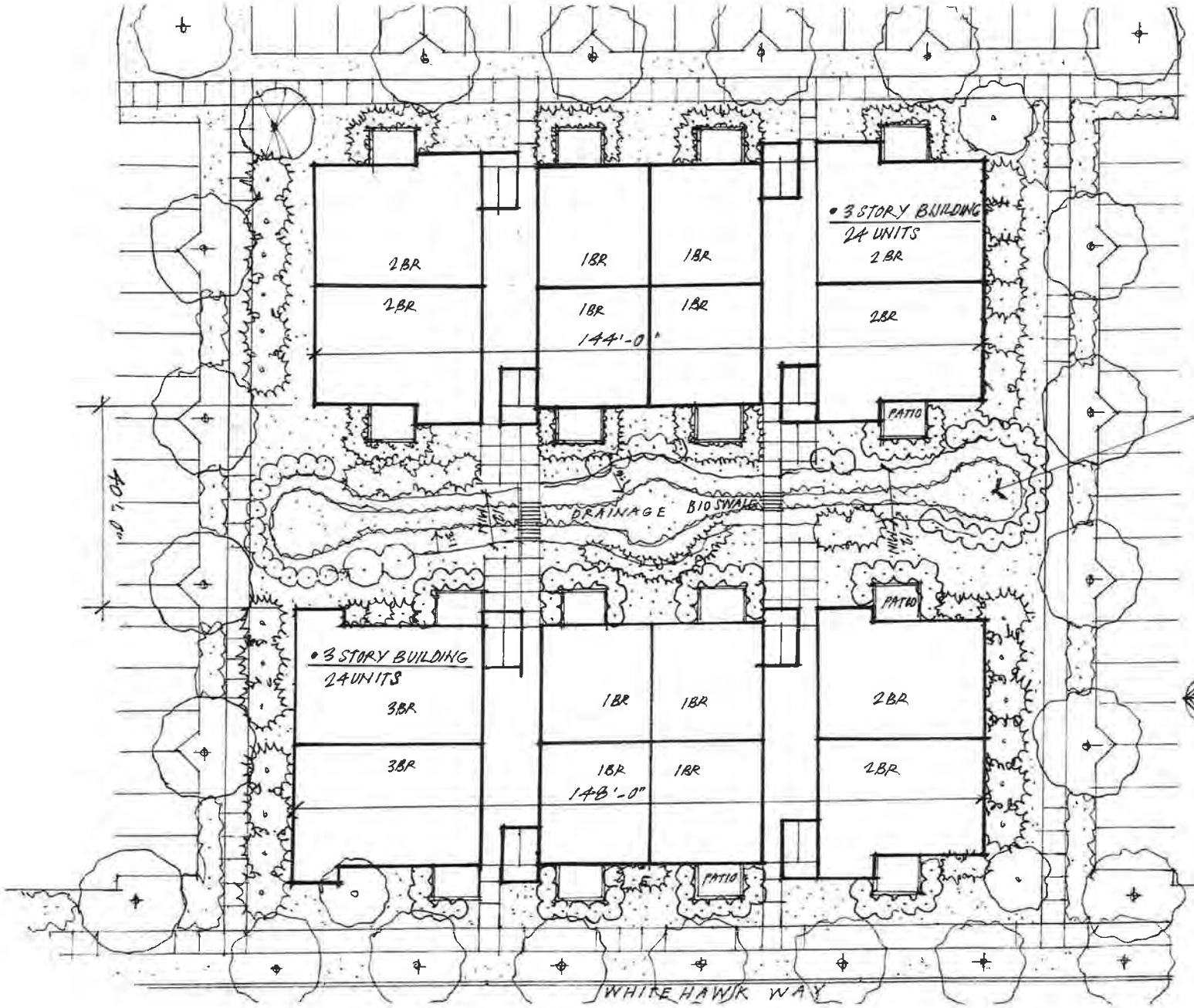


PROTOTYPE
BUILDING PLAN · 3STY · 24 UNITS · WHITE HAWK
1" = 10'

TAHRAN ARCHITECTURE & PLANNING LLC
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net



• DRAINAGE BIOSWALE 18" DEPRESSION WITH 3:1 SLOPES, PLANTED WITH NATIVE PLANTS MIN. 1150SF AREA PER BUILDING

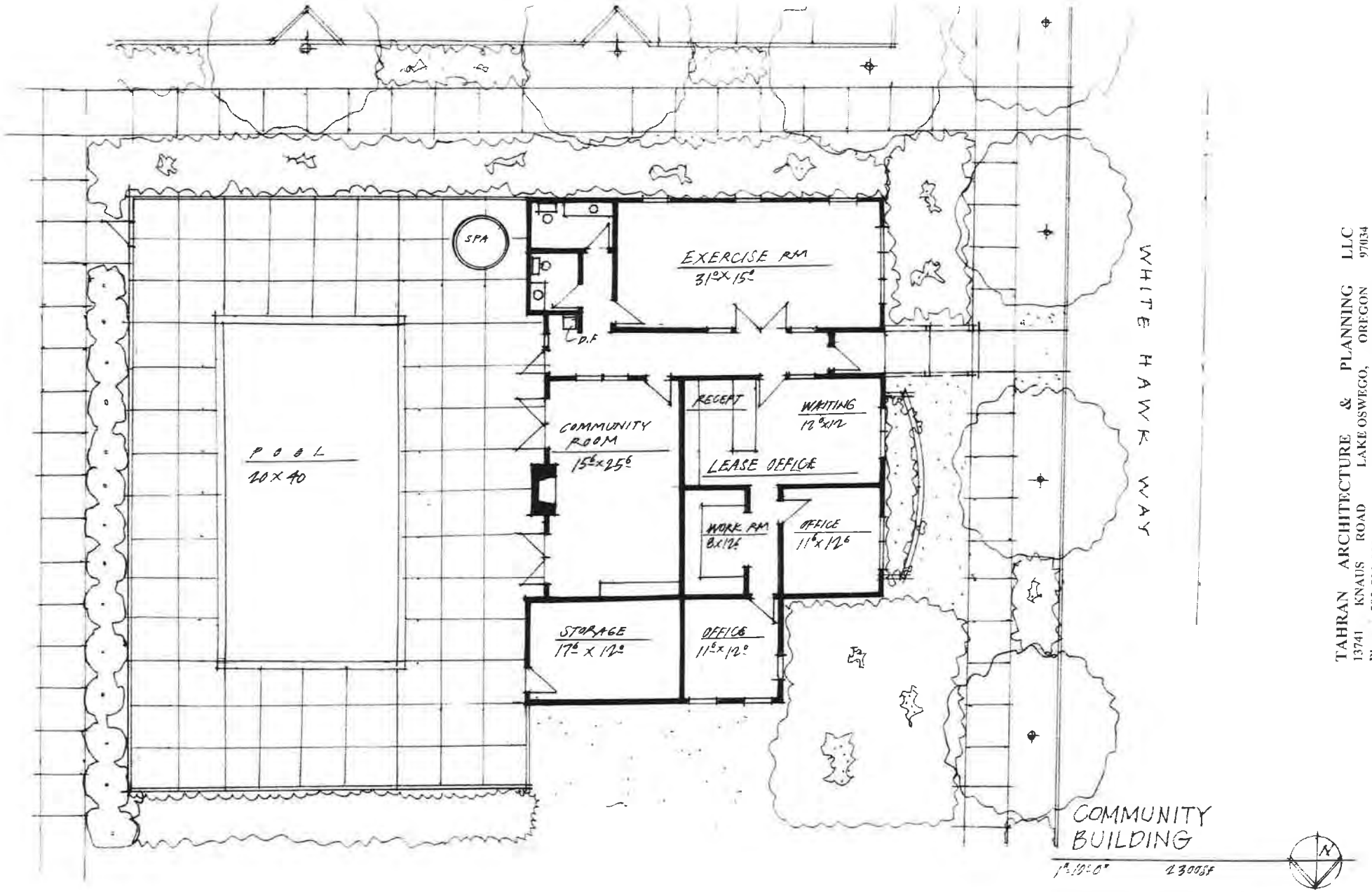
APARTMENT PROTOTYPE COURTYARD

1" = 20'-0"

REGISTERED ARCHITECT
RALPH G. TAHRAN
PORTLAND, OREGON
2399
STATE OF OREGON

TAHRAN ARCHITECTURE & PLANNING LLC
13741 KNAUS ROAD LAKE OSWEGO, OREGON 97034
Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net

EXHIBIT "12"



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Phone: 503-539-8802 Fax: 503-697-1958 ralphtahran@comcast.net

Attachment "D"

Master Plan Appendices

White Hawk Development

Traffic Impact Analysis

July 20, 2014

Prepared By:

Transportation Engineering, LLC

Southern Oregon Transportation Engineering, LLC

White Hawk Development

Traffic Impact Analysis

July 20, 2014

Prepared By:

Southern Oregon Transportation Engineering, LLC

TABLE OF CONTENTS

LIST OF TABLES

FIGURES

APPENDICES

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I. EXECUTIVE SUMMARY

Summary

Southern Oregon Transportation Engineering, LLC prepared a traffic impact analysis for the proposed White Hawk development in Central Point, Oregon. The development includes 288 apartments, 58 duplex/rowhouses, and an approximate 5.5 acre city park located on the northeast corner of Beebe Road and Gebhard Road on Township 37S Range 2W Section 02, tax lots 2700 and 2701.

Access to the site is provided from both Beebe Road and Gebhard Road. The development is estimated to generate 2,274 average daily trips (ADT) with 218 occurring during the p.m. peak hour. Three study area intersections were evaluated under existing year 2014, design year 2017, and future year 2038 conditions to determine what impacts the proposed development may have on the transportation system.

Conclusions

The findings of the traffic impact analysis conclude that the proposed White Hawk development can be accommodated on the existing transportation system without creating adverse impacts with proposed mitigations. Results of the analysis show the following:

1. All study area intersections operate acceptably under existing year 2014 and design year 2017 no-build conditions during the p.m. peak hour. The intersection of Beebe Road / Hamrick Road degrades to a LOS F under design year 2017 build conditions as a result of development traffic. Proposed mitigation includes:

    a) Installation of a traffic signal. The proportional share of impact is approximately 11% of mitigation costs (based upon a volume-based impact analysis) without a Beebe Road east-west connection and 5% with a Beebe Road connection. The difference in impact results from less project traffic using the Beebe Road/Hamrick Road connection when the Beebe Road extension is in place.

2. Left and right turn lanes are not shown to be necessary at any development access point under design year 2017 build conditions. Turn lanes are met in the future at the following locations:

    a) A left turn lane at both Gebhard Road development access points and Beebe Road access point under future year 2038 build conditions.

    b) A right turn lane at the Gebhard Road south development access point under projected year 2038 build conditions if the speed continues to stay 55 mph. If the speed is reduced to 40 mph as would be expected then a right turn lane will not be met in the future scenario.

3. The estimated average daily traffic (ADT) for the proposed White Hawk development is 2,274 ADT, which is within the Eastside Transit Oriented Development District (ETOD) trip cap of 6,100 ADT. To date this is the first development application within the TOD.

The proposed development application is in compliance with the Central Point Comprehensive Plan and Land Development Code. Streets that serve the subject property will accommodate projected p.m. peak hour traffic volumes within acceptable levels of service with identified improvements.

II. INTRODUCTION

Background

Southern Oregon Transportation Engineering, LLC prepared a traffic impact analysis for the proposed White Hawk development in Central Point, Oregon. The purpose of this analysis is to identify any traffic related impacts the proposed development may have on the transportation system.

A traffic impact analysis is required by the City of Central Point and Jackson County to address development impacts within the study area. Study area intersections included:

1. East Pine Street / Hamrick Road
2. Beebe Road / Hamrick Road
3. Gebhard Road / Wilson Road

Access to the site is provided from Beebe Road and Gebhard Road. Proposed development is estimated to generate 2,274 average daily trips (ADT) with 218 occurring during the p.m. peak hour. Study area intersections were evaluated under existing year 2014, design year 2017, and future year 2038 conditions to determine development impacts on the transportation system.

Project Location

The subject property is located on the northeast corner of Beebe Road and Gebhard Road on Township 37S Range 2W Section 2, tax lots 2700 and 2701 in Central Point, Oregon. Refer to Figures 1 and 2 for a vicinity map and site plan.

Project Description

The subject property is zoned for medium density residential development and is currently vacant. Proposed development includes 288 apartments, 58 duplex/rowhouses, and an approximate 5.5 acre city park. Access to the site is provided from a single access on Beebe Road and two access points on Gebhard Road.

Figure 1 : Vicinity Map

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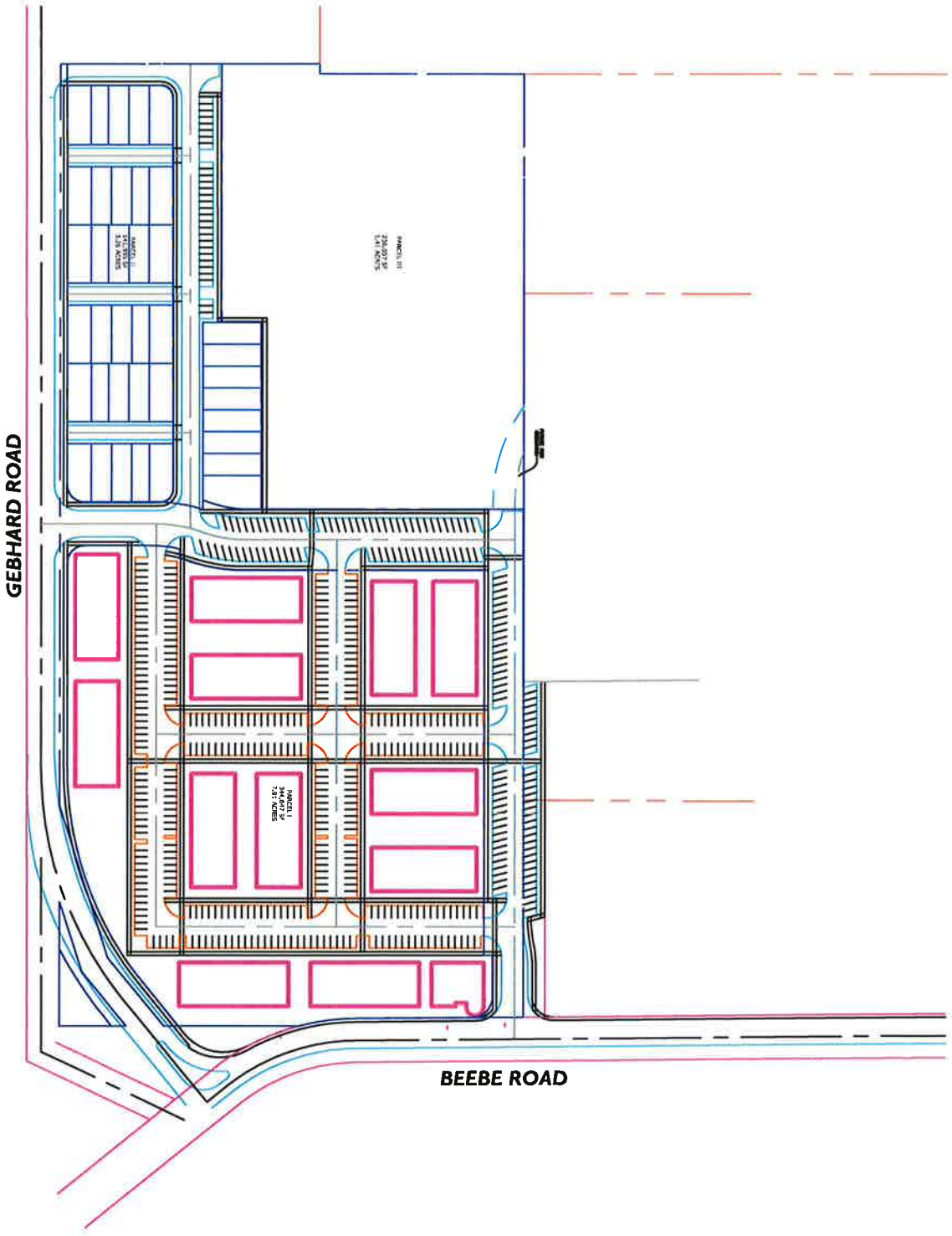
White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

Figure 2 : Site Plan



NOT TO SCALE

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White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

III. EXISTING YEAR 2014 NO-BUILD CONDITIONS

Site Conditions

The subject property is located on the northeast corner of Beebe Road and Gebhard Road on Township 37S Range 2W Section 02, tax lots 2700 and 2701 in Central Point, Oregon. The site is currently vacant.

Roadway Characteristics

The project study area was determined by the City of Central Point and Jackson County and includes the intersections of Beebe Road/Hamrick Road, Gebhard Road/Wilson Road, and East Pine Street/Hamrick Road. All access points to the site were also included in the study area, and included one on Beebe Road and two on Gebhard Road. Study area intersections were analyzed in accordance with City of Central Point and Jackson County standards.

Table 1 provides a summary of existing roadway classifications and descriptions in the study area.

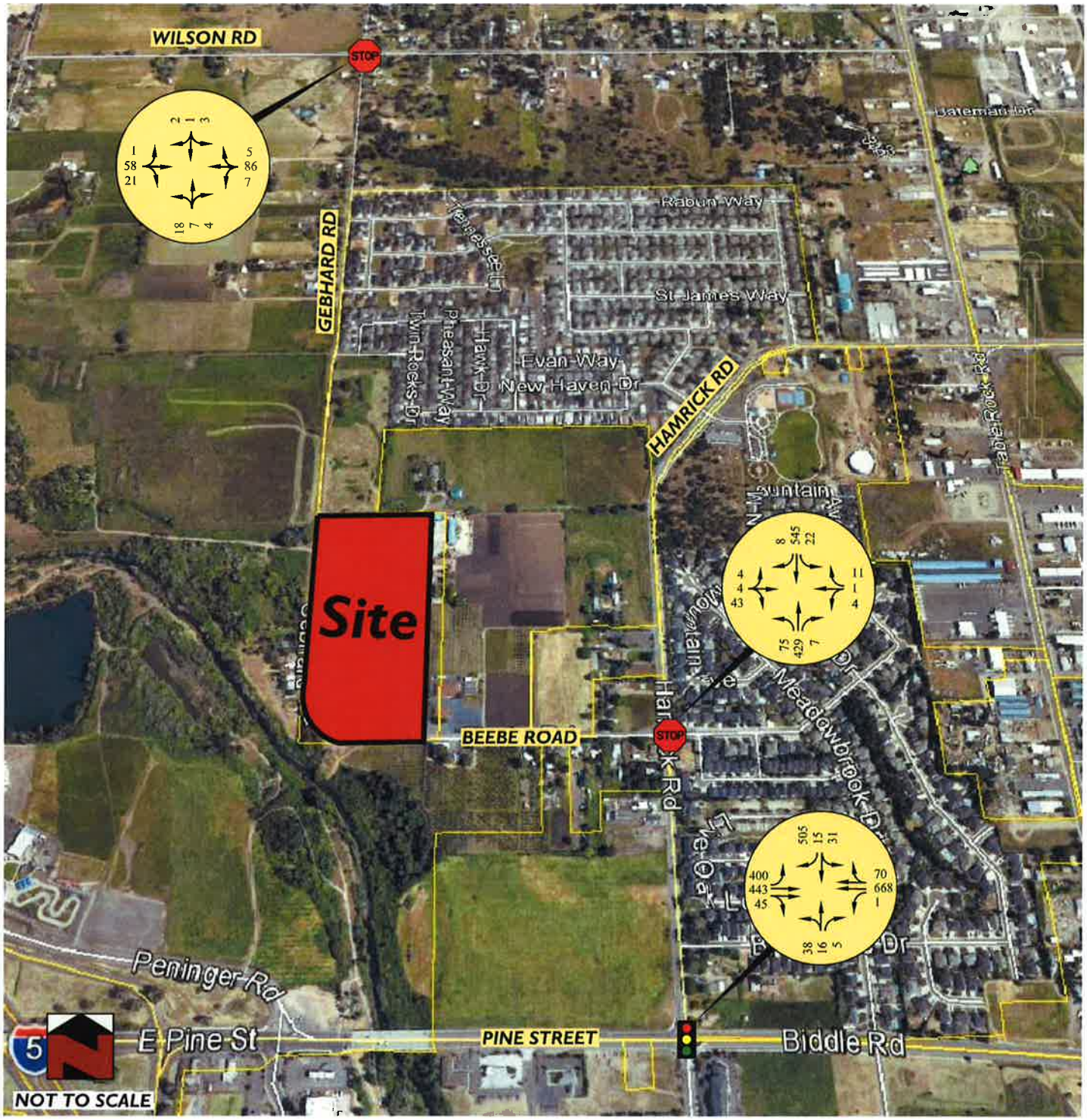
Table 1 - Roadway Classifications and Descriptions

Roadway	Jurisdiction	Functional Classification	Lanes	Operational Standard	Posted Speed (MPH)
Beebe Road	City of Central Point	Collector	2	LOS D V/C 0.95	40
East Pine Street	Jackson County	Arterial	5	LOS D V/C 0.85	35/45
Gebhard Road	Jackson County	Collector	2	LOS D V/C 0.95	40/55
Hamrick Road	Jackson County	Arterial	3	LOS D V/C 0.95	40
Wilson Road	Jackson County	Collector	2	LOS D V/C 0.95	45

Traffic Counts

Year 2014 manual traffic counts (4-6pm) were supplied by Southern Oregon Transportation Engineering, LLC for all study area intersections. Counts were taken in late April and early May, and seasonally adjusted using ODOT's 2013 Seasonal Trend Table. An average of commuter/summer traffic trends were used to adjust raw count data to reflect 30th Highest Hourly Volumes. Refer to Appendix A for data.

Figure 3 : Year 2014 Raw Count Data - P.M. Peak Hour



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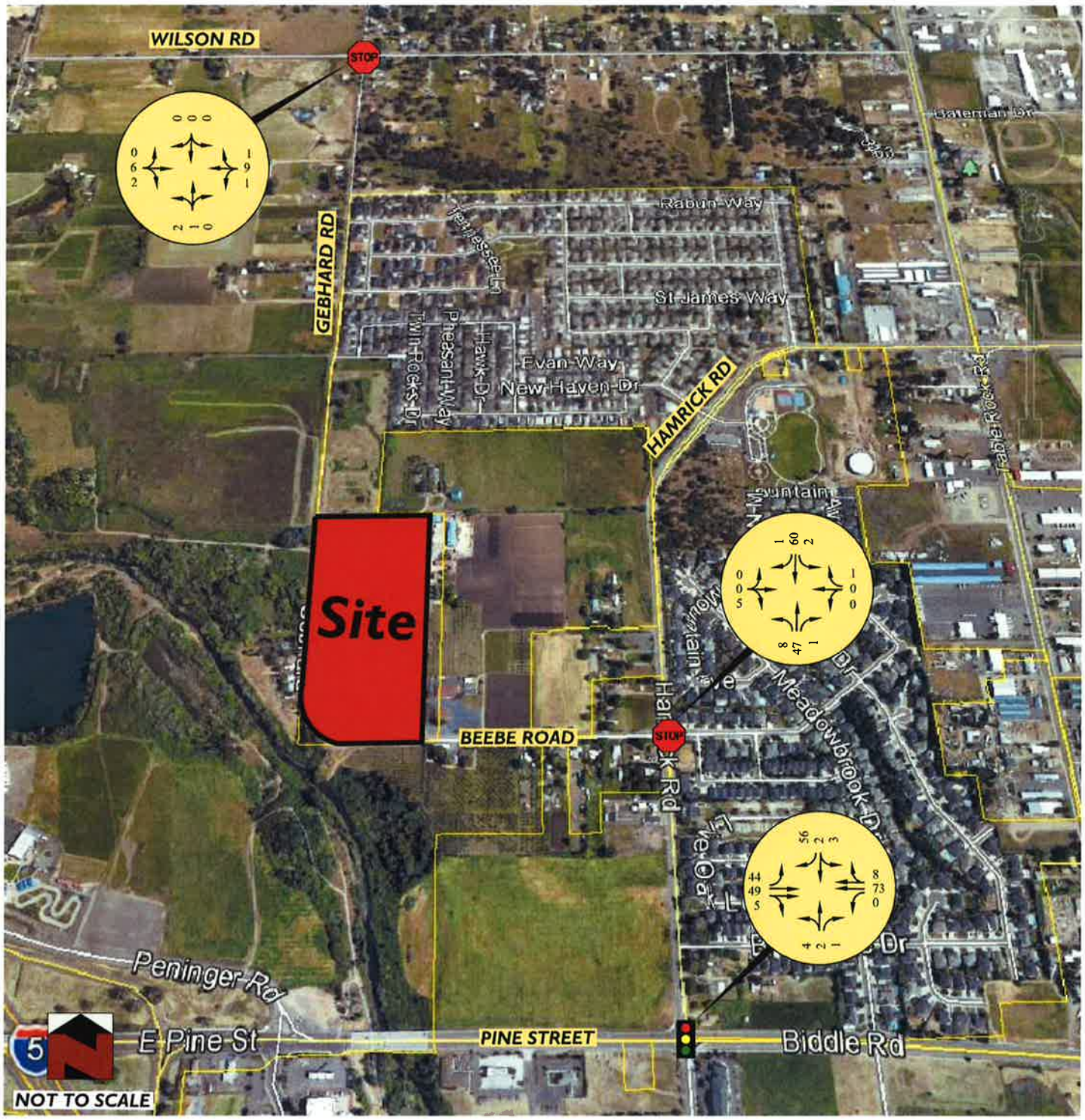
White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

Figure 4 : Seasonal Adjustment, PM Peak Hour



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White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

Figure 5 : Year 2014 No-Build Traffic Volumes, PM Peak Hour

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White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

Intersection Capacity and Level of Service

Intersection capacity calculations were conducted utilizing the methodologies presented in the Year 2000 *Highway Capacity Manual*. Capacity and level of service calculations for signalized and unsignalized intersections were prepared using "SYNCHRO" timing software.

Level of service quantifies the degree of comfort afforded to drivers as they travel through an intersection or along a roadway section. The level of service methodology was developed to quantify the quality of service of transportation facilities. Level of service is based on total delay, defined as the total elapsed time from when a vehicle stops at the end of a queue until the vehicle departs from the stop line. Level of service ranges from "A" to "F", with "A" indicating the most desirable condition and "F" indicating an unsatisfactory condition. The HCM LOS designations for stop-controlled intersections are provided in Table 2. The HCM LOS designations for signalized intersections are provided in Table 3.

Table 2 – HCM Level of Service Designations for Stop-Controlled Intersections

Level of Service	Delay Range
A	< 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F	> 50

Table 3 – HCM Level of Service Designations for Signalized Intersections

Level of Service	Delay Range
A	< 10
B	>10 – 20
C	>20 – 35
D	>35 – 55
E	>55 – 80
F	> 80

Streets within the study area are under City of Central Point and Jackson County jurisdiction. The City of Central Point requires all study area intersections to operate at acceptable levels of service (LOS). The minimum acceptable level of service for signalized intersections and unsignalized intersection movements is LOS "D". Jackson County's operational standard considers both a LOS and volume-to-capacity (V/C) ratio standard. Mitigation is required at intersections operating below LOS "D" and/or the applicable v/c ratio under existing and design year conditions. For future planning year conditions, mitigation is required when build conditions are shown to be worse than no-build conditions, which is in accordance with criteria provided in the Transportation Planning Rule (TPR) 660-012-0060 (1)(C).

Year 2014 No-Build Intersection Operations

Study area intersections were evaluated under existing year 2014 no-build conditions during the p.m. peak hour. Results are summarized in Table 4.

Table 4 - Year 2014 No-Build Intersection Operations

Intersection	Performance Standard	Traffic Control	Year 2014 No-Build P.M. Peak
East Pine Street / Hamrick Road	LOS D V/C 0.95	Signal	C 0.80
Beebe Road / Hamrick Road	LOS D	TWSC	C
Gebhard Road / Wilson Road	LOS D V/C 0.95	TWSC	B 0.06

LOS = Level of Service, V/C = Volume-to-Capacity, TWSC = Two-way stop controlled
Note: Exceeded performance standards are shown in bold, italic

Results of the analysis show all study area intersections operating acceptably (within performance standards) under year 2014 no-build conditions. Refer to Appendix C for synchro output sheets.

Year 2014 No-Build 95th Percentile Queuing

Queuing is the stacking up of vehicles for a given lane movement, and it can have a significant effect on roadway safety and the overall operation of a transportation system. Long queue lengths in through lanes can block access to turn lanes, driveways, and minor street approaches, as well as spill back into upstream intersections. As a result of this, the estimation of queue lengths is an important aspect of the analysis process for determining how a transportation corridor operates.

Queue lengths are reported as the average, maximum, or 95th percentile queue length. The 95th percentile queue length is used for design purposes and is the queue length reported in this analysis. Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths. Queues were evaluated at study area intersections under existing year 2014 no-build conditions. Queue lengths were rounded up to the nearest 25 feet (single vehicle length) and reported in Table 5 for the p.m. peak hour if shown to exceed their available link distance or block a downstream intersection.

Table 5 – Year 2014 No-Build 95th Percentile Queue Lengths			
Intersection / Movement	**Available Link Distance (Ft)**	**95th Percentile Queue Lengths P.M. Peak Hour**	**Exceeded or Blocked Roadway**
East Pine Street / Hamrick Road			
Southbound Right	200'	***275'***	Right Turn Storage

Note: Exceeded performance standards are shown in bold, italic

Results of the queuing analysis show that the southbound right turn pocket is exceeded under existing year 2014 no-build conditions during the p.m. peak hour. The queue length from the right turn movement is estimated to exceed the turn pocket and spill into the adjacent through lane 3% of the time during the pm peak hour and increase the queue length for the through lane. The adjacent through lane was not shown to block any downstream driveways or intersections as a result of the exceeded right turn lane, which would be the primary concern, so no mitigation is shown to be necessary. Refer to Appendix C for a full queuing and blocking report.

Crash History

Crash data for the most recent 3-year period was provided from Jackson County as well as ODOT's crash analysis unit. Results were provided for the period of October 1, 2010 through September 30th, 2013.

Intersection safety is generally evaluated by determining the crash rate in terms of crashes per Million Entering Vehicles (MEV) at intersections. The details of crash data are examined to identify any patterns that could be attributable to geometric or operational deficiencies. A crash rate higher than 1.0 crash/MEV or trends of a specific type of crash may indicate the need for further investigation at an intersection. Tables 6 and 7 provide intersection crash rates and types of collisions at study area intersections. Crash data is provided in Appendix A.

Table 6 - Study Area Intersection Crash Rates, 2010-2013						
Intersection	**2010-2011**	**2011-2012**	**2012-2013**	**Total Crashes**	**ADT**	**Crash Rate**
East Pine / Hamrick	2	1	3	6	37,700	0.15
Beebe / Hamrick	1	3	0	4	16,000	0.23
Gebhard / Wilson	0	2	1	3	2,900	0.94
Gebhard / Beebe	0	1	0	1	1,600	0.57

Table 7 - Crash History by Type, 2010-2013							
Intersection	**Collision Type**				**Severity**		
	Rear-End	**Turning**	**Head-On**	**Pedestrian/ Bicyclist**	**Non-Injury**	**Injury**	**Fatal**
East Pine / Hamrick	0	6	0	0	4	2	0
Beebe / Hamrick	1	2	0	1	2	2	0
Gebhard / Wilson	0	2	1	0	1	2	0
Gebhard / Beebe	0	1	0	0	0	0	1

None of the study area intersections are shown to have crash rates greater than 1.0 crashes/MEV. The intersection with the highest occurrence was the signalized intersection of East Pine Street / Hamrick Road with 6 reported crashes in a three year period. All six were turning collisions with drivers failing to yield to on-coming vehicles. These types of collisions are common with permissive turning movements. The most critical crash occurred where Beebe Road turns 90 degrees and becomes Gebhard Road. At this location, a fatal collision occurred in 2012 when a motorcycle overshot the turn and was hit by an on-coming vehicle. It was determined that the driver of the motorcycle was speeding too fast for the curve and was at fault. No other locations were shown to have fatalities or any significant pattern of crashes involving injury.

The only safety concern determined from the crash analysis is the severity of the crash at Beebe Road and Gebhard Road. Possible measures to reduce this type of collision in the future include ensuring adequate signage is in place to let a driver know that a 90 degree turn is up ahead, changing the severity of the curve, and/or possibly examining a speed reduction on Gebhard Road where it changes from 40 mph to 55 mph. From a field visit, it looked like the curve may have been widened and fencing installed on the southern end of the intersection, as well as a large shoulder constructed. All or some of these improvements may have already mitigated the curve. As land along Gebhard Road and Beebe develops, it is recommended that the speed on Gebhard Road be re-evaluated to ensure that what currently exists is still appropriate.

85th Percentile Speed

Speeds were measured on Gebhard Road near the northern boundary of the proposed site and on Beebe Road near the eastern boundary to determine 85th percentile speeds. The 85th percentile speed represents the speed at which 85% of vehicles drive at or below, and is used to determine adequate sight distances from development access points, which is discussed further in chapter IV of this report.

Results of the speed study for existing conditions showed the 85th percentile speed on Gebhard Road to be 46 mph northbound and 49 mph southbound, which are less than the 55 mph speed permitted. On Beebe Road the 85th percentile speed was measured to be 44 mph westbound and 45 mph eastbound, both of which exceed the posted speed of 40 mph. Speed data sheets are provided in Appendix I.

IV. DESIGN YEAR 2017 NO-BUILD CONDITIONS

Year 2017 No-Build Description

Design year 2017 no-build conditions represent development build year conditions for a study area without consideration of proposed development trips. This condition is evaluated to determine how a study area will be impacted by area background growth. Background growth in this report was kept consistent with growth used in the I-5 Exit 33 Interchange Area Management Plan (IAMP) prepared by David Evans & Associates. Growth from the IAMP was developed using model runs provided by ODOT's Transportation Planning Analysis Unit (TPAU). Refer to Figure 5 for estimated growth between the existing year 2014 and design year 2017. Refer to Figure 6 for design year 2017 no-build traffic volumes.

Year 2017 No-Build Intersection Operations

Study area intersections were evaluated under design year 2017 no-build conditions during the p.m. peak hour. Results are summarized in Table 8.

Table 8 – Design Year 2017 No-Build Intersection Operations

Intersection	Performance Standard	Traffic Control	Year 2017 No-Build P.M. Peak
East Pine Street / Hamrick Road	LOS D V/C 0.95	Signal	D 0.87
Beebe Road / Hamrick Road	LOS D	TWSC	D
Gebhard Road / Wilson Road	LOS D V/C 0.95	TWSC	B 0.06

LOS = Level of Service, V/C = Volume-to-Capacity, TWSC = Two-way stop controlled
Note: Exceeded performance standards are shown in bold, italic

Results of the analysis show all study area intersections operating acceptably (within performance standards) under year 2017 no-build conditions. Refer to Appendix D for synchro output sheets.

Year 2017 No-Build 95th Percentile Queuing

Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths at study area intersections under design year 2017 no-build conditions. Queue lengths were rounded up to the nearest 25 feet (single vehicle length) and reported in Table 9 for the p.m. peak hour if shown to exceed their available link distance or block a downstream intersection.

Table 9 – Design Year 2017 No-Build 95th Percentile Queue Lengths

Intersection / Movement	Available Link Distance (Ft)	95th Percentile Queue Lengths P.M. Peak Hour	Exceeded or Blocked Roadway
East Pine Street / Hamrick Road			
Southbound Right	200'	***325'***	Right Turn Storage

Note: Exceeded performance standards are shown in bold, italic

Results of the queuing analysis show that the southbound right turn pocket continues to be exceeded under design year 2017 no-build conditions during the p.m. peak hour. The queue length from the right turn movement is estimated to exceed the turn pocket and spill into the adjacent through lane 7% of the time during the pm peak hour and increase the queue length for the through lane. No other lengths are shown to be exceeded at study area intersections. Refer to Appendix E for a full queuing and blocking report.

Figure 6 : Background Growth Year 2014-2017, PM Peak Hour

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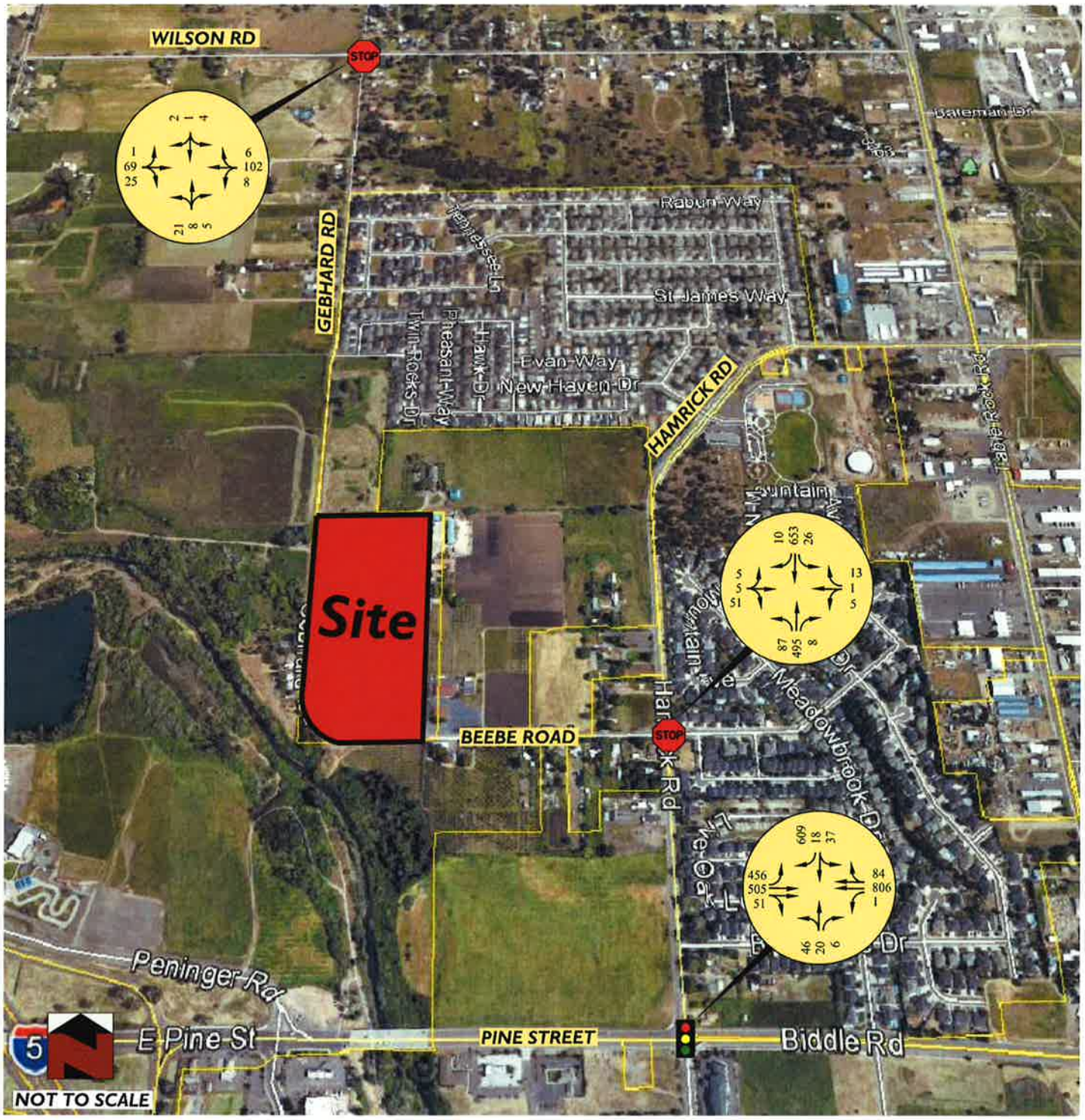
White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

Figure 7 : Design Year 2017 No-Build Traffic Volumes, PM Peak Hour



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White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

V. SITE TRAFFIC

Trip Generation

Trip generation calculations for the proposed White Hawk development were prepared utilizing the Institute of Transportation Engineers (ITE) *Trip Generation*, 9th Edition. Rates were used for land use code 220 – Apartment, 230 – Townhouse/Condominium, and 411 – City Park. All trips to the transportation system were considered new trips with no deductions taken for pass-by or internalization. Table 10 provides a summary of trip generations. ITE graphs are provided in Appendix I.

Table 10 – Development Trip Generations

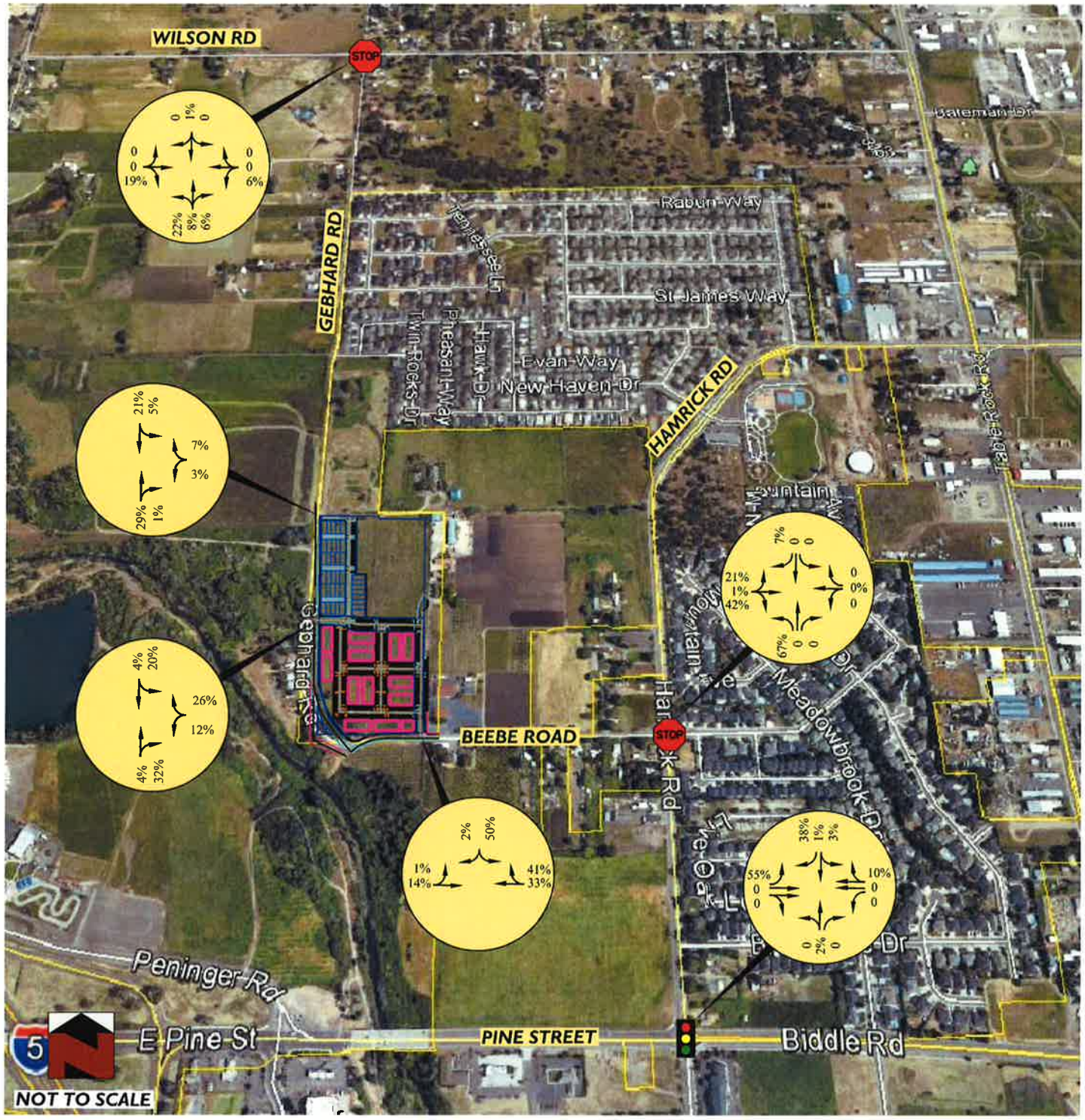
Land Use	Unit	Size	Weekday Rate	PM Peak Rate	Weekday Trips	PM Peak Hour				
					Total	Total	% In	In	% Out	Out
Apartments	DU	288	6.65	0.62	1915	179	0.65	116	0.35	62
Duplex/Rowhouse	DU	38	5.81	0.52	221	20	0.67	13	0.33	7
City Park	Acre	5.5	25.09*	3.50	138	19	0.57	11	0.43	8
Total					**2,274**	**218**		**140**		**77**

* Interpolated from ITE graph
DU – dwelling unit

Trip Distribution and Assignment

Development trips were distributed in accordance with existing traffic patterns within the study area. Roadway volumes were compared in the local project vicinity to estimate the percentage of trips going to and coming from Beebe Road and Gebhard Road. This resulted in 36% of project traffic going to the north on Gebhard Road and 64% going to the east on Beebe Road. Similarly, 26% were shown to come from the north on Gebhard Road and 74% from the east on Beebe Road. At study area intersections, development trips were distributed using existing traffic splits. Refer to Figures 8 and 9 for development trip distributions and assignments during the p.m. peak hour.

Figure 8 : White Hawk Development Trip Distributions, PM Peak Hour



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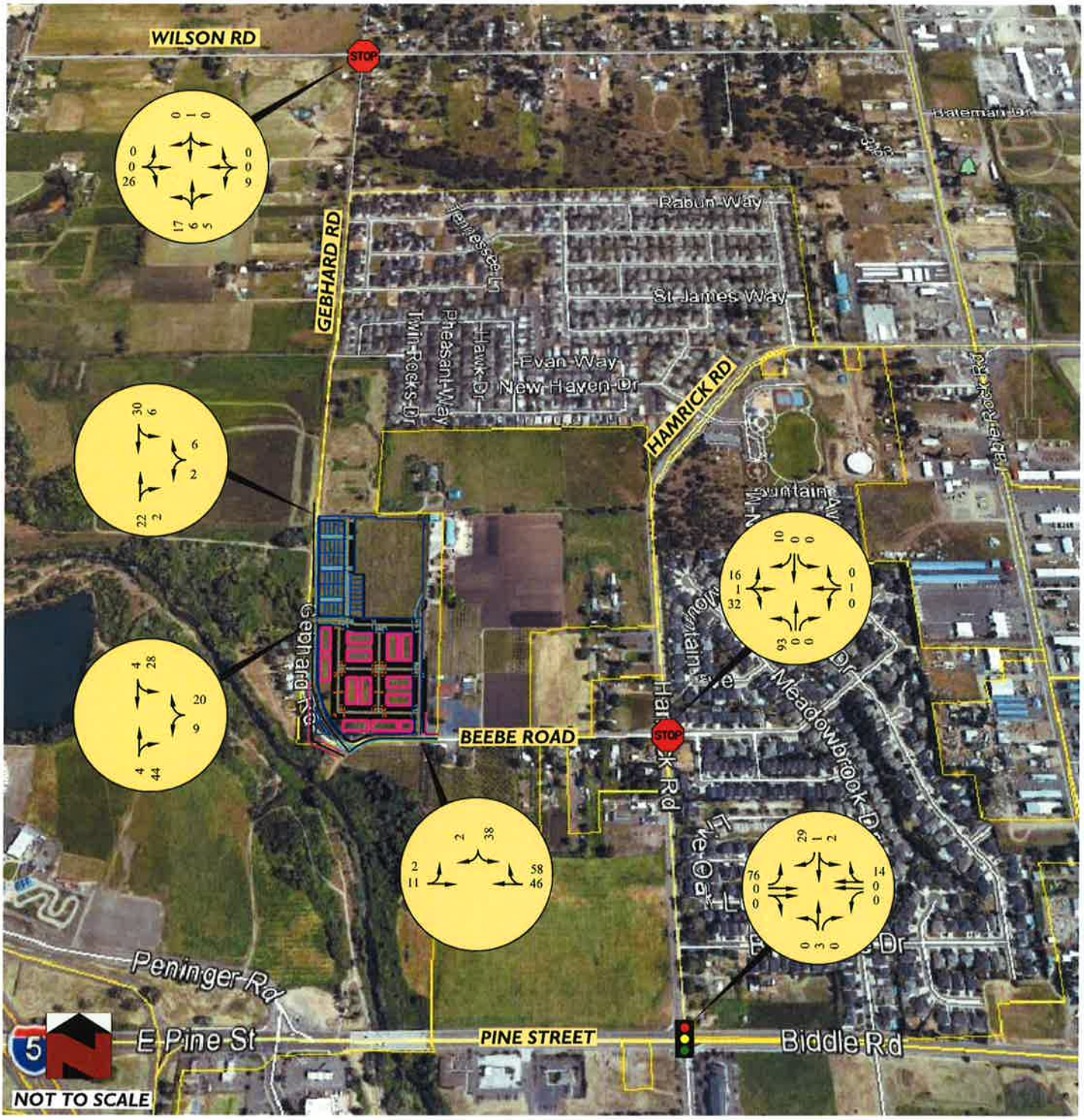
White Hawk Development

Traffic Impact Analysis

Central Point, Oregon

Figure 9 : White Hawk Development Trips, PM Peak Hour



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VI. DESIGN YEAR 2017 BUILD CONDITIONS

Year 2017 Build Description

Build conditions represent no build conditions for a study area with the addition of proposed development trips considered. Build conditions are compared to no-build conditions to determine what impacts and/or mitigation measures will result from proposed development.

Year 2017 Build Intersection Operations

Design year 2017 build traffic volumes were evaluated at study area intersections during the p.m. peak hour. Results are summarized in Table 11. Synchro output sheets are provided in Appendix D.

Table 11 – Design Year 2017 Build Intersection Operations

Intersection	Performance Standard	Traffic Control	Year 2017 No-Build P.M. Peak
East Pine Street / Hamrick Road	LOS D V/C 0.95	Signal	D 0.92
Beebe Road / Hamrick Road	LOS D	TWSC	***F***
Gebhard Road / Wilson Road	LOS D V/C 0.95	TWSC	B 0.06
Beebe Road / Project Access	NA	Stop-Controlled	B
Gebhard Road / South Access	NA	Stop-Controlled	A
Gebhard Road / North Access	NA	Stop-Controlled	A

LOS = Level of Service, V/C = Volume-to-Capacity, TWSC = Two-way stop controlled
Note: Exceeded performance standards are shown in bold, italic

The intersection of Beebe Road/Hamrick Road is the only study area intersection shown to exceed its operational performance standard in the design year 2017 with full build out of the proposed White Hawk development. Preliminary signal warrants are also shown to be met. Possible mitigations include construction of a traffic signal or roundabout. Results of these mitigations are provided in Table 12. Preliminary signal warrants are provided in Appendix I.

Table 12 – Design Year 2017 Build Intersection Operations with Mitigation

Intersection	Performance Standard	Year 2017 Build w/ Traffic Signal	Year 2017 Build w/ Roundabout
Beebe Road / Hamrick Road	LOS D	A	B

LOS = Level of Service, V/C = Volume-to-Capacity
Note: Exceeded performance standards are shown in bold, italic

The proportional share of impact is approximately 11% of mitigation costs based on a volume-based impact analysis. This reduces to 5% once Beebe Road is extended to the west. The trigger for when a traffic signal is necessary (in the estimated design year) is 107 p.m. development trips, which is shown to contribute 75 p.m. trips to the intersection of Beebe Road/Hamrick Road. A

possible development option within this threshold includes 38 duplex/rowhouse units and up to 140 apartments before mitigation is required.

Year 2017 Build 95th Percentile Queuing

Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths at study area intersections under design year 2017 build conditions. Queue lengths were rounded up to the nearest 25 feet (single vehicle length) and reported in Table 13 for the p.m. peak hour if shown to exceed their available link distance or block a downstream intersection.

Table 13 – Design Year 2017 Build 95th Percentile Queue Lengths

Intersection / Movement	Available Link Distance (Ft)	95th Percentile Queue Lengths P.M. Peak Hour	Exceeded or Blocked Roadway
East Pine Street / Hamrick Road			
Southbound Right	200'	***325'***	Right Turn Storage
Eastbound Left	400'	***450'***	Left Turn Storage

Note: Exceeded performance standards are shown in bold, italic

Results of the queuing analysis show that the southbound right turn pocket and the eastbound left turn pocket exceed their available storage lengths under design year 2017 build conditions during the p.m. peak hour. The queue length from the right turn movement is estimated to exceed the turn pocket and spill into the adjacent through lane 9% of the time while the eastbound left turn is estimated to exceed 4% of the time during the pm peak hour. Neither causes the adjacent through lane to block any downstream driveways or intersections as a result. The eastbound left turn queue length has a center two-way-left-turn-lane (TWLTL) that it can spill into. No other lengths are shown to be exceeded at study area intersections. Refer to Appendix E for a full queuing and blocking report.

Sight Distance

Access to the site is provided from a single access on Beebe Road and two proposed access points on Gebhard Road. All access points were evaluated in the field for adequate sight distance.

Sight distance is provided at intersections to allow drivers adequate time to perceive other vehicles approaching the intersection and react in time to avoid collisions. The driver of a vehicle approaching an intersection should have an unobstructed view of the entire intersection. Likewise, stopped vehicles at intersections should have a sufficient view of the intersecting roadway to decide when to enter or cross without colliding with on-coming vehicles. Minimum sight distances are provided by the American Association of State Highways and Transportation Officials (AASHTO) in what is referred to as the AASHTO handbook.

Departure sight triangles for were considered for two situations:

1. Case B1 – Left turns from the minor road or driveway
2. Case B2 – Right turns from the minor road or driveway

The length of the leg of the departure sight triangle along the major road for all stop-controlled movements is dependent upon the speed of the major roadway and perception-reaction times of drivers. The minimum stopping sight distance (SSD) represents the minimum sight distance required by ODOT and AASHTO. The intersection sight distance (ISD) is considered to be the

desirable sight distance by ODOT and AASHTO. The roadway speed used in analyses is either the design speed or the 85th percentile speed. The 85th percentile speed was measured to be 46 mph northbound and 49 mph southbound on Gebhard Road and 44 mph westbound and 45 mph eastbound on Beebe Road. The speed used for each sight distance analysis was 55 mph on Gebhard Road and 45 mph on Beebe Road to provide a conservative analysis.

From the access point on Beebe Road:

- The minimum SSD for a left, through or right turn movement is 360 feet.
- The desirable ISD for a left turn movement is 500 feet
- The desirable ISD for a right turn is 430 feet

Sight distance at the Beebe Road access point is unrestricted both to the east and west. There is a clear line of sight to the Hamrick Road intersection approximately 1200 feet to the east and to the Beebe/Gebhard curve which is approximately 600 feet to the west. The minimum SSD and desirable ISD are both met at this location.

From the access points on Gebhard Road:

- The minimum SSD for a left, through or right turn movement is 495 feet.
- The desirable ISD for a left turn movement is 610 feet
- The desirable ISD for a right turn or crossing maneuver is 530 feet

Sight distance from the proposed Gebhard Road access points is also unrestricted in both directions. The southern access point has clear line of sight to the Beebe/Gebhard curve approximately 700 feet to the south. The northern access point has clear line of sight to the Beebe/Gebhard curve approximately 1300 feet to the south. Both accesses have more than the required clear line of sight to the north. The minimum SSD and desirable ISD are both met at these locations. Refer to Appendix I for sight distance tables.

Year 2017 Turn Lane Criterion

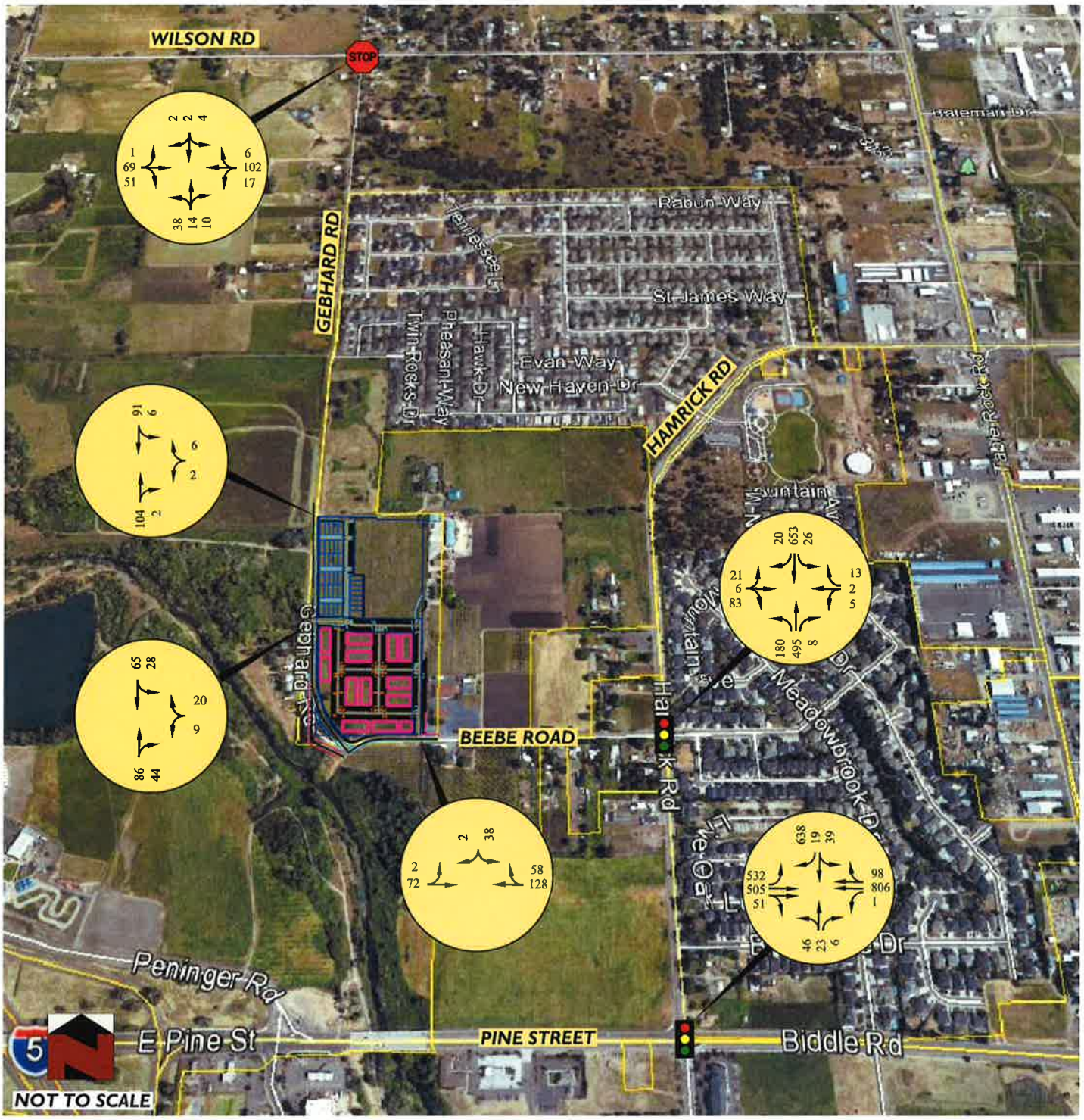
Left Turn Lane

Left turn lane criterion was evaluated on Beebe Road and Gebhard Road at the development access points during the PM peak hour to determine whether left turn lane criterion is met under design year 2017 build conditions. Results of the analysis show that criterion is not met for a southbound left turn lane at either Gebhard Road access or for an eastbound left turn lane at the Beebe Road access in the design year 2017. Refer to Appendix H for left turn lane graphs.

Right Turn Lane

Right turn lane criterion was evaluated on Beebe Road and Gebhard Road at the development access points during the PM peak hour to determine whether right turn lane criterion is met under design year 2017 build conditions. Results of the analysis show that criterion is not met for a northbound right turn lane on Gebhard Road at either access or for a westbound right turn lane on Beebe Road. Refer to Appendix H for right turn lane graphs.

Figure 10 : Design Year 2017 Build, PM Peak Hour



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VII. FUTURE YEAR 2038 NO-BUILD AND BUILD CONDITIONS

Future Year 2038 No-Build Description

Future year 2038 no-build conditions represent future planning year conditions for a study area without consideration of proposed development trips. This condition is evaluated to determine how a study area will be impacted by future background growth. Background growth in this report was assumed to be consistent with Exit 33 IAMP assumptions, which are currently in draft form but will eventually will be finalized and adopted by the City of Central Point. Estimated growth on Hamrick Road was used to develop growth for Beebe Road and Gebhard Road. Refer to Figure 11 for estimated growth between the design year 2017 and future year 2038.

Future Year 2038 Build Description

Future year 2038 build conditions represent future conditions for a study area with background growth and proposed development trips considered. Build conditions are compared to no-build conditions to determine what kind of impacts and/or mitigation measures will result from proposed development under future conditions. Future conditions are evaluated in this analysis for the Transportation System Plan (TSP) horizon year of 2038, which also meets Transportation Planning Rule (TPR) criteria for the planning period of twenty years from adoption of a TSP. Refer to Figures 12 and 14 for future year 2038 no-build and build traffic volumes during the p.m. peak hours. Figure 13 shows re-routed development trips with an east-west Beebe Road extension to Peninger Road in place.

Future Year 2038 No-Build and Build Intersection Operations

Future year 2038 no-build and build traffic volumes were evaluated at study area intersections under p.m. peak hour conditions. No-build and build intersection operations were derived using the I-5 Exit 33 IAMP and East Pine Street Study. Projected future 2038 traffic volumes for the preferred concept alternative were used at the signalized intersections of Peninger Road/East Pine Street and Hamrick Road/East Pine Street, and traffic volumes for the intersection of Beebe Road/Hamrick Road were derived based on traffic projections and distributions from the East Pine Street Study. Remaining study area intersections were balanced with these intersections. Results for all intersections are summarized in Table 14.

Table 14 – Future Year 2038 No-Build and Build Intersection Operations

Intersection	Performance Standard	Traffic Control	Future Year 2038 No-Build P.M. Peak	Future Year 2038 Build P.M. Peak
East Pine Street / Hamrick Road	LOS D V/C 0.95	Signal	C 0.84**	D 0.85**
Beebe Road / Hamrick Road	LOS D	Signal	B*	
Gebhard Road / Wilson Road	LOS D V/C 0.95	TWSC	B 0.30	C 0.38

LOS = Level of Service, V/C = Volume-to-Capacity, TWSC = Two-way stop controlled
Note: Exceeded performance standards are shown in bold
* Includes traffic signal mitigation
** Includes IAMP Improvements within preferred concept scenario
***Includes minimum single lane approaches with shared movements

Table 14 Continued – Future Year 2038 No-Build and Build Intersection Operations				
Intersection	**Performance Standard**	**Traffic Control**	**Future Year 2038 No-Build P.M. Peak**	**Future year 2038 Build P.M. Peak**
Beebe Road / Project Access	NA	Stop-Controlled	--	B
Gebhard Road / South Access	NA	Stop-Controlled	--	B
Gebhard Road / North Access	NA	Stop-Controlled	--	B
Beebe Road / Gebhard Road	LOS D V/C 0.95	Stop-Controlled	C***	C***

LOS = Level of Service, V/C = Volume-to-Capacity, TWSC = Two-way stop controlled
Note: Exceeded performance standards are shown in bold
* Includes traffic signal mitigation
** Includes IAMP Improvements within preferred concept scenario
***Includes minimum single lane approaches with shared movements

With preferred concept improvements in the future year 2038 scenario, all study area intersections are shown to operate acceptably. Minimum lane configurations were used at the future Gebhard Road/Beebe Road intersection as well as at the Beebe Road/Hamrick Road intersection to evaluate worst case conditions, but the intersections would likely operate more efficiently with some additional lanes. Further evaluation should be considered once some unknowns for the area regarding development growth and more precise traffic splits are known. Synchro output sheets are provided in Appendix F.

Future Year 2038 No-Build and Build 95th Percentile Queuing

Study area queuing was evaluated under future year 2038 no-build and build conditions. Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths. Queue lengths were then rounded up to the nearest 25 feet (single vehicle length) and reported in Table 15 for the p.m. peak hour if exceeded or shown to block downstream intersections. A full queuing and blocking report is provided in Appendix G.

Table 15 – Future Year 2038 No-Build and Build 95th Percentile Queue Lengths				
Intersection Movement	**Available Link Distance (Feet)**	**95th Percentile Queue Lengths No-Build P.M. Peak Hour**	**95th Percentile Queue Lengths Build P.M. Peak Hour**	**Exceeded or Blocked Roadway**
East Pine / Hamrick Road				
Southbound Right	200'	***325'***	***350'***	Right Turn Storage
Eastbound Left	400'	***475'***	***575'***	Left Turn Storage
Beebe Road / Hamrick Road				
Southbound Right Flair	50'	***125'***	***125'***	Right Turn Storage

Note: Exceeded performance standards are shown in bold, italic

Results of the queuing analysis show that the southbound right turn pocket and the eastbound left turn pocket at the signalized intersection of East Pine / Hamrick Road continue to exceed their available storage lengths under future year 2038 build conditions even with preferred concept improvements during the p.m. peak hour. The queue length from the right turn movement is estimated to exceed the turn pocket and spill into the adjacent through lane 15% of the time while the eastbound left turns are estimated to exceed 20% of the time under build conditions during the pm peak hour. Depending upon development along East Pine Street, consideration should be

given in the future to re-striping and extending the turn pocket, but this would likely be determined when the commercial parcel on the northwest corner of the intersection develops.

The southbound right turn flair that currently exists on Hamrick Road at Beebe Road is shown to exceed its 50' storage length under future year 2038 conditions. Consideration should be given to extending this turn pocket if growth occurs as expected. No other lengths are shown to be exceeded at study area intersections. Refer to Appendix G for a full queuing and blocking report.

Future Year 2038 Build Turn Lane Criterion

Left Turn Lane

Left turn lane criterion was evaluated on Beebe Road and Gebhard Road at the development access points during the PM peak hour to determine whether left turn lane criterion is met under projected future year 2038 build conditions. Results of the analysis show that criterion is met for a southbound left turn lane at both Gebhard Road access points as well as an eastbound left turn lane at the Beebe Road access. This, however, is based on projections of growth for the area that have many unknowns and may not be reliable. Refer to Appendix H for left turn lane graphs.

Right Turn Lane

Right turn lane criterion was evaluated on Beebe Road and Gebhard Road at the development access points during the PM peak hour to determine whether right turn lane criterion is met under projected future year 2038 build conditions. Results of the analysis show that criterion is not met for a northbound right turn lane on Gebhard Road at the north access or for a westbound right turn lane on Beebe Road, but criterion is met on Gebhard Road at the south development access because of this being the main access to the site on Gebhard Road and also because of the un-posted speed limit of 55 mph. If the speed limit is reduced in the future to 40 mph, which is more likely once development occurs, then criterion will not be met for a right turn lane. Refer to Appendix H for right turn lane graphs.

Figure 11 : Background Growth Year 2017-2038, PM Peak Hour

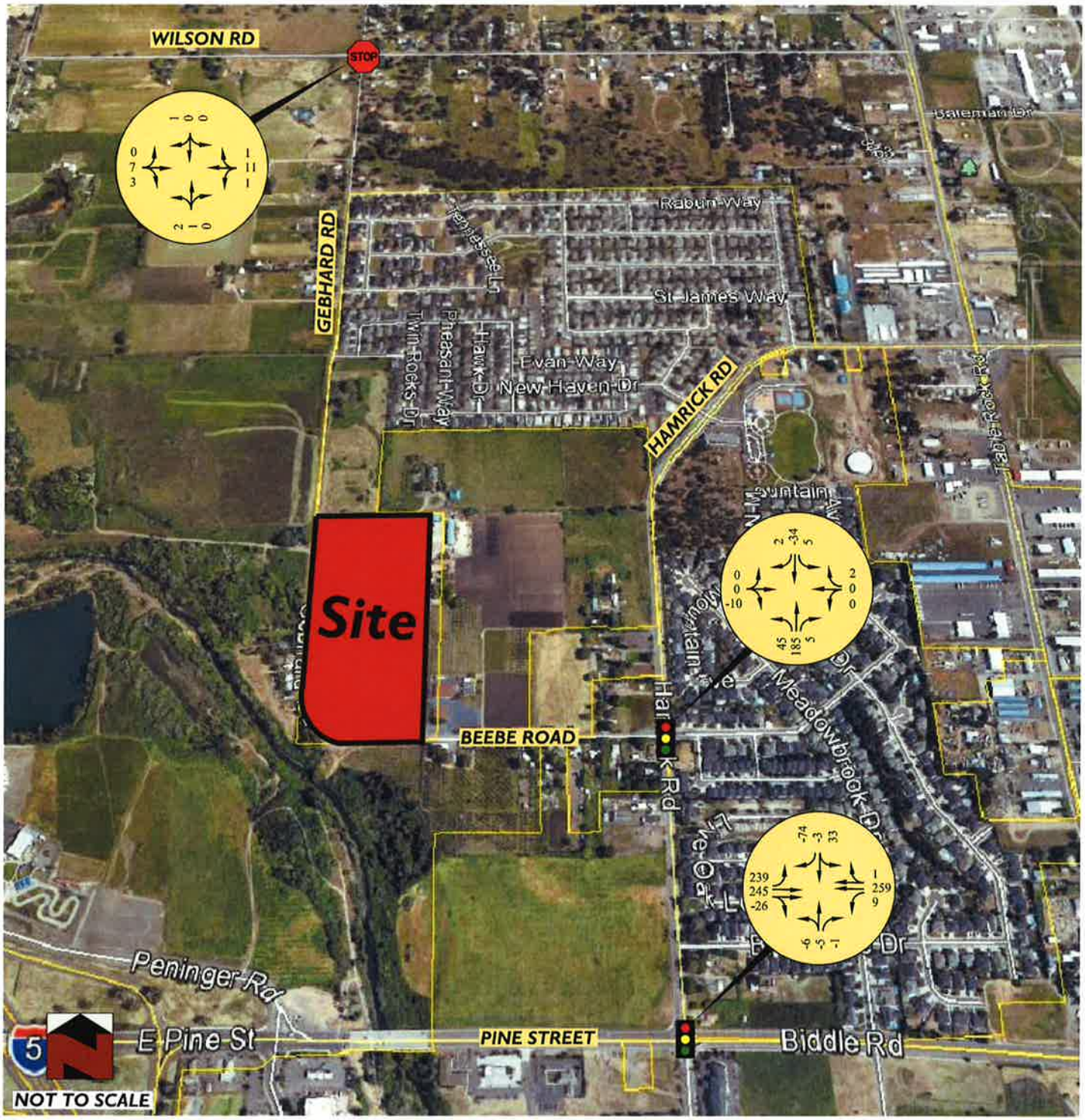

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Figure 12 : Future Year 2038 No-Build Traffic Volumes, PM Peak Hour

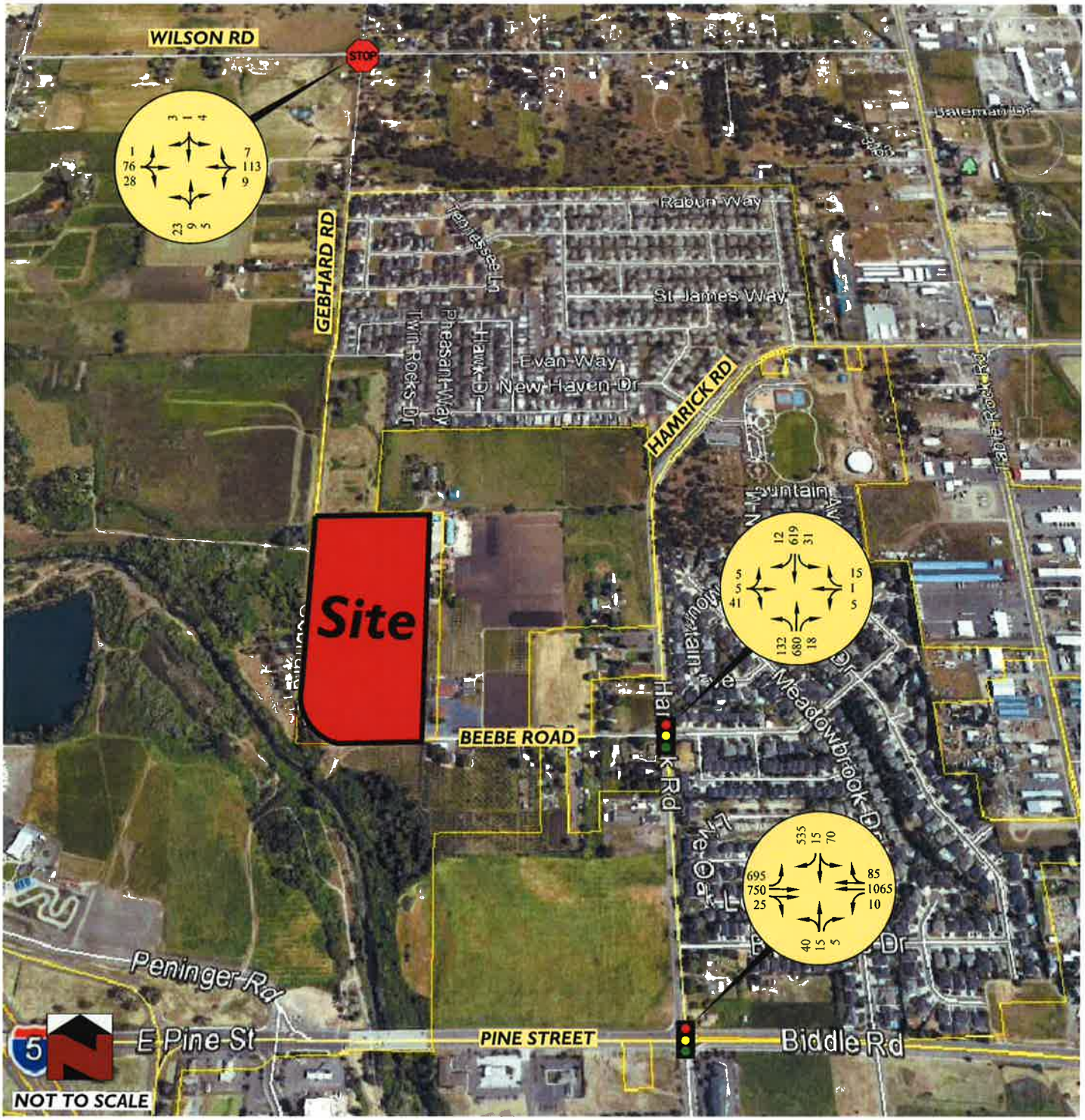

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Figure 13 : Re-routed White Hawk Development Trips, PM Peak Hour

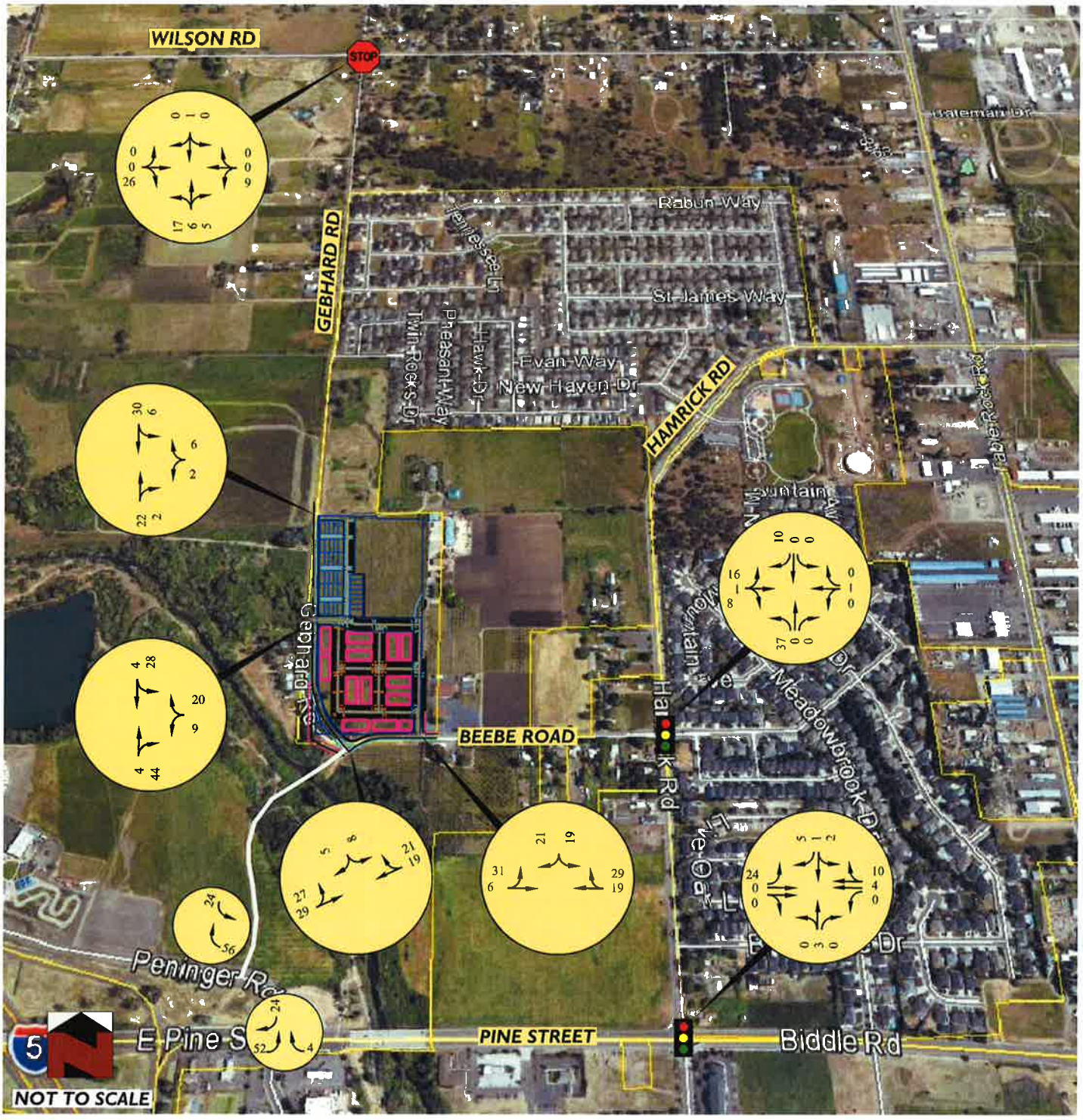

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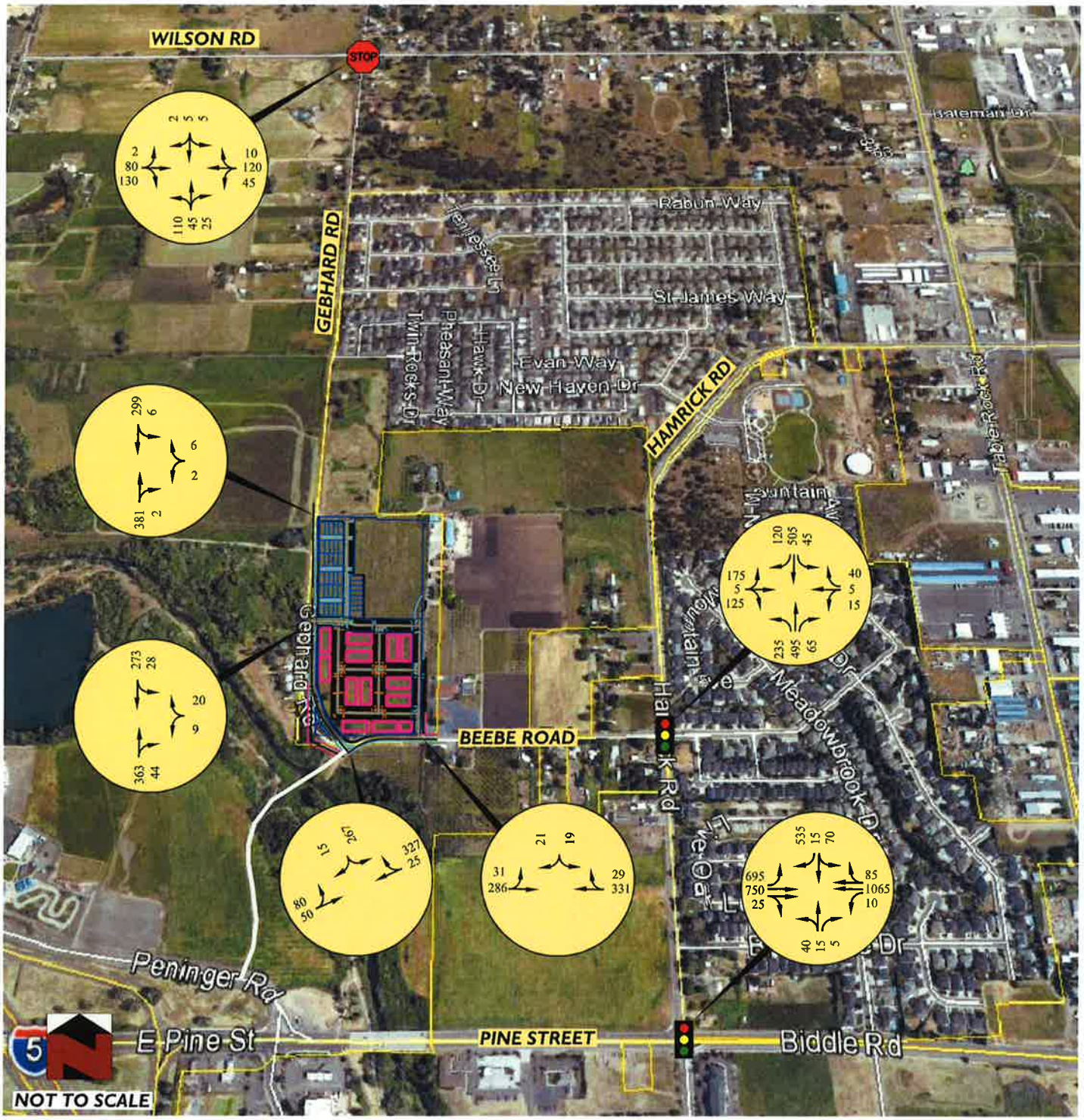
Figure 14 : Future Year 2038 Build, PM Peak Hour



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VIII. CONCLUSIONS

Conclusions

The findings of the traffic impact analysis conclude that the proposed White Hawk development can be accommodated on the existing transportation system without creating adverse impacts with proposed mitigations. Intersection operations and safety was evaluated to address development impacts to the surrounding area. Results of the analysis show the following:

1. All study area intersections operate acceptably under existing year 2014 and design year 2017 no-build conditions during the p.m. peak hour. The intersection of Beebe Road / Hamrick Road degrades to a LOS F under design year 2017 build conditions as a result of development traffic. Proposed mitigation includes:

a) Installation of a traffic signal. The proportional share of impact is approximately 11% of mitigation costs (based upon a volume-based impact analysis) without a Beebe Road east-west connection and 5% with a Beebe Road connection. The difference in impact results from less project traffic using the Beebe Road/Hamrick Road connection when the Beebe Road extension is in place.

2. Left and right turn lanes are not shown to be necessary at any development access point under design year 2017 build conditions. Turn lanes are met in the future at the following locations:

a) A left turn lane at both Gebhard Road development access points and Beebe Road access point under future year 2038 build conditions.

b) A right turn lane at the Gebhard Road south development access point under projected year 2038 build conditions if the speed continues to stay 55 mph. If the speed is reduced to 40 mph as would be expected then a right turn lane will not be met in the future scenario.

3. The estimated average daily traffic (ADT) for the proposed White Hawk development is 2,274 ADT, which is within the Eastside Transit Oriented Development District (ETOD) trip cap of 6,100 ADT. To date this is the first development application within the TOD.

The proposed development application is in compliance with the Central Point Comprehensive Plan and Land Development Code. Streets that serve the subject property will accommodate projected p.m. peak hour traffic volumes within acceptable levels of service with identified improvements.

April 14, 2015

Tony Weller, P.E., P.L.S.
CESNW, Inc.
13190 SW 68th Parkway, Suite 150
Tigard, Oregon 97223

Re: Sewer Construction Potential Impacts on Water Wells
White Hawk Development
718 Beebe Road
Central Point, Oregon
1141-01

Dear Mr. Weller:

This letter assesses potential impacts on private water wells from sewer installation associated with the referenced project and discusses potential mitigation measures.

PROJECT UNDERSTANDING

The project site consists of an approximately 18-acre, rectangular parcel located on the northeast corner of Beebe Road and Gebhard Road in Central Point, Oregon, which is located in Bear Creek Valley. The project is a residential development with new utilities including water, sanitary sewer, and storm sewer. A preliminary master plan is included as Attachment A. In addition to sewer lines on the project site, sewer lines will extend into Beebe Road to connect to existing lines, and new sanitary or storm sewer lines will be installed in Gebhard Road the full length of the project site. Maximum installation depths of the sewers are expected to be in the range of 12 to 15 feet below the ground surface (bgs).

NEARBY WATER WELLS

CESNW obtained information on nearby water wells by searching the Oregon Water Resources Department (OWRD) database. Attachment B is a summary of the obtained well information. Eight wells were identified on parcels adjacent to or near the site: two to the east, four to the southeast, one to the west, and one to the northeast. The distance from the wells to the nearest proposed sewer installation ranges from 90 to 600 feet. The well logs from the OWRD database were reviewed with the following observations/conclusions:

- Four of the eight wells have bentonite clay seals from the surface to depths of 20 to 50 feet.
- Of the four wells without seals or with no seal information:
  - The distances from proposed sewer installation to the wells range from 180 to 600 feet;
  - Two of the wells have depths of 90 to 204 feet and draw water from depths of 30 to 90 feet and 120 to 180 feet; and
  - The other two wells have depths of 13 feet and 45 feet and are located approximately 270 feet from the nearest proposed sewer installation. The 13-foot depth well is an irrigation well.
- Three of the eight wells were deepened between 1983 and 1999.

SOIL AND GROUNDWATER CONDITIONS

The following summarizes our understanding of the soil and groundwater conditions at the site based on publicly available information and soil and groundwater sampling conducted by Ash Creek Associates in 2005/2006.

The regional geology consists of quaternary older alluvium that is a mixture of unconsolidated gravel, sand, silt, and clay in varying proportions; the alluvium thickness ranges up to 60 feet in the region (State of Oregon Department of Geology and Mineral Industries, 1977b). This quaternary older alluvium may be underlain by quaternary bench gravels that are a mixture of semi-consolidated gravel, sand, clay, and silt up to 70 feet thick. The bedrock geologic unit in the Bear Creek Valley is cretaceous sedimentary rock consisting of hard conglomerate and sandstone overlain by mudstone with thick sandstone interbeds (State of Oregon Department of Geology and Mineral Industries, 1977a).

Regionally, the quaternary older alluvium and bench gravels underlying the site contain restrictive soil layers and are subject to poor drainage, ponding, and high groundwater (State of Oregon Department of Geology and Mineral Industries, 1977a). The Bear Creek Valley has a shallow water-bearing zone, with groundwater encountered at less than 50 feet bgs on average (City of Medford Comprehensive Plan Environmental Element, 2003). The primary aquifer in the area is located in the alluvial deposits found in the region.

Four borings were completed at/near the site in 2006. Soils encountered consisted of 5 to 12 feet of clay overlying clayey sand, clayey gravel, or sandy gravel. In June 2006, the depth to groundwater was measured in the four temporary borings. In three borings, the depth to groundwater was 9 to 9.5 feet bgs. In one boring, located near the southwest corner of the site, the depth to groundwater was 16 feet bgs. The soil in this boring had greater clay content than the other locations, so it is possible that the water level did not have sufficient time to equilibrate in the temporary boring and depth to water may have been approximately 9 feet throughout the site. Based on the site topography and the presence of Bear Creek south and west of the site, groundwater at the site likely flows west or southwest, toward Bear Creek (the presence of Bear Creek to the southwest may also explain the lower water level in the boring nearest the creek).

POTENTIAL IMPACTS AND MITIGATION RECOMMENDATIONS DURING SEWER INSTALLATION

The proposed sewer trench may intercept the water table. Sewer installation could impact groundwater levels (and thereby impact nearby water wells) in the following ways:

- Dewatering during construction;
- Infiltration into sewer lines; or
- Longitudinal flow in trench backfill.

If dewatering is necessary during construction, the water table would be lowered and these effects could extend to nearby water wells. This effect would be temporary and conditions would be expected to return to normal within a short period after completion of the work.

Long-term, if the sewer lines leak, infiltration into the sewer lines could permanently lower the water table in the vicinity of the sewer. This effect would likely extend only a few feet from the sewer trench. This potential impact is addressed by quality control during construction to assure the sewer lines are installed in alignment, seals are in place and intact, proper pipe bedding is used, and trench backfill is properly compacted. These conditions assure the sewer lines have a tight seal and will not leak.

If trench backfill is more permeable than native soil, water could flow longitudinally along the trench and discharge to surface water, permanently lowering the water table in the vicinity of the trench. Given the native soil conditions (clayey soils), it is possible that the trench backfill could be more permeable than the native soil. Depending on the

depth to which the trench penetrates the water table, longitudinal flow could occur. This effect would likely extend only a few feet laterally from the sewer trench. If needed, this localized depression in the water table caused by the trench could be addressed by installing low-permeability plugs at intervals in the trench backfill.

EVALUATION AND MITIGATION OPTIONS

An evaluation of the potential impact of the installation and presence of the proposed storm and sanitary lines was performed given the above site conditions and the following conclusions were made:

- Eight wells are located in the vicinity of the proposed project. For the following reasons, the proposed sewer installation is not expected to impact these wells:
  - If at all, the sewer installations will penetrate only 3 to 6 feet into the water table.
  - The wells are located at distances and/or depths that are outside the potential influence of the sewer installation.
- Three of the eight wells have been deepened over a period of 16 years, indicating that there is a long-term reduction in water level in the area.

The following presents mitigation options to address potential concerns:

- Prior to construction, verify whether the 13-foot-deep irrigation well located 270 feet from the site is still in service. Consider monitoring water levels in that well during construction.
- If sewer installation does penetrate the water table, low-permeability plugs can be used to inhibit flow along the trench line. Assuming crushed rock is used for trench backfill, adding 5 percent (dry weight) bentonite to the backfill is sufficient to reduce the permeability of the backfill. The plugs should be placed from the bottom of the trench to 1 foot above the water table the full width of the trench and have a minimum length of 5 feet. A plug should be placed at the low end of each main sewer line.

If you have any questions or need further information, please contact us at your convenience.

Sincerely,

Herb Clough, P.E.
Principal Engineer

ATTACHMENTS

Attachment A – Preliminary Master Plan
Attachment B – Nearby Water Wells

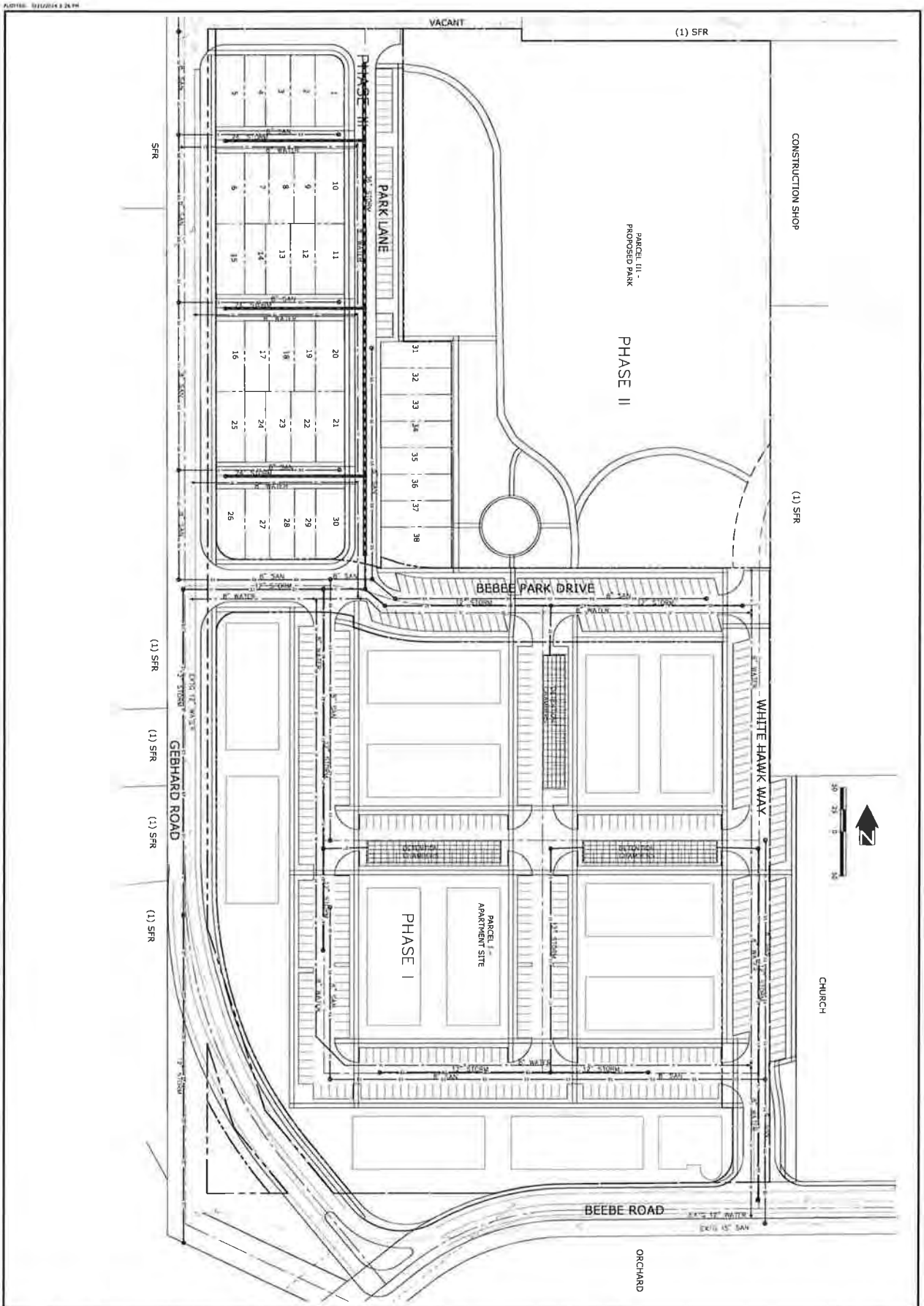
REFERENCES

State of Oregon Department of Geology and Mineral Industries. Geologic Map of the Medford Quadrangle Oregon. 1977a. Ralph S. Mason, State geologist. C.A. Schumacher, Chief Cartographer.

State of Oregon Department of Geology and Mineral Industries. Land Use Geology of Central Jackson County, Oregon. 1977b. Ralph S. Mason, State Geologist.

Attachment A

Preliminary Master Plan

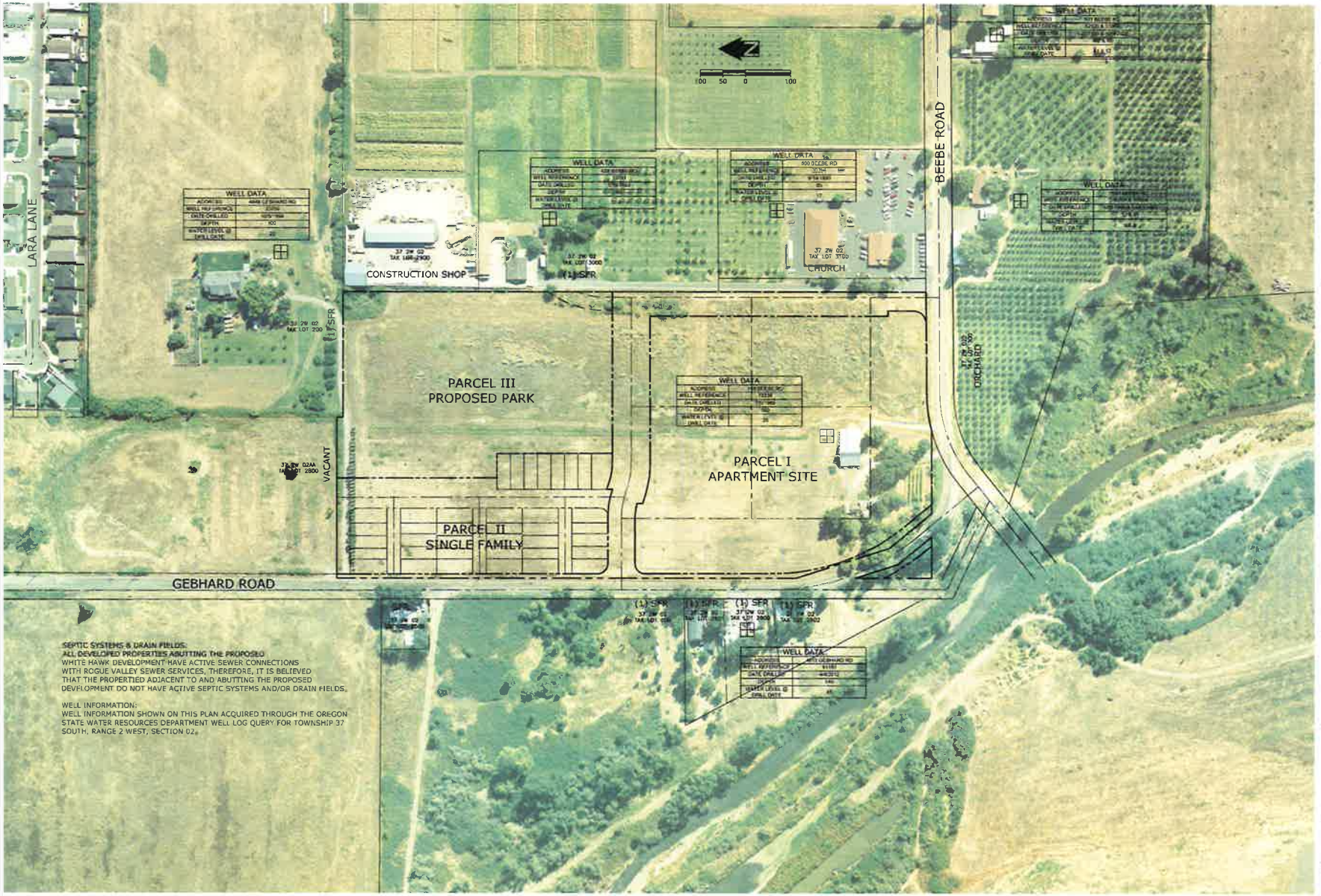


6 OF 9	3	SITE ANALYSIS & MASTER UTILITY PLAN	CES|NW 13190 SW 68th Parkway, Suite 150 Tigard, Oregon 97223 503.968.6655 www.cesnw.com	WHITE HAWK 37 2W 02, TAXLOTS 2700 & 2979 DUNCAN DEVELOPMENT, LLC P.O. BOX 5656 CENTRAL POINT, OREGON 97502 PH: 541-665-6263 FAX: 541-665-2979

PRELIMINARY

Attachment B

Nearby Water Wells



SEPTIC SYSTEMS & DRAIN FIELDS:
ALL DEVELOPED PROPERTIES ABUTTING THE PROPOSED
WHITE HAWK DEVELOPMENT HAVE ACTIVE SEWER CONNECTIONS WITH ROGUE VALLEY SEWER SERVICES, THEREFORE, IT IS BELIEVED THAT THE PROPERTIED ADJACENT TO AND ABUTTING THE PROPOSED DEVELOPMENT DO NOT HAVE ACTIVE SEPTIC SYSTEMS AND/OR DRAIN FIELDS.

WELL INFORMATION:
WELL INFORMATION SHOWN ON THIS PLAN ACQUIRED THROUGH THE OREGON STATE WATER RESOURCES DEPARTMENT WELL LOG QUERY FOR TOWNSHIP 37 SOUTH, RANGE 2 WEST, SECTION 02.

PRELIMINARY
RENEWS: 6/30/15

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

DUNCAN DEVELOPMENT, LLC
P.O. BOX 5656
CENTRAL POINT, OREGON 97502
PH: 541-665-6263 FAX: 541-665-2979

CES NW
13190 SW 68th Parkway, Suite 150
Tigard, Oregon 97223
503.968.6655 www.cesnw.com

ADJACENT LAND UES PLAN
(SITE ANALYSIS)

SHEET 5
OF 6

CES|NW

Memorandum

TO:	**City of Central Point**	**DATE:**	**04/28/15**
FROM:	**John D. Jensen, PE**	**PROJECT #:**	**1910**
SUBJECT:	**White Hawk Master Plan - Preliminary Stormwater Management Report**		

REGISTERED PROFESSIONAL ENGINEER 59880PE OREGON JAN. 14, 2003 JOHN DYER JENSEN

RENEWAL DATE 6/30/16

Existing Conditions

The White Hawk project is located directly north of Beebe Road and east of Gebhard Rd. The site is bounded on the north and east by private driveways providing access to the adjacent properties. The site is un-developed and is generally open space. The site is generally flat, covered with native grasses, with a few trees in its south-west corner. The site generally drains towards the north-west and Gebhard Rd with only a small portion of the sites south end draining towards Beebe Rd. The total site area is approximately 18.77 acres.

According to the Soil Conservation Service's soil survey for the Jackson County Area, the site consists of Medford silty clay loam, 0 to 3 percent slopes designated as Map Unit Symbol 127A, classified as Hydrologic Soil Group C.

Proposed Improvements

The White Hawk project will consist of an apartment area, an attached townhome/duplex area and future park area. These areas will be interconnected by three public roads (Beebe Park Dr, White Hawk Way and Park Lane) and a series of private drive aisle with parking. The on-site improvements will include a storm system that will collect, treat and detain stormwater from the proposed improvements before releasing flows the public storm sewer in Beebe Rd and a proposed new discharge to Bear Creek.

Summary of Areas

For the purpose of this memo, the site is looked at as three areas summarized below:

Description	Total Area (acres)	Impervious Area (acres)	Pervious Area (acres)
Park Area	4.22	0.34	3.88
Park Lane & Row Homes	3.62	2.55	1.07
Bebee Park Dr, White Hawk Way, & Apartment Site	10.93	7.18	3.75
Total Site	18.77	10.07	8.70

Stormwater Quality

The project will meet the City of Central Point's and the Rogue Valley Sewer Service's requirements for stormwater quality. The stormwater runoff from the proposed improvements will be treated by utilizing a combination of treatment methods. The treatment methods proposed for the project are:

- Stormwater Planters
- Rain Gardens/Bio-Cells
- Filter strips
- EcoStorm/EcoStorm Plus treatment trains (TAPE Approved).

Treated flows will then be released into the underground detention facilities or to the storm pipe network as required to achieve flow control requirements for the site.

The total on-site impervious created by the proposed improvements is estimated to be of the order of 10.07 acres (438,649 SF). This includes about 0.34 acres (15,000 SF) of walkway within the proposed park area and about 3.82 acres (166,400 SF) of roof area throughout the site.

The treatment approach utilized for the impervious surfaces within the park area will be filter strips. About 1,250 LF of filter strips directly adjacent to the park's walkways, and paved areas will treat the runoff from these surfaces. The Peak Water Quality Flow Rate form this 0.34 acres of impervious surface is about 0.1cfs with a total Water Quality Volume of about 974 cubic-feet. The 1,250 LF of filter strip will easily address water quality for these areas.

The remainder of the site's impervious area will be treated by either an EcoStorm/EcoStorm Plus treatment train installed directly up-stream of the proposed detention facility, or by Rain Garden/Bio-Cells and stormwater planters strategically located throughout the roadway and parking areas, picking up gutter flows and treating them prior to discharge to the detention facilities.

The EcoStorm/EcoStorm Plus treatment train system will treat runoff from the Park Lane & Row Homes area. This area consists of about 2.55 acres of impervious. Since this treatment system in installed down-stream of the detention, it will be sized to treat the full 2-year release rate for the detention facility. The full 2-year release rate for the entire 3.9 acre area is estimated to be about 0.5 cfs. The full 2-year release rate is based on a Tc = 25 min, Precipitation = 2 inches, CN = 86, Total area = 3.9 acres, Impervious area = 0. The EcoStorm Model Number 0.5 has a treatment capacity of 0.83 cfs which is adequate for treatment. The EcoStorm Plus has a treatment capacity of 0.4 cfs therefore two units will be required to treat the flow.

The EcoStorm/EcoStorm Plus and Rain Gardens/Bio-Cells will be utilized to treat the stormwater runoff from the remainder of the site which includes Beebe Park Dr, White Hawk Way and the apartment site. The rain garden/Bio-Cells will be sized as 9% of the total area of the parking lot and sidewalks that drain into them approximately 2 acres. The EcoStorm/EcoStorm Plus treatment train system will treat the remainder of the run off from 5.18 acres of new impervious surfaces. With a total effective area of 10.93 acres and effective impervious area of 5.18 acres, the peak water quality flow rate is estimated to be about 1.1 cfs with a total volume of 18,824 cubic-feet. Three EcoStorm Plus units with a capacity of 1.2 total cfs will be used to treat the runoff.

Water Quantity

The project will meet the City of Central Point's and the Rogue Valley Sewer Service's requirements for water quantity. The stormwater for the proposed on-site improvements will be detained and released by four (3) independent detention systems and flow control structures located throughout the site. Two of the detention facilities are to be located within the apartment site area and will manage flow control for the Beebe Park Dr, White Hawk Way, & Apartment Site area. These two detention systems will utilize banks of StormTech DC-780 Chambers. A detention pipe system will manage the

flow control for the combined Park Area and Park Lane & Row Homes area.

The Beebe Park Dr, White Hawk Way, & Apartment Site area estimated Pre-Development and Post-Development peak flows and storm volumes are summarized below:

	Total Area (acres)	Impervious Area (acres)	Peak Flow (cfs)	Total Volume (cf)
Pre Development	10.93	0.00	2.8	64,416
Post Development	10.93	7.18	6.5	94,330

The storage volume require to mitigate the 10-year Post-Development flows to 10-year Pre-development flows is estimated to be about 10,000 cf of storage. Utilizing the StormTech DC-780 Chambers with a storage capacity of about 78 cf per unit, it is estimated that about 130 units will be adequate to provide the needed storage to mitigate post-development flows to pre-development levels. Each of the three banks proposed will consist of about 65 StormTech DC-780 Chambers.

The combined Park Area and Park Lane & Row Homes area estimated Pre-Development and Post-Development peak flows and storm volumes are summarized below:

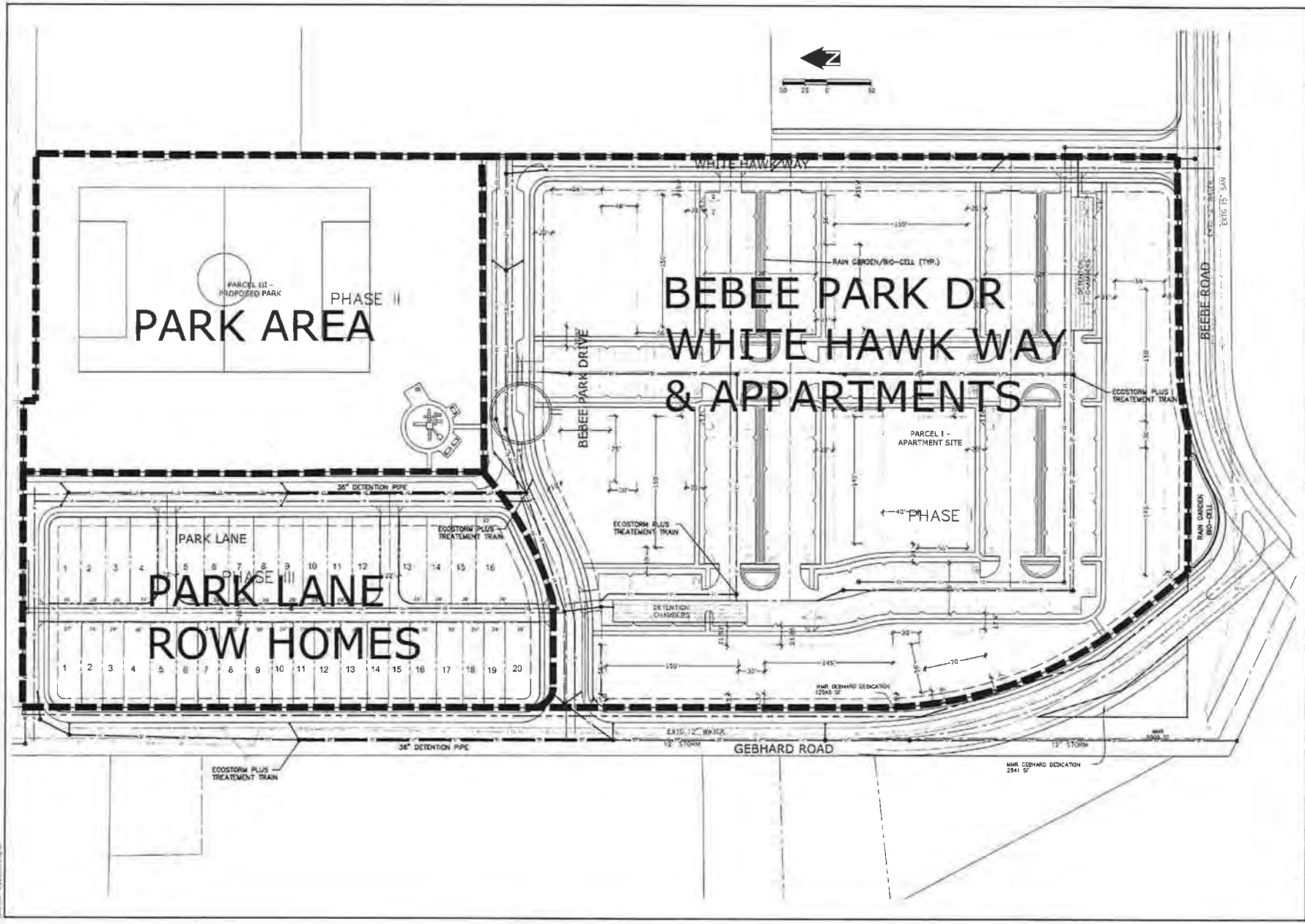
	Total Area (acres)	Impervious Area (acres)	Peak Flow (cfs)	Total Volume (cf)
Pre Development	7.84	0.0	1.9	46,089
Post Development	7.84	2.89	4.0	58,603

The storage volume require to mitigate the 10-year Post-Development flows to 10-year Pre-development flows is estimated to be about 5,000 cf of storage. Utilizing about 710 LF of 36" detention pipe, about 5,000 cf of storage can be provided for this area.

Flows being released from the proposed detention facilities by flow control structures sized during final design. The proposed storm system will be designed with a 25-year design conveyance capacity.

Stormwater Disposal

All stormwater runoff for the proposed site improvements will be treated and detained, then released at pre-development flow rates into the public storm system in Beebe Street, or released directly to Bear Creek through the new discharge structure proposed for this project at Bear Creek.



PRELIMINARY

WHITE HAWK
37 2W 02, TAXLOTS 2700 & 2979

PEOPLES BANK OF COMMERCE
1311 E BARNETT ROAD
MEDFORD, OR 97504
PH: (541) 774 7656

CES|NW
1150 SW 6th Parkway, Suite 150
Redmond, Oregon 97756
503 968 6655 www.cesnw.com

SITE DRAINAGE AREA PLAN

SHEET 7

OF 7

CES|NW

SANTA BARBARA URBAN HYDROGRAPH
SCS TYPE 1A 24-HOUR DISTRIBUTION

Project: *White Hawk*
Project Number: *1910*
Date: *Apr 28, 2015*

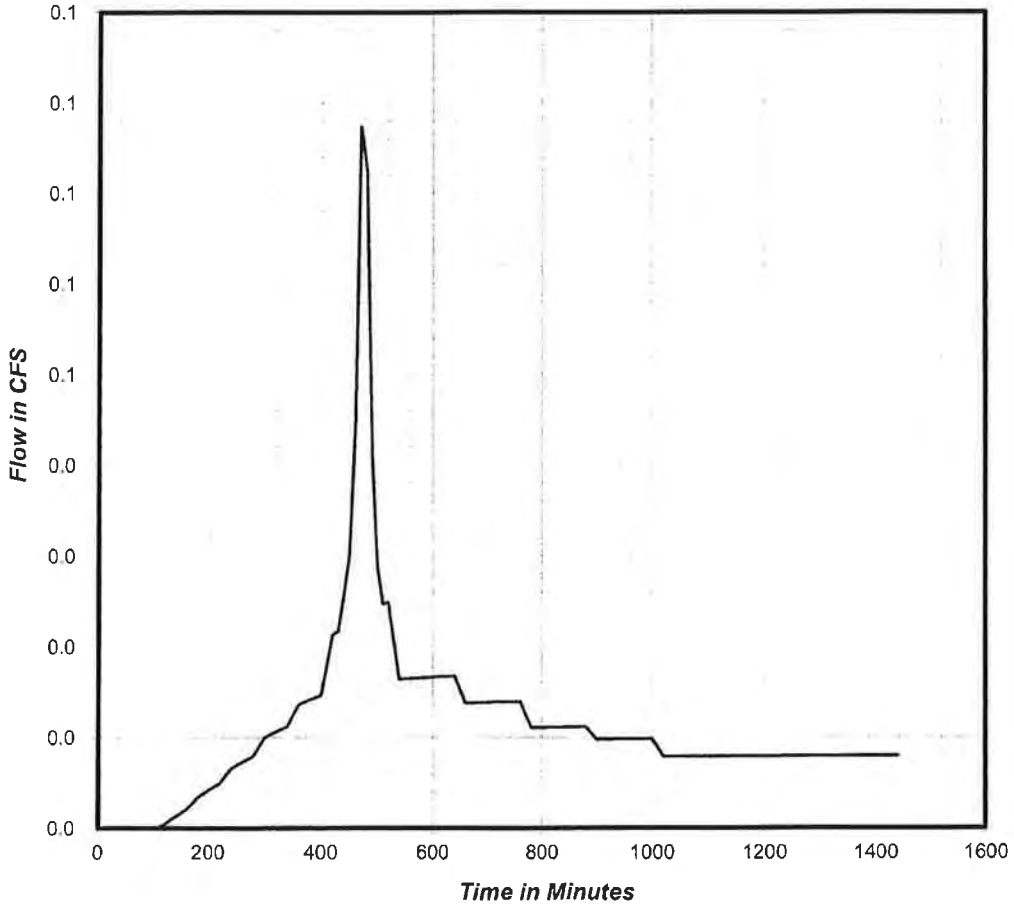
Basin: *Park Impervious*
Event: *1-Inch 24-Hr*

Given:

Area =	0.34	acres
Pt =	1	inches
dt =	10	min.
Tc =	5	min.
w =	0.5000	routing constant

Pervious Area		**Impervious Area**		**HYDROGRAPH RESULTS**	
Area =	0 acres	Area =	0.34 acres	Peak Runoff	0.1 cfs
CN =	86	CN =	98	Total Vol. :	974 cf
S =	1.63	S =	0.20		
0.2S =	0.33	0.2S =	0.04		

Peak Runoff Hydrograph



					Pervious Area		Impervious Area				
(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
1	10	0.0040	0.0040	0.0040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0040	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0040	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
4	40	0.0040	0.0040	0.0160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
5	50	0.0040	0.0040	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
6	60	0.0040	0.0040	0.0240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
7	70	0.0040	0.0040	0.0280	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
8	80	0.0040	0.0040	0.0320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
9	90	0.0040	0.0040	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
10	100	0.0040	0.0040	0.0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
11	110	0.0050	0.0050	0.0450	0.0000	0.0000	0.0001	0.0001	0.0001	0.0	0.0
12	120	0.0050	0.0050	0.0500	0.0000	0.0000	0.0004	0.0003	0.0003	0.0	0.0
13	130	0.0050	0.0050	0.0550	0.0000	0.0000	0.0009	0.0005	0.0005	0.0	0.0
14	140	0.0050	0.0050	0.0600	0.0000	0.0000	0.0016	0.0007	0.0007	0.0	0.0
15	150	0.0050	0.0050	0.0650	0.0000	0.0000	0.0026	0.0009	0.0009	0.0	0.0
16	160	0.0050	0.0050	0.0700	0.0000	0.0000	0.0037	0.0011	0.0011	0.0	0.0
17	170	0.0060	0.0060	0.0760	0.0000	0.0000	0.0052	0.0015	0.0015	0.0	0.0
18	180	0.0060	0.0060	0.0820	0.0000	0.0000	0.0069	0.0017	0.0017	0.0	0.0
19	190	0.0060	0.0060	0.0880	0.0000	0.0000	0.0089	0.0019	0.0019	0.0	0.0
20	200	0.0060	0.0060	0.0940	0.0000	0.0000	0.0110	0.0021	0.0021	0.0	0.0
21	210	0.0060	0.0060	0.1000	0.0000	0.0000	0.0133	0.0023	0.0023	0.0	0.0
22	220	0.0060	0.0060	0.1060	0.0000	0.0000	0.0158	0.0025	0.0025	0.0	0.0
23	230	0.0070	0.0070	0.1130	0.0000	0.0000	0.0189	0.0031	0.0031	0.0	0.0
24	240	0.0070	0.0070	0.1200	0.0000	0.0000	0.0221	0.0033	0.0033	0.0	0.0
25	250	0.0070	0.0070	0.1270	0.0000	0.0000	0.0256	0.0035	0.0035	0.0	0.0
26	260	0.0070	0.0070	0.1340	0.0000	0.0000	0.0292	0.0036	0.0036	0.0	0.0
27	270	0.0070	0.0070	0.1410	0.0000	0.0000	0.0330	0.0038	0.0038	0.0	0.0
28	280	0.0070	0.0070	0.1480	0.0000	0.0000	0.0369	0.0039	0.0039	0.0	0.0
29	290	0.0082	0.0082	0.1562	0.0000	0.0000	0.0417	0.0048	0.0048	0.0	0.0
30	300	0.0082	0.0082	0.1644	0.0000	0.0000	0.0466	0.0049	0.0049	0.0	0.0
31	310	0.0082	0.0082	0.1726	0.0000	0.0000	0.0517	0.0051	0.0051	0.0	0.0
32	320	0.0082	0.0082	0.1808	0.0000	0.0000	0.0570	0.0052	0.0052	0.0	0.0
33	330	0.0082	0.0082	0.1890	0.0000	0.0000	0.0623	0.0054	0.0054	0.0	0.0
34	340	0.0082	0.0082	0.1972	0.0000	0.0000	0.0678	0.0055	0.0055	0.0	0.0
35	350	0.0095	0.0095	0.2067	0.0000	0.0000	0.0744	0.0065	0.0065	0.0	0.0
36	360	0.0095	0.0095	0.2162	0.0000	0.0000	0.0811	0.0067	0.0067	0.0	0.0
37	370	0.0095	0.0095	0.2257	0.0000	0.0000	0.0879	0.0068	0.0068	0.0	0.0
38	380	0.0095	0.0095	0.2352	0.0000	0.0000	0.0948	0.0069	0.0069	0.0	0.0
39	390	0.0095	0.0095	0.2447	0.0000	0.0000	0.1019	0.0071	0.0071	0.0	0.0
40	400	0.0095	0.0095	0.2542	0.0000	0.0000	0.1091	0.0072	0.0072	0.0	0.0
41	410	0.0134	0.0134	0.2676	0.0000	0.0000	0.1194	0.0103	0.0103	0.0	0.0
42	420	0.0134	0.0134	0.2810	0.0000	0.0000	0.1299	0.0105	0.0105	0.0	0.0
43	430	0.0134	0.0134	0.2944	0.0000	0.0000	0.1405	0.0107	0.0107	0.0	0.0
44	440	0.0180	0.0180	0.3124	0.0000	0.0000	0.1551	0.0146	0.0146	0.0	0.0
45	450	0.0180	0.0180	0.3304	0.0000	0.0000	0.1699	0.0148	0.0148	0.0	0.0
46	460	0.0340	0.0340	0.3644	0.0009	0.0009	0.1984	0.0286	0.0286	0.1	0.0
47	470	0.0540	0.0540	0.4184	0.0050	0.0041	0.2451	0.0467	0.0467	0.1	0.1
48	480	0.0270	0.0270	0.4454	0.0082	0.0032	0.2689	0.0238	0.0238	0.0	0.1
49	490	0.0180	0.0180	0.4634	0.0108	0.0025	0.2850	0.0160	0.0160	0.0	0.0
50	500	0.0134	0.0134	0.4768	0.0129	0.0021	0.2970	0.0120	0.0120	0.0	0.0
51	510	0.0134	0.0134	0.4902	0.0151	0.0023	0.3090	0.0121	0.0121	0.0	0.0
52	520	0.0134	0.0134	0.5036	0.0175	0.0024	0.3212	0.0121	0.0121	0.0	0.0
53	530	0.0088	0.0088	0.5124	0.0192	0.0017	0.3291	0.0080	0.0080	0.0	0.0
54	540	0.0088	0.0088	0.5212	0.0210	0.0018	0.3372	0.0080	0.0080	0.0	0.0
55	550	0.0088	0.0088	0.5300	0.0228	0.0018	0.3452	0.0080	0.0080	0.0	0.0
56	560	0.0088	0.0088	0.5388	0.0247	0.0019	0.3532	0.0080	0.0080	0.0	0.0
57	570	0.0088	0.0088	0.5476	0.0266	0.0020	0.3613	0.0081	0.0081	0.0	0.0
58	580	0.0088	0.0088	0.5564	0.0287	0.0020	0.3694	0.0081	0.0081	0.0	0.0
59	590	0.0088	0.0088	0.5652	0.0307	0.0021	0.3775	0.0081	0.0081	0.0	0.0
60	600	0.0088	0.0088	0.5740	0.0329	0.0021	0.3856	0.0081	0.0081	0.0	0.0
61	610	0.0088	0.0088	0.5828	0.0351	0.0022	0.3937	0.0081	0.0081	0.0	0.0
62	620	0.0088	0.0088	0.5916	0.0374	0.0023	0.4019	0.0081	0.0081	0.0	0.0
63	630	0.0088	0.0088	0.6004	0.0397	0.0023	0.4100	0.0082	0.0082	0.0	0.0
64	640	0.0088	0.0088	0.6092	0.0421	0.0024	0.4182	0.0082	0.0082	0.0	0.0
65	650	0.0072	0.0072	0.6164	0.0441	0.0020	0.4249	0.0067	0.0067	0.0	0.0
66	660	0.0072	0.0072	0.6236	0.0461	0.0020	0.4316	0.0067	0.0067	0.0	0.0
67	670	0.0072	0.0072	0.6308	0.0482	0.0021	0.4384	0.0067	0.0067	0.0	0.0
68	680	0.0072	0.0072	0.6380	0.0503	0.0021	0.4451	0.0067	0.0067	0.0	0.0

(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
69	690	0.0072	0.0072	0.6452	0.0525	0.0022	0.4518	0.0067	0.0067	0.0	0.0
70	700	0.0072	0.0072	0.6524	0.0546	0.0022	0.4586	0.0067	0.0067	0.0	0.0
71	710	0.0072	0.0072	0.6596	0.0569	0.0022	0.4653	0.0068	0.0068	0.0	0.0

(1) Time Incre-ment	(2) Time	(3) Rainfall Distri-bution	(4) Incre-mental Rainfall	(5) Accumu-lated Rainfall	(6) Accumu-lated Runoff	(7) Incre-mental Runoff	(8) Accumu-lated Runoff	(9) Incre-mental Runoff	(10) Total Runoff	(11) Instant Hydro-graph	(12) Design Hydro-graph
	(Min)	(% of Pt)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(cfs)	(cfs)
72	720	0.0072	0.0072	0.6668	0.0591	0.0023	0.4721	0.0068	0.0068	0.0	0.0
73	730	0.0072	0.0072	0.6740	0.0614	0.0023	0.4788	0.0068	0.0068	0.0	0.0
74	740	0.0072	0.0072	0.6812	0.0638	0.0023	0.4856	0.0068	0.0068	0.0	0.0
75	750	0.0072	0.0072	0.6884	0.0661	0.0024	0.4924	0.0068	0.0068	0.0	0.0
76	760	0.0072	0.0072	0.6956	0.0685	0.0024	0.4992	0.0068	0.0068	0.0	0.0
77	770	0.0057	0.0057	0.7013	0.0705	0.0019	0.5046	0.0054	0.0054	0.0	0.0
78	780	0.0057	0.0057	0.7070	0.0724	0.0019	0.5100	0.0054	0.0054	0.0	0.0
79	790	0.0057	0.0057	0.7127	0.0744	0.0020	0.5153	0.0054	0.0054	0.0	0.0
80	800	0.0057	0.0057	0.7184	0.0764	0.0020	0.5207	0.0054	0.0054	0.0	0.0
81	810	0.0057	0.0057	0.7241	0.0784	0.0020	0.5261	0.0054	0.0054	0.0	0.0
82	820	0.0057	0.0057	0.7298	0.0804	0.0020	0.5315	0.0054	0.0054	0.0	0.0
83	830	0.0057	0.0057	0.7355	0.0825	0.0021	0.5369	0.0054	0.0054	0.0	0.0
84	840	0.0057	0.0057	0.7412	0.0845	0.0021	0.5424	0.0054	0.0054	0.0	0.0
85	850	0.0057	0.0057	0.7469	0.0866	0.0021	0.5478	0.0054	0.0054	0.0	0.0
86	860	0.0057	0.0057	0.7526	0.0887	0.0021	0.5532	0.0054	0.0054	0.0	0.0
87	870	0.0057	0.0057	0.7583	0.0909	0.0021	0.5586	0.0054	0.0054	0.0	0.0
88	880	0.0057	0.0057	0.7640	0.0930	0.0022	0.5640	0.0054	0.0054	0.0	0.0
89	890	0.0050	0.0050	0.7690	0.0949	0.0019	0.5688	0.0048	0.0048	0.0	0.0
90	900	0.0050	0.0050	0.7740	0.0968	0.0019	0.5735	0.0048	0.0048	0.0	0.0
91	910	0.0050	0.0050	0.7790	0.0988	0.0019	0.5783	0.0048	0.0048	0.0	0.0
92	920	0.0050	0.0050	0.7840	0.1007	0.0019	0.5831	0.0048	0.0048	0.0	0.0
93	930	0.0050	0.0050	0.7890	0.1027	0.0020	0.5878	0.0048	0.0048	0.0	0.0
94	940	0.0050	0.0050	0.7940	0.1047	0.0020	0.5926	0.0048	0.0048	0.0	0.0
95	950	0.0050	0.0050	0.7990	0.1067	0.0020	0.5974	0.0048	0.0048	0.0	0.0
96	960	0.0050	0.0050	0.8040	0.1087	0.0020	0.6022	0.0048	0.0048	0.0	0.0
97	970	0.0050	0.0050	0.8090	0.1107	0.0020	0.6069	0.0048	0.0048	0.0	0.0
98	980	0.0050	0.0050	0.8140	0.1127	0.0020	0.6117	0.0048	0.0048	0.0	0.0
99	990	0.0050	0.0050	0.8190	0.1148	0.0020	0.6165	0.0048	0.0048	0.0	0.0
100	1000	0.0050	0.0050	0.8240	0.1168	0.0021	0.6213	0.0048	0.0048	0.0	0.0
101	1010	0.0040	0.0040	0.8280	0.1185	0.0017	0.6251	0.0038	0.0038	0.0	0.0
102	1020	0.0040	0.0040	0.8320	0.1202	0.0017	0.6289	0.0038	0.0038	0.0	0.0
103	1030	0.0040	0.0040	0.8360	0.1218	0.0017	0.6328	0.0038	0.0038	0.0	0.0
104	1040	0.0040	0.0040	0.8400	0.1235	0.0017	0.6366	0.0038	0.0038	0.0	0.0
105	1050	0.0040	0.0040	0.8440	0.1252	0.0017	0.6405	0.0038	0.0038	0.0	0.0
106	1060	0.0040	0.0040	0.8480	0.1269	0.0017	0.6443	0.0038	0.0038	0.0	0.0
107	1070	0.0040	0.0040	0.8520	0.1286	0.0017	0.6481	0.0038	0.0038	0.0	0.0
108	1080	0.0040	0.0040	0.8560	0.1304	0.0017	0.6520	0.0038	0.0038	0.0	0.0
109	1090	0.0040	0.0040	0.8600	0.1321	0.0017	0.6558	0.0038	0.0038	0.0	0.0
110	1100	0.0040	0.0040	0.8640	0.1338	0.0017	0.6596	0.0038	0.0038	0.0	0.0
111	1110	0.0040	0.0040	0.8680	0.1356	0.0017	0.6635	0.0038	0.0038	0.0	0.0
112	1120	0.0040	0.0040	0.8720	0.1373	0.0018	0.6673	0.0038	0.0038	0.0	0.0
113	1130	0.0040	0.0040	0.8760	0.1391	0.0018	0.6712	0.0038	0.0038	0.0	0.0
114	1140	0.0040	0.0040	0.8800	0.1408	0.0018	0.6750	0.0038	0.0038	0.0	0.0
115	1150	0.0040	0.0040	0.8840	0.1426	0.0018	0.6789	0.0038	0.0038	0.0	0.0
116	1160	0.0040	0.0040	0.8880	0.1444	0.0018	0.6827	0.0038	0.0038	0.0	0.0
117	1170	0.0040	0.0040	0.8920	0.1462	0.0018	0.6866	0.0038	0.0038	0.0	0.0
118	1180	0.0040	0.0040	0.8960	0.1480	0.0018	0.6904	0.0039	0.0039	0.0	0.0
119	1190	0.0040	0.0040	0.9000	0.1498	0.0018	0.6943	0.0039	0.0039	0.0	0.0
120	1200	0.0040	0.0040	0.9040	0.1516	0.0018	0.6981	0.0039	0.0039	0.0	0.0
121	1210	0.0040	0.0040	0.9080	0.1535	0.0018	0.7020	0.0039	0.0039	0.0	0.0
122	1220	0.0040	0.0040	0.9120	0.1553	0.0018	0.7058	0.0039	0.0039	0.0	0.0
123	1230	0.0040	0.0040	0.9160	0.1571	0.0018	0.7097	0.0039	0.0039	0.0	0.0
124	1240	0.0040	0.0040	0.9200	0.1590	0.0018	0.7135	0.0039	0.0039	0.0	0.0
125	1250	0.0040	0.0040	0.9240	0.1609	0.0019	0.7174	0.0039	0.0039	0.0	0.0
126	1260	0.0040	0.0040	0.9280	0.1627	0.0019	0.7213	0.0039	0.0039	0.0	0.0
127	1270	0.0040	0.0040	0.9320	0.1646	0.0019	0.7251	0.0039	0.0039	0.0	0.0
128	1280	0.0040	0.0040	0.9360	0.1665	0.0019	0.7290	0.0039	0.0039	0.0	0.0
129	1290	0.0040	0.0040	0.9400	0.1684	0.0019	0.7329	0.0039	0.0039	0.0	0.0
130	1300	0.0040	0.0040	0.9440	0.1703	0.0019	0.7367	0.0039	0.0039	0.0	0.0
131	1310	0.0040	0.0040	0.9480	0.1722	0.0019	0.7406	0.0039	0.0039	0.0	0.0
132	1320	0.0040	0.0040	0.9520	0.1741	0.0019	0.7444	0.0039	0.0039	0.0	0.0
133	1330	0.0040	0.0040	0.9560	0.1760	0.0019	0.7483	0.0039	0.0039	0.0	0.0
134	1340	0.0040	0.0040	0.9600	0.1779	0.0019	0.7522	0.0039	0.0039	0.0	0.0
135	1350	0.0040	0.0040	0.9640	0.1798	0.0019	0.7560	0.0039	0.0039	0.0	0.0
136	1360	0.0040	0.0040	0.9680	0.1818	0.0019	0.7599	0.0039	0.0039	0.0	0.0
137	1370	0.0040	0.0040	0.9720	0.1837	0.0019	0.7638	0.0039	0.0039	0.0	0.0
138	1380	0.0040	0.0040	0.9760	0.1857	0.0020	0.7677	0.0039	0.0039	0.0	0.0
139	1390	0.0040	0.0040	0.9800	0.1876	0.0020	0.7715	0.0039	0.0039	0.0	0.0
140	1400	0.0040	0.0040	0.9840	0.1896	0.0020	0.7754	0.0039	0.0039	0.0	0.0
141	1410	0.0040	0.0040	0.9880	0.1916	0.0020	0.7793	0.0039	0.0039	0.0	0.0

(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
142	1420	0.0040	0.0040	0.9920	0.1936	0.0020	0.7832	0.0039	0.0039	0.0	0.0
143	1430	0.0040	0.0040	0.9960	0.1956	0.0020	0.7870	0.0039	0.0039	0.0	0.0
144	1440	0.0040	0.0040	1.0000	0.1976	0.0020	0.7909	0.0039	0.0039	0.0	0.0
	Total	1.0000	1.0000						Hydrograph Volume (Cubic Feet)		974

CES|NW

SANTA BARBARA URBAN HYDROGRAPH
SCS TYPE 1A 24-HOUR DISTRIBUTION

Project: *White Hawk*
Project Number: *1910*
Date: *Apr 28, 2015*

Basin: *Row Homes - Pre Dev*
Event: *2-year 24-Hr*

Given:

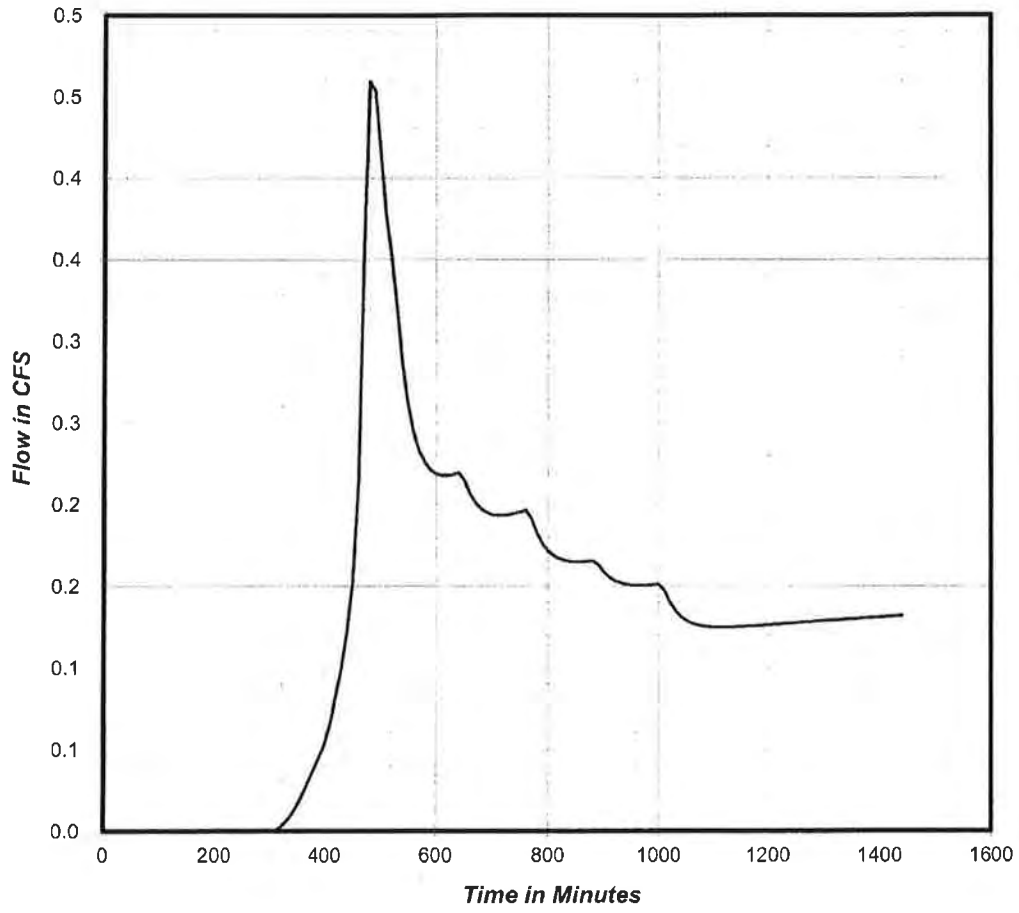
Area =	3.62	acres
Pt =	2	inches
dt =	10	min.
Tc =	30	min.
w =	0.1429	routing constant

Pervious Area			**Impervious Area**		
Area =	3.62	acres	Area =	0	acres
CN =	86		CN =	98	
S =	1.63		S =	0.20	
0.2S =	0.33		0.2S =	0.04	

HYDROGRAPH RESULTS

Peak Runoff	0.5	cfs
Total Vol. :	10919	cf

Peak Runoff Hydrograph



					Pervious Area		Impervious Area				
(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
1	10	0.0040	0.0080	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0080	0.0160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0080	0.0240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
4	40	0.0040	0.0080	0.0320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
5	50	0.0040	0.0080	0.0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
6	60	0.0040	0.0080	0.0480	0.0000	0.0000	0.0002	0.0002	0.0000	0.0	0.0
7	70	0.0040	0.0080	0.0560	0.0000	0.0000	0.0011	0.0008	0.0000	0.0	0.0
8	80	0.0040	0.0080	0.0640	0.0000	0.0000	0.0024	0.0013	0.0000	0.0	0.0
9	90	0.0040	0.0080	0.0720	0.0000	0.0000	0.0041	0.0018	0.0000	0.0	0.0
10	100	0.0040	0.0080	0.0800	0.0000	0.0000	0.0063	0.0022	0.0000	0.0	0.0
11	110	0.0050	0.0100	0.0900	0.0000	0.0000	0.0096	0.0032	0.0000	0.0	0.0
12	120	0.0050	0.0100	0.1000	0.0000	0.0000	0.0133	0.0038	0.0000	0.0	0.0
13	130	0.0050	0.0100	0.1100	0.0000	0.0000	0.0175	0.0042	0.0000	0.0	0.0
14	140	0.0050	0.0100	0.1200	0.0000	0.0000	0.0221	0.0046	0.0000	0.0	0.0
15	150	0.0050	0.0100	0.1300	0.0000	0.0000	0.0271	0.0050	0.0000	0.0	0.0
16	160	0.0050	0.0100	0.1400	0.0000	0.0000	0.0324	0.0053	0.0000	0.0	0.0
17	170	0.0060	0.0120	0.1520	0.0000	0.0000	0.0392	0.0068	0.0000	0.0	0.0
18	180	0.0060	0.0120	0.1640	0.0000	0.0000	0.0464	0.0072	0.0000	0.0	0.0
19	190	0.0060	0.0120	0.1760	0.0000	0.0000	0.0539	0.0075	0.0000	0.0	0.0
20	200	0.0060	0.0120	0.1880	0.0000	0.0000	0.0617	0.0078	0.0000	0.0	0.0
21	210	0.0060	0.0120	0.2000	0.0000	0.0000	0.0698	0.0081	0.0000	0.0	0.0
22	220	0.0060	0.0120	0.2120	0.0000	0.0000	0.0781	0.0083	0.0000	0.0	0.0
23	230	0.0070	0.0140	0.2260	0.0000	0.0000	0.0881	0.0100	0.0000	0.0	0.0
24	240	0.0070	0.0140	0.2400	0.0000	0.0000	0.0984	0.0103	0.0000	0.0	0.0
25	250	0.0070	0.0140	0.2540	0.0000	0.0000	0.1089	0.0105	0.0000	0.0	0.0
26	260	0.0070	0.0140	0.2680	0.0000	0.0000	0.1197	0.0108	0.0000	0.0	0.0
27	270	0.0070	0.0140	0.2820	0.0000	0.0000	0.1306	0.0110	0.0000	0.0	0.0
28	280	0.0070	0.0140	0.2960	0.0000	0.0000	0.1418	0.0111	0.0000	0.0	0.0
29	290	0.0082	0.0164	0.3124	0.0000	0.0000	0.1551	0.0133	0.0000	0.0	0.0
30	300	0.0082	0.0164	0.3288	0.0000	0.0000	0.1685	0.0135	0.0000	0.0	0.0
31	310	0.0082	0.0164	0.3452	0.0002	0.0002	0.1822	0.0137	0.0002	0.0	0.0
32	320	0.0082	0.0164	0.3616	0.0008	0.0005	0.1961	0.0138	0.0005	0.0	0.0
33	330	0.0082	0.0164	0.3780	0.0016	0.0009	0.2101	0.0140	0.0009	0.0	0.0
34	340	0.0082	0.0164	0.3944	0.0028	0.0012	0.2242	0.0141	0.0012	0.0	0.0
35	350	0.0095	0.0190	0.4134	0.0045	0.0017	0.2407	0.0165	0.0017	0.0	0.0
36	360	0.0095	0.0190	0.4324	0.0066	0.0021	0.2574	0.0167	0.0021	0.0	0.0
37	370	0.0095	0.0190	0.4514	0.0090	0.0024	0.2743	0.0168	0.0024	0.1	0.0
38	380	0.0095	0.0190	0.4704	0.0118	0.0028	0.2912	0.0170	0.0028	0.1	0.0
39	390	0.0095	0.0190	0.4894	0.0150	0.0031	0.3083	0.0171	0.0031	0.1	0.0
40	400	0.0095	0.0190	0.5084	0.0185	0.0035	0.3255	0.0172	0.0035	0.1	0.1
41	410	0.0134	0.0268	0.5352	0.0239	0.0055	0.3499	0.0244	0.0055	0.1	0.1
42	420	0.0134	0.0268	0.5620	0.0300	0.0061	0.3745	0.0246	0.0061	0.1	0.1
43	430	0.0134	0.0268	0.5888	0.0366	0.0067	0.3993	0.0248	0.0067	0.1	0.1
44	440	0.0180	0.0360	0.6248	0.0465	0.0098	0.4328	0.0335	0.0098	0.2	0.1
45	450	0.0180	0.0360	0.6608	0.0572	0.0108	0.4664	0.0337	0.0108	0.2	0.2
46	460	0.0340	0.0680	0.7288	0.0800	0.0228	0.5306	0.0641	0.0228	0.5	0.2
47	470	0.0540	0.1080	0.8368	0.1222	0.0421	0.6335	0.1030	0.0421	0.9	0.4
48	480	0.0270	0.0540	0.8908	0.1457	0.0235	0.6854	0.0519	0.0235	0.5	0.5
49	490	0.0180	0.0360	0.9268	0.1622	0.0165	0.7201	0.0347	0.0165	0.4	0.5
50	500	0.0134	0.0268	0.9536	0.1748	0.0127	0.7460	0.0259	0.0127	0.3	0.4
51	510	0.0134	0.0268	0.9804	0.1878	0.0130	0.7719	0.0259	0.0130	0.3	0.4
52	520	0.0134	0.0268	1.0072	0.2012	0.0133	0.7979	0.0260	0.0133	0.3	0.4
53	530	0.0088	0.0176	1.0248	0.2101	0.0089	0.8150	0.0171	0.0089	0.2	0.3
54	540	0.0088	0.0176	1.0424	0.2191	0.0091	0.8320	0.0171	0.0091	0.2	0.3
55	550	0.0088	0.0176	1.0600	0.2283	0.0092	0.8491	0.0171	0.0092	0.2	0.3
56	560	0.0088	0.0176	1.0776	0.2376	0.0093	0.8663	0.0171	0.0093	0.2	0.2
57	570	0.0088	0.0176	1.0952	0.2471	0.0094	0.8834	0.0171	0.0094	0.2	0.2
58	580	0.0088	0.0176	1.1128	0.2566	0.0095	0.9005	0.0171	0.0095	0.2	0.2
59	590	0.0088	0.0176	1.1304	0.2663	0.0097	0.9177	0.0172	0.0097	0.2	0.2
60	600	0.0088	0.0176	1.1480	0.2760	0.0098	0.9349	0.0172	0.0098	0.2	0.2
61	610	0.0088	0.0176	1.1656	0.2859	0.0099	0.9520	0.0172	0.0099	0.2	0.2
62	620	0.0088	0.0176	1.1832	0.2959	0.0100	0.9692	0.0172	0.0100	0.2	0.2
63	630	0.0088	0.0176	1.2008	0.3060	0.0101	0.9864	0.0172	0.0101	0.2	0.2
64	640	0.0088	0.0176	1.2184	0.3162	0.0102	1.0036	0.0172	0.0102	0.2	0.2
65	650	0.0072	0.0144	1.2328	0.3247	0.0084	1.0177	0.0141	0.0084	0.2	0.2
66	660	0.0072	0.0144	1.2472	0.3332	0.0085	1.0318	0.0141	0.0085	0.2	0.2
67	670	0.0072	0.0144	1.2616	0.3417	0.0086	1.0459	0.0141	0.0086	0.2	0.2
68	680	0.0072	0.0144	1.2760	0.3503	0.0086	1.0600	0.0141	0.0086	0.2	0.2

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (in)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
69	690	0.0072	0.0144	1.2904	0.3590	0.0087	1.0742	0.0141	0.0087	0.2	0.2
70	700	0.0072	0.0144	1.3048	0.3678	0.0088	1.0883	0.0141	0.0088	0.2	0.2
71	710	0.0072	0.0144	1.3192	0.3766	0.0088	1.1024	0.0141	0.0088	0.2	0.2

(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
72	720	0.0072	0.0144	1.3336	0.3855	0.0089	1.1165	0.0141	0.0089	0.2	0.2
73	730	0.0072	0.0144	1.3480	0.3944	0.0089	1.1307	0.0141	0.0089	0.2	0.2
74	740	0.0072	0.0144	1.3624	0.4034	0.0090	1.1448	0.0141	0.0090	0.2	0.2
75	750	0.0072	0.0144	1.3768	0.4125	0.0091	1.1589	0.0141	0.0091	0.2	0.2
76	760	0.0072	0.0144	1.3912	0.4216	0.0091	1.1731	0.0141	0.0091	0.2	0.2
77	770	0.0057	0.0114	1.4026	0.4288	0.0073	1.1843	0.0112	0.0073	0.2	0.2
78	780	0.0057	0.0114	1.4140	0.4361	0.0073	1.1955	0.0112	0.0073	0.2	0.2
79	790	0.0057	0.0114	1.4254	0.4434	0.0073	1.2067	0.0112	0.0073	0.2	0.2
80	800	0.0057	0.0114	1.4368	0.4508	0.0074	1.2179	0.0112	0.0074	0.2	0.2
81	810	0.0057	0.0114	1.4482	0.4582	0.0074	1.2291	0.0112	0.0074	0.2	0.2
82	820	0.0057	0.0114	1.4596	0.4656	0.0074	1.2404	0.0112	0.0074	0.2	0.2
83	830	0.0057	0.0114	1.4710	0.4731	0.0075	1.2516	0.0112	0.0075	0.2	0.2
84	840	0.0057	0.0114	1.4824	0.4806	0.0075	1.2628	0.0112	0.0075	0.2	0.2
85	850	0.0057	0.0114	1.4938	0.4881	0.0075	1.2740	0.0112	0.0075	0.2	0.2
86	860	0.0057	0.0114	1.5052	0.4956	0.0076	1.2853	0.0112	0.0076	0.2	0.2
87	870	0.0057	0.0114	1.5166	0.5032	0.0076	1.2965	0.0112	0.0076	0.2	0.2
88	880	0.0057	0.0114	1.5280	0.5108	0.0076	1.3077	0.0112	0.0076	0.2	0.2
89	890	0.0050	0.0100	1.5380	0.5175	0.0067	1.3176	0.0099	0.0067	0.1	0.2
90	900	0.0050	0.0100	1.5480	0.5243	0.0067	1.3274	0.0099	0.0067	0.1	0.2
91	910	0.0050	0.0100	1.5580	0.5310	0.0067	1.3373	0.0099	0.0067	0.1	0.2
92	920	0.0050	0.0100	1.5680	0.5378	0.0068	1.3472	0.0099	0.0068	0.1	0.2
93	930	0.0050	0.0100	1.5780	0.5446	0.0068	1.3570	0.0099	0.0068	0.1	0.2
94	940	0.0050	0.0100	1.5880	0.5514	0.0068	1.3669	0.0099	0.0068	0.1	0.2
95	950	0.0050	0.0100	1.5980	0.5582	0.0068	1.3767	0.0099	0.0068	0.1	0.2
96	960	0.0050	0.0100	1.6080	0.5651	0.0069	1.3866	0.0099	0.0069	0.2	0.2
97	970	0.0050	0.0100	1.6180	0.5720	0.0069	1.3965	0.0099	0.0069	0.2	0.2
98	980	0.0050	0.0100	1.6280	0.5789	0.0069	1.4064	0.0099	0.0069	0.2	0.2
99	990	0.0050	0.0100	1.6380	0.5858	0.0069	1.4162	0.0099	0.0069	0.2	0.2
100	1000	0.0050	0.0100	1.6480	0.5927	0.0069	1.4261	0.0099	0.0069	0.2	0.2
101	1010	0.0040	0.0080	1.6560	0.5983	0.0056	1.4340	0.0079	0.0056	0.1	0.1
102	1020	0.0040	0.0080	1.6640	0.6039	0.0056	1.4419	0.0079	0.0056	0.1	0.1
103	1030	0.0040	0.0080	1.6720	0.6095	0.0056	1.4498	0.0079	0.0056	0.1	0.1
104	1040	0.0040	0.0080	1.6800	0.6151	0.0056	1.4577	0.0079	0.0056	0.1	0.1
105	1050	0.0040	0.0080	1.6880	0.6207	0.0056	1.4656	0.0079	0.0056	0.1	0.1
106	1060	0.0040	0.0080	1.6960	0.6264	0.0056	1.4735	0.0079	0.0056	0.1	0.1
107	1070	0.0040	0.0080	1.7040	0.6320	0.0056	1.4814	0.0079	0.0056	0.1	0.1
108	1080	0.0040	0.0080	1.7120	0.6377	0.0057	1.4893	0.0079	0.0057	0.1	0.1
109	1090	0.0040	0.0080	1.7200	0.6433	0.0057	1.4972	0.0079	0.0057	0.1	0.1
110	1100	0.0040	0.0080	1.7280	0.6490	0.0057	1.5051	0.0079	0.0057	0.1	0.1
111	1110	0.0040	0.0080	1.7360	0.6547	0.0057	1.5130	0.0079	0.0057	0.1	0.1
112	1120	0.0040	0.0080	1.7440	0.6604	0.0057	1.5209	0.0079	0.0057	0.1	0.1
113	1130	0.0040	0.0080	1.7520	0.6662	0.0057	1.5288	0.0079	0.0057	0.1	0.1
114	1140	0.0040	0.0080	1.7600	0.6719	0.0057	1.5368	0.0079	0.0057	0.1	0.1
115	1150	0.0040	0.0080	1.7680	0.6776	0.0057	1.5447	0.0079	0.0057	0.1	0.1
116	1160	0.0040	0.0080	1.7760	0.6834	0.0058	1.5526	0.0079	0.0058	0.1	0.1
117	1170	0.0040	0.0080	1.7840	0.6892	0.0058	1.5605	0.0079	0.0058	0.1	0.1
118	1180	0.0040	0.0080	1.7920	0.6949	0.0058	1.5684	0.0079	0.0058	0.1	0.1
119	1190	0.0040	0.0080	1.8000	0.7007	0.0058	1.5763	0.0079	0.0058	0.1	0.1
120	1200	0.0040	0.0080	1.8080	0.7065	0.0058	1.5842	0.0079	0.0058	0.1	0.1
121	1210	0.0040	0.0080	1.8160	0.7124	0.0058	1.5921	0.0079	0.0058	0.1	0.1
122	1220	0.0040	0.0080	1.8240	0.7182	0.0058	1.6001	0.0079	0.0058	0.1	0.1
123	1230	0.0040	0.0080	1.8320	0.7240	0.0058	1.6080	0.0079	0.0058	0.1	0.1
124	1240	0.0040	0.0080	1.8400	0.7299	0.0058	1.6159	0.0079	0.0058	0.1	0.1
125	1250	0.0040	0.0080	1.8480	0.7357	0.0059	1.6238	0.0079	0.0059	0.1	0.1
126	1260	0.0040	0.0080	1.8560	0.7416	0.0059	1.6317	0.0079	0.0059	0.1	0.1
127	1270	0.0040	0.0080	1.8640	0.7475	0.0059	1.6396	0.0079	0.0059	0.1	0.1
128	1280	0.0040	0.0080	1.8720	0.7534	0.0059	1.6476	0.0079	0.0059	0.1	0.1
129	1290	0.0040	0.0080	1.8800	0.7593	0.0059	1.6555	0.0079	0.0059	0.1	0.1
130	1300	0.0040	0.0080	1.8880	0.7652	0.0059	1.6634	0.0079	0.0059	0.1	0.1
131	1310	0.0040	0.0080	1.8960	0.7711	0.0059	1.6713	0.0079	0.0059	0.1	0.1
132	1320	0.0040	0.0080	1.9040	0.7770	0.0059	1.6792	0.0079	0.0059	0.1	0.1
133	1330	0.0040	0.0080	1.9120	0.7830	0.0059	1.6872	0.0079	0.0059	0.1	0.1
134	1340	0.0040	0.0080	1.9200	0.7889	0.0060	1.6951	0.0079	0.0060	0.1	0.1
135	1350	0.0040	0.0080	1.9280	0.7949	0.0060	1.7030	0.0079	0.0060	0.1	0.1
136	1360	0.0040	0.0080	1.9360	0.8009	0.0060	1.7109	0.0079	0.0060	0.1	0.1
137	1370	0.0040	0.0080	1.9440	0.8068	0.0060	1.7189	0.0079	0.0060	0.1	0.1
138	1380	0.0040	0.0080	1.9520	0.8128	0.0060	1.7268	0.0079	0.0060	0.1	0.1
139	1390	0.0040	0.0080	1.9600	0.8188	0.0060	1.7347	0.0079	0.0060	0.1	0.1
140	1400	0.0040	0.0080	1.9680	0.8249	0.0060	1.7426	0.0079	0.0060	0.1	0.1
141	1410	0.0040	0.0080	1.9760	0.8309	0.0060	1.7506	0.0079	0.0060	0.1	0.1

(1) Time Increment	(2) Time	(3) Rainfall Distribution	(4) Incremental Rainfall	(5) Accumulated Rainfall	(6) Accumulated Runoff	(7) Incremental Runoff	(8) Accumulated Runoff	(9) Incremental Runoff	(10) Total Runoff	(11) Instant Hydrograph	(12) Design Hydrograph
	(Min)	(% of Pt)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(cfs)	(cfs)
142	1420	0.0040	0.0080	1.9840	0.8369	0.0060	1.7585	0.0079	0.0060	0.1	0.1
143	1430	0.0040	0.0080	1.9920	0.8429	0.0060	1.7664	0.0079	0.0060	0.1	0.1
144	1440	0.0040	0.0080	2.0000	0.8490	0.0061	1.7744	0.0079	0.0061	0.1	0.1
	Total	1.0000	2.0000						Hydrograph Volume (Cubic Feet)		10919

CES|NW

SANTA BARBARA URBAN HYDROGRAPH
SCS TYPE 1A 24-HOUR DISTRIBUTION

Project: *White Hawk*
Project Number: *1910*
Date: *Apr 28, 2015*

Basin: *Apartment Area*
Event: *1-Inch 24-Hr*

Given:

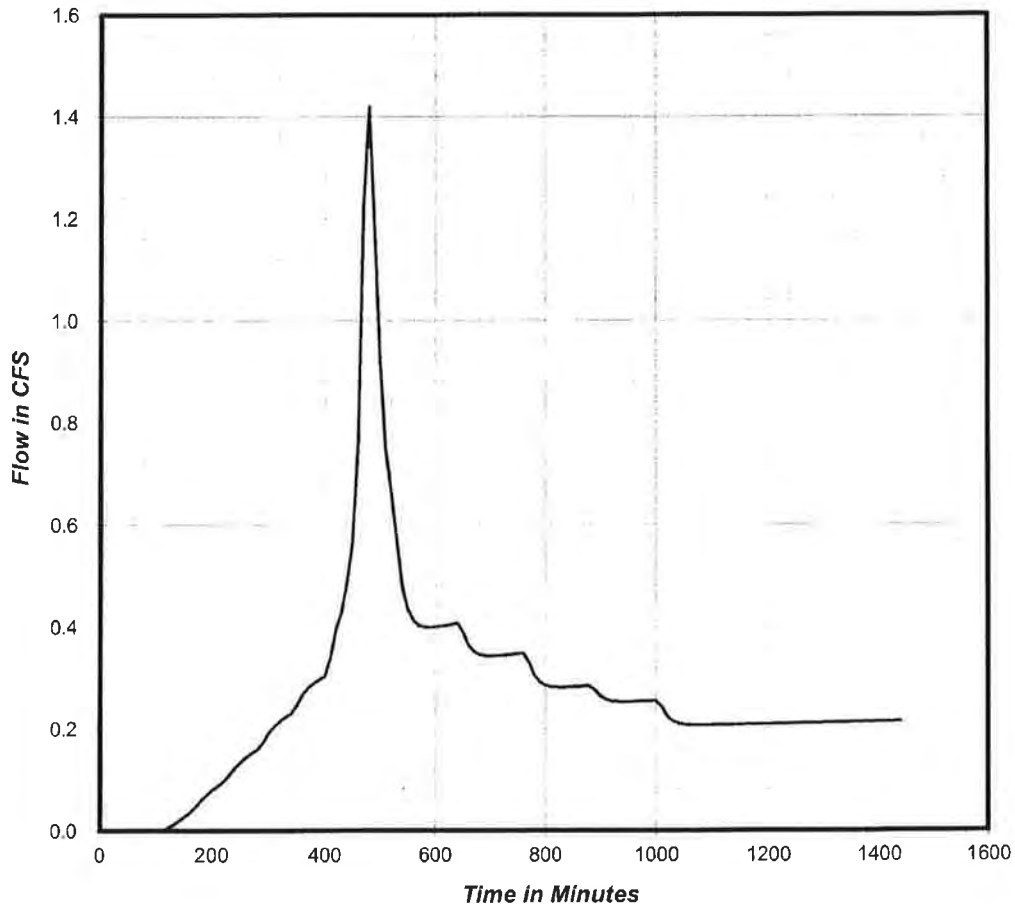
Area =	10.93	acres
Pt =	1	inches
dt =	10	min.
Tc =	15	min.
w =	0.2500	routing constant

Pervious Area		**Impervious Area**	
Area =	3.75 acres	Area =	7.18 acres
CN =	86	CN =	98
S =	1.63	S =	0.20
0.2S =	0.33	0.2S =	0.04

HYDROGRAPH RESULTS

Peak Runoff	1.4 cfs
Total Vol. :	23111 cf

Peak Runoff Hydrograph



					Pervious Area		Impervious Area				
(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
1	10	0.0040	0.0040	0.0040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0040	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0040	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
4	40	0.0040	0.0040	0.0160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
5	50	0.0040	0.0040	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
6	60	0.0040	0.0040	0.0240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
7	70	0.0040	0.0040	0.0280	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
8	80	0.0040	0.0040	0.0320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
9	90	0.0040	0.0040	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
10	100	0.0040	0.0040	0.0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
11	110	0.0050	0.0050	0.0450	0.0000	0.0000	0.0001	0.0001	0.0001	0.0	0.0
12	120	0.0050	0.0050	0.0500	0.0000	0.0000	0.0004	0.0003	0.0002	0.0	0.0
13	130	0.0050	0.0050	0.0550	0.0000	0.0000	0.0009	0.0005	0.0003	0.0	0.0
14	140	0.0050	0.0050	0.0600	0.0000	0.0000	0.0016	0.0007	0.0005	0.0	0.0
15	150	0.0050	0.0050	0.0650	0.0000	0.0000	0.0026	0.0009	0.0006	0.0	0.0
16	160	0.0050	0.0050	0.0700	0.0000	0.0000	0.0037	0.0011	0.0007	0.0	0.0
17	170	0.0060	0.0060	0.0760	0.0000	0.0000	0.0052	0.0015	0.0010	0.1	0.0
18	180	0.0060	0.0060	0.0820	0.0000	0.0000	0.0069	0.0017	0.0011	0.1	0.1
19	190	0.0060	0.0060	0.0880	0.0000	0.0000	0.0089	0.0019	0.0013	0.1	0.1
20	200	0.0060	0.0060	0.0940	0.0000	0.0000	0.0110	0.0021	0.0014	0.1	0.1
21	210	0.0060	0.0060	0.1000	0.0000	0.0000	0.0133	0.0023	0.0015	0.1	0.1
22	220	0.0060	0.0060	0.1060	0.0000	0.0000	0.0158	0.0025	0.0016	0.1	0.1
23	230	0.0070	0.0070	0.1130	0.0000	0.0000	0.0189	0.0031	0.0020	0.1	0.1
24	240	0.0070	0.0070	0.1200	0.0000	0.0000	0.0221	0.0033	0.0022	0.1	0.1
25	250	0.0070	0.0070	0.1270	0.0000	0.0000	0.0256	0.0035	0.0023	0.2	0.1
26	260	0.0070	0.0070	0.1340	0.0000	0.0000	0.0292	0.0036	0.0024	0.2	0.1
27	270	0.0070	0.0070	0.1410	0.0000	0.0000	0.0330	0.0038	0.0025	0.2	0.2
28	280	0.0070	0.0070	0.1480	0.0000	0.0000	0.0369	0.0039	0.0026	0.2	0.2
29	290	0.0082	0.0082	0.1562	0.0000	0.0000	0.0417	0.0048	0.0031	0.2	0.2
30	300	0.0082	0.0082	0.1644	0.0000	0.0000	0.0466	0.0049	0.0032	0.2	0.2
31	310	0.0082	0.0082	0.1726	0.0000	0.0000	0.0517	0.0051	0.0033	0.2	0.2
32	320	0.0082	0.0082	0.1808	0.0000	0.0000	0.0570	0.0052	0.0034	0.2	0.2
33	330	0.0082	0.0082	0.1890	0.0000	0.0000	0.0623	0.0054	0.0035	0.2	0.2
34	340	0.0082	0.0082	0.1972	0.0000	0.0000	0.0678	0.0055	0.0036	0.2	0.2
35	350	0.0095	0.0095	0.2067	0.0000	0.0000	0.0744	0.0065	0.0043	0.3	0.2
36	360	0.0095	0.0095	0.2162	0.0000	0.0000	0.0811	0.0067	0.0044	0.3	0.3
37	370	0.0095	0.0095	0.2257	0.0000	0.0000	0.0879	0.0068	0.0045	0.3	0.3
38	380	0.0095	0.0095	0.2352	0.0000	0.0000	0.0948	0.0069	0.0046	0.3	0.3
39	390	0.0095	0.0095	0.2447	0.0000	0.0000	0.1019	0.0071	0.0046	0.3	0.3
40	400	0.0095	0.0095	0.2542	0.0000	0.0000	0.1091	0.0072	0.0047	0.3	0.3
41	410	0.0134	0.0134	0.2676	0.0000	0.0000	0.1194	0.0103	0.0068	0.4	0.3
42	420	0.0134	0.0134	0.2810	0.0000	0.0000	0.1299	0.0105	0.0069	0.5	0.4
43	430	0.0134	0.0134	0.2944	0.0000	0.0000	0.1405	0.0107	0.0070	0.5	0.4
44	440	0.0180	0.0180	0.3124	0.0000	0.0000	0.1551	0.0146	0.0096	0.6	0.5
45	450	0.0180	0.0180	0.3304	0.0000	0.0000	0.1699	0.0148	0.0097	0.6	0.6
46	460	0.0340	0.0340	0.3644	0.0009	0.0009	0.1984	0.0286	0.0191	1.3	0.8
47	470	0.0540	0.0540	0.4184	0.0050	0.0041	0.2451	0.0467	0.0321	2.1	1.2
48	480	0.0270	0.0270	0.4454	0.0082	0.0032	0.2689	0.0238	0.0168	1.1	1.4
49	490	0.0180	0.0180	0.4634	0.0108	0.0025	0.2850	0.0160	0.0114	0.8	1.2
50	500	0.0134	0.0134	0.4768	0.0129	0.0021	0.2970	0.0120	0.0086	0.6	0.9
51	510	0.0134	0.0134	0.4902	0.0151	0.0023	0.3090	0.0121	0.0087	0.6	0.7
52	520	0.0134	0.0134	0.5036	0.0175	0.0024	0.3212	0.0121	0.0088	0.6	0.7
53	530	0.0088	0.0088	0.5124	0.0192	0.0017	0.3291	0.0080	0.0058	0.4	0.6
54	540	0.0088	0.0088	0.5212	0.0210	0.0018	0.3372	0.0080	0.0059	0.4	0.5
55	550	0.0088	0.0088	0.5300	0.0228	0.0018	0.3452	0.0080	0.0059	0.4	0.4
56	560	0.0088	0.0088	0.5388	0.0247	0.0019	0.3532	0.0080	0.0059	0.4	0.4
57	570	0.0088	0.0088	0.5476	0.0266	0.0020	0.3613	0.0081	0.0060	0.4	0.4
58	580	0.0088	0.0088	0.5564	0.0287	0.0020	0.3694	0.0081	0.0060	0.4	0.4
59	590	0.0088	0.0088	0.5652	0.0307	0.0021	0.3775	0.0081	0.0060	0.4	0.4
60	600	0.0088	0.0088	0.5740	0.0329	0.0021	0.3856	0.0081	0.0061	0.4	0.4
61	610	0.0088	0.0088	0.5828	0.0351	0.0022	0.3937	0.0081	0.0061	0.4	0.4
62	620	0.0088	0.0088	0.5916	0.0374	0.0023	0.4019	0.0081	0.0061	0.4	0.4
63	630	0.0088	0.0088	0.6004	0.0397	0.0023	0.4100	0.0082	0.0062	0.4	0.4
64	640	0.0088	0.0088	0.6092	0.0421	0.0024	0.4182	0.0082	0.0062	0.4	0.4
65	650	0.0072	0.0072	0.6164	0.0441	0.0020	0.4249	0.0067	0.0051	0.3	0.4
66	660	0.0072	0.0072	0.6236	0.0461	0.0020	0.4316	0.0067	0.0051	0.3	0.4
67	670	0.0072	0.0072	0.6308	0.0482	0.0021	0.4384	0.0067	0.0051	0.3	0.4
68	680	0.0072	0.0072	0.6380	0.0503	0.0021	0.4451	0.0067	0.0051	0.3	0.3

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (In)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (in)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (in)	(10) Total Runoff (In)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
69	690	0.0072	0.0072	0.6452	0.0525	0.0022	0.4518	0.0067	0.0052	0.3	0.3
70	700	0.0072	0.0072	0.6524	0.0546	0.0022	0.4586	0.0067	0.0052	0.3	0.3
71	710	0.0072	0.0072	0.6596	0.0569	0.0022	0.4653	0.0068	0.0052	0.3	0.3

(1) Time Increment	(2) Time	(3) Rainfall Distribution	(4) Incremental Rainfall	(5) Accumulated Rainfall	(6) Accumulated Runoff	(7) Incremental Runoff	(8) Accumulated Runoff	(9) Incremental Runoff	(10) Total Runoff	(11) Instant Hydrograph	(12) Design Hydrograph
	(Min)	(% of Pt)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(cfs)	(cfs)
72	720	0.0072	0.0072	0.6668	0.0591	0.0023	0.4721	0.0068	0.0052	0.3	0.3
73	730	0.0072	0.0072	0.6740	0.0614	0.0023	0.4788	0.0068	0.0052	0.3	0.3
74	740	0.0072	0.0072	0.6812	0.0638	0.0023	0.4856	0.0068	0.0053	0.3	0.3
75	750	0.0072	0.0072	0.6884	0.0661	0.0024	0.4924	0.0068	0.0053	0.3	0.3
76	760	0.0072	0.0072	0.6956	0.0685	0.0024	0.4992	0.0068	0.0053	0.3	0.3
77	770	0.0057	0.0057	0.7013	0.0705	0.0019	0.5046	0.0054	0.0042	0.3	0.3
78	780	0.0057	0.0057	0.7070	0.0724	0.0019	0.5100	0.0054	0.0042	0.3	0.3
79	790	0.0057	0.0057	0.7127	0.0744	0.0020	0.5153	0.0054	0.0042	0.3	0.3
80	800	0.0057	0.0057	0.7184	0.0764	0.0020	0.5207	0.0054	0.0042	0.3	0.3
81	810	0.0057	0.0057	0.7241	0.0784	0.0020	0.5261	0.0054	0.0042	0.3	0.3
82	820	0.0057	0.0057	0.7298	0.0804	0.0020	0.5315	0.0054	0.0042	0.3	0.3
83	830	0.0057	0.0057	0.7355	0.0825	0.0021	0.5369	0.0054	0.0043	0.3	0.3
84	840	0.0057	0.0057	0.7412	0.0845	0.0021	0.5424	0.0054	0.0043	0.3	0.3
85	850	0.0057	0.0057	0.7469	0.0866	0.0021	0.5478	0.0054	0.0043	0.3	0.3
86	860	0.0057	0.0057	0.7526	0.0887	0.0021	0.5532	0.0054	0.0043	0.3	0.3
87	870	0.0057	0.0057	0.7583	0.0909	0.0021	0.5586	0.0054	0.0043	0.3	0.3
88	880	0.0057	0.0057	0.7640	0.0930	0.0022	0.5640	0.0054	0.0043	0.3	0.3
89	890	0.0050	0.0050	0.7690	0.0949	0.0019	0.5688	0.0048	0.0038	0.2	0.3
90	900	0.0050	0.0050	0.7740	0.0968	0.0019	0.5735	0.0048	0.0038	0.3	0.3
91	910	0.0050	0.0050	0.7790	0.0988	0.0019	0.5783	0.0048	0.0038	0.3	0.3
92	920	0.0050	0.0050	0.7840	0.1007	0.0019	0.5831	0.0048	0.0038	0.3	0.3
93	930	0.0050	0.0050	0.7890	0.1027	0.0020	0.5878	0.0048	0.0038	0.3	0.3
94	940	0.0050	0.0050	0.7940	0.1047	0.0020	0.5926	0.0048	0.0038	0.3	0.3
95	950	0.0050	0.0050	0.7990	0.1067	0.0020	0.5974	0.0048	0.0038	0.3	0.3
96	960	0.0050	0.0050	0.8040	0.1087	0.0020	0.6022	0.0048	0.0038	0.3	0.3
97	970	0.0050	0.0050	0.8090	0.1107	0.0020	0.6069	0.0048	0.0038	0.3	0.3
98	980	0.0050	0.0050	0.8140	0.1127	0.0020	0.6117	0.0048	0.0038	0.3	0.3
99	990	0.0050	0.0050	0.8190	0.1148	0.0020	0.6165	0.0048	0.0038	0.3	0.3
100	1000	0.0050	0.0050	0.8240	0.1168	0.0021	0.6213	0.0048	0.0039	0.3	0.3
101	1010	0.0040	0.0040	0.8280	0.1185	0.0017	0.6251	0.0038	0.0031	0.2	0.2
102	1020	0.0040	0.0040	0.8320	0.1202	0.0017	0.6289	0.0038	0.0031	0.2	0.2
103	1030	0.0040	0.0040	0.8360	0.1218	0.0017	0.6328	0.0038	0.0031	0.2	0.2
104	1040	0.0040	0.0040	0.8400	0.1235	0.0017	0.6366	0.0038	0.0031	0.2	0.2
105	1050	0.0040	0.0040	0.8440	0.1252	0.0017	0.6405	0.0038	0.0031	0.2	0.2
106	1060	0.0040	0.0040	0.8480	0.1269	0.0017	0.6443	0.0038	0.0031	0.2	0.2
107	1070	0.0040	0.0040	0.8520	0.1286	0.0017	0.6481	0.0038	0.0031	0.2	0.2
108	1080	0.0040	0.0040	0.8560	0.1304	0.0017	0.6520	0.0038	0.0031	0.2	0.2
109	1090	0.0040	0.0040	0.8600	0.1321	0.0017	0.6558	0.0038	0.0031	0.2	0.2
110	1100	0.0040	0.0040	0.8640	0.1338	0.0017	0.6596	0.0038	0.0031	0.2	0.2
111	1110	0.0040	0.0040	0.8680	0.1356	0.0017	0.6635	0.0038	0.0031	0.2	0.2
112	1120	0.0040	0.0040	0.8720	0.1373	0.0018	0.6673	0.0038	0.0031	0.2	0.2
113	1130	0.0040	0.0040	0.8760	0.1391	0.0018	0.6712	0.0038	0.0031	0.2	0.2
114	1140	0.0040	0.0040	0.8800	0.1408	0.0018	0.6750	0.0038	0.0031	0.2	0.2
115	1150	0.0040	0.0040	0.8840	0.1426	0.0018	0.6789	0.0038	0.0031	0.2	0.2
116	1160	0.0040	0.0040	0.8880	0.1444	0.0018	0.6827	0.0038	0.0031	0.2	0.2
117	1170	0.0040	0.0040	0.8920	0.1462	0.0018	0.6866	0.0038	0.0031	0.2	0.2
118	1180	0.0040	0.0040	0.8960	0.1480	0.0018	0.6904	0.0039	0.0031	0.2	0.2
119	1190	0.0040	0.0040	0.9000	0.1498	0.0018	0.6943	0.0039	0.0032	0.2	0.2
120	1200	0.0040	0.0040	0.9040	0.1516	0.0018	0.6981	0.0039	0.0032	0.2	0.2
121	1210	0.0040	0.0040	0.9080	0.1535	0.0018	0.7020	0.0039	0.0032	0.2	0.2
122	1220	0.0040	0.0040	0.9120	0.1553	0.0018	0.7058	0.0039	0.0032	0.2	0.2
123	1230	0.0040	0.0040	0.9160	0.1571	0.0018	0.7097	0.0039	0.0032	0.2	0.2
124	1240	0.0040	0.0040	0.9200	0.1590	0.0018	0.7135	0.0039	0.0032	0.2	0.2
125	1250	0.0040	0.0040	0.9240	0.1609	0.0019	0.7174	0.0039	0.0032	0.2	0.2
126	1260	0.0040	0.0040	0.9280	0.1627	0.0019	0.7213	0.0039	0.0032	0.2	0.2
127	1270	0.0040	0.0040	0.9320	0.1646	0.0019	0.7251	0.0039	0.0032	0.2	0.2
128	1280	0.0040	0.0040	0.9360	0.1665	0.0019	0.7290	0.0039	0.0032	0.2	0.2
129	1290	0.0040	0.0040	0.9400	0.1684	0.0019	0.7329	0.0039	0.0032	0.2	0.2
130	1300	0.0040	0.0040	0.9440	0.1703	0.0019	0.7367	0.0039	0.0032	0.2	0.2
131	1310	0.0040	0.0040	0.9480	0.1722	0.0019	0.7406	0.0039	0.0032	0.2	0.2
132	1320	0.0040	0.0040	0.9520	0.1741	0.0019	0.7444	0.0039	0.0032	0.2	0.2
133	1330	0.0040	0.0040	0.9560	0.1760	0.0019	0.7483	0.0039	0.0032	0.2	0.2
134	1340	0.0040	0.0040	0.9600	0.1779	0.0019	0.7522	0.0039	0.0032	0.2	0.2
135	1350	0.0040	0.0040	0.9640	0.1798	0.0019	0.7560	0.0039	0.0032	0.2	0.2
136	1360	0.0040	0.0040	0.9680	0.1818	0.0019	0.7599	0.0039	0.0032	0.2	0.2
137	1370	0.0040	0.0040	0.9720	0.1837	0.0019	0.7638	0.0039	0.0032	0.2	0.2
138	1380	0.0040	0.0040	0.9760	0.1857	0.0020	0.7677	0.0039	0.0032	0.2	0.2
139	1390	0.0040	0.0040	0.9800	0.1876	0.0020	0.7715	0.0039	0.0032	0.2	0.2
140	1400	0.0040	0.0040	0.9840	0.1896	0.0020	0.7754	0.0039	0.0032	0.2	0.2
141	1410	0.0040	0.0040	0.9880	0.1916	0.0020	0.7793	0.0039	0.0032	0.2	0.2

(1) Time Incre-ment	(2) Time	(3) Rainfall Distri-bution	(4) Incre-mental Rainfall	(5) Accumu-lated Rainfall	(6) Accumu-lated Runoff	(7) Incre-mental Runoff	(8) Accumu-lated Runoff	(9) Incre-mental Runoff	(10) Total Runoff	(11) Instant Hydro-graph	(12) Design Hydro-graph
	(Min)	(% of Pt)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(cfs)	(cfs)
142	1420	0.0040	0.0040	0.9920	0.1936	0.0020	0.7832	0.0039	0.0032	0.2	0.2
143	1430	0.0040	0.0040	0.9960	0.1956	0.0020	0.7870	0.0039	0.0032	0.2	0.2
144	1440	0.0040	0.0040	1.0000	0.1976	0.0020	0.7909	0.0039	0.0032	0.2	0.2
	Total	1.0000	1.0000						Hydrograph Volume (Cubic Feet)		23111

CES|NW

SANTA BARBARA URBAN HYDROGRAPH
SCS TYPE 1A 24-HOUR DISTRIBUTION

Project: *White Hawk*
Project Number: *1910*
Date: *Apr 28, 2015*

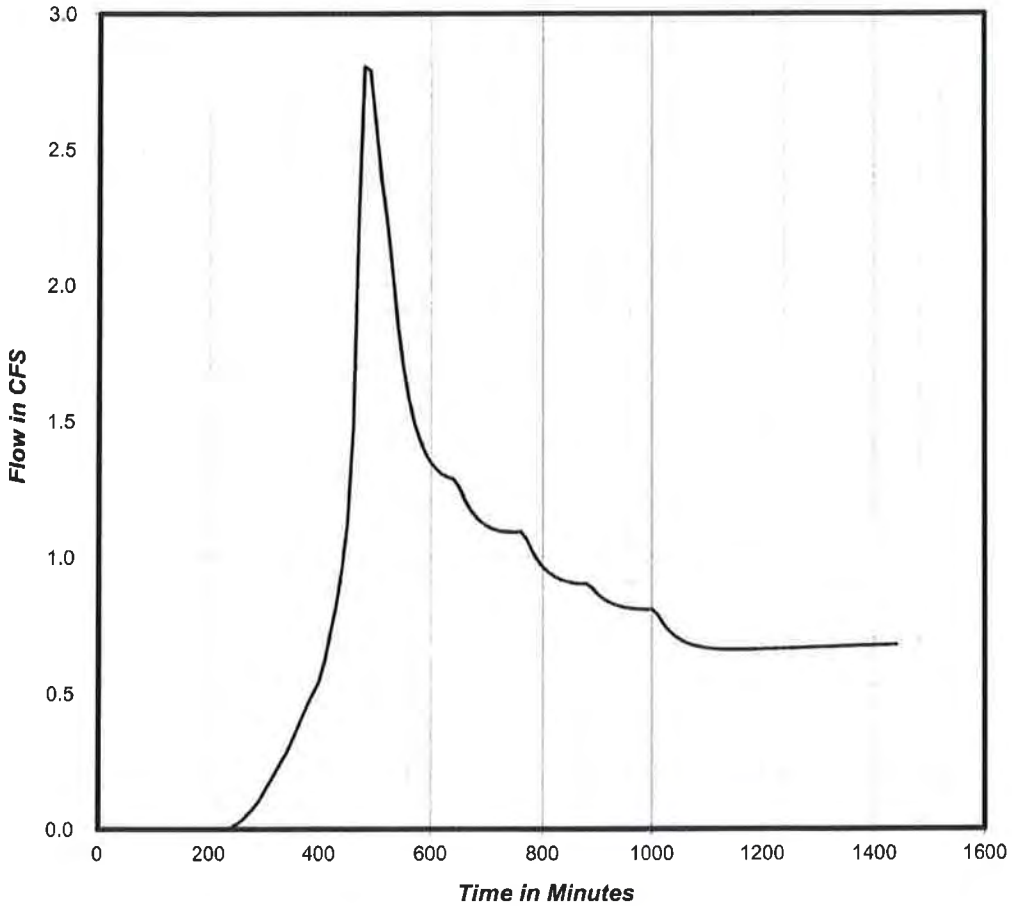
Basin: *Apartments*
Event: *10 Year Pre*

Given:

Area = 10.93 acres
Pt = 3 inches
dt = 10 min.
Tc = 38 min.
w = 0.1163 routing constant

Pervious Area		**Impervious Area**		**HYDROGRAPH RESULTS**	
Area =	10.93 acres	Area =	0 acres	Peak Runoff	2.8 cfs
CN =	86	CN =	98	Total Vol. :	64416 cf
S =	1.63	S =	0.20		
0.2S =	0.33	0.2S =	0.04		

Peak Runoff Hydrograph



					Pervious Area		Impervious Area				
(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
1	10	0.0040	0.0120	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0120	0.0240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0120	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
4	40	0.0040	0.0120	0.0480	0.0000	0.0000	0.0002	0.0002	0.0000	0.0	0.0
5	50	0.0040	0.0120	0.0600	0.0000	0.0000	0.0016	0.0014	0.0000	0.0	0.0
6	60	0.0040	0.0120	0.0720	0.0000	0.0000	0.0041	0.0025	0.0000	0.0	0.0
7	70	0.0040	0.0120	0.0840	0.0000	0.0000	0.0075	0.0034	0.0000	0.0	0.0
8	80	0.0040	0.0120	0.0960	0.0000	0.0000	0.0117	0.0042	0.0000	0.0	0.0
9	90	0.0040	0.0120	0.1080	0.0000	0.0000	0.0166	0.0049	0.0000	0.0	0.0
10	100	0.0040	0.0120	0.1200	0.0000	0.0000	0.0221	0.0055	0.0000	0.0	0.0
11	110	0.0050	0.0150	0.1350	0.0000	0.0000	0.0297	0.0076	0.0000	0.0	0.0
12	120	0.0050	0.0150	0.1500	0.0000	0.0000	0.0381	0.0083	0.0000	0.0	0.0
13	130	0.0050	0.0150	0.1650	0.0000	0.0000	0.0470	0.0089	0.0000	0.0	0.0
14	140	0.0050	0.0150	0.1800	0.0000	0.0000	0.0564	0.0095	0.0000	0.0	0.0
15	150	0.0050	0.0150	0.1950	0.0000	0.0000	0.0664	0.0099	0.0000	0.0	0.0
16	160	0.0050	0.0150	0.2100	0.0000	0.0000	0.0767	0.0103	0.0000	0.0	0.0
17	170	0.0060	0.0180	0.2280	0.0000	0.0000	0.0895	0.0129	0.0000	0.0	0.0
18	180	0.0060	0.0180	0.2460	0.0000	0.0000	0.1029	0.0133	0.0000	0.0	0.0
19	190	0.0060	0.0180	0.2640	0.0000	0.0000	0.1166	0.0137	0.0000	0.0	0.0
20	200	0.0060	0.0180	0.2820	0.0000	0.0000	0.1306	0.0141	0.0000	0.0	0.0
21	210	0.0060	0.0180	0.3000	0.0000	0.0000	0.1450	0.0144	0.0000	0.0	0.0
22	220	0.0060	0.0180	0.3180	0.0000	0.0000	0.1596	0.0146	0.0000	0.0	0.0
23	230	0.0070	0.0210	0.3390	0.0001	0.0001	0.1770	0.0174	0.0001	0.0	0.0
24	240	0.0070	0.0210	0.3600	0.0007	0.0006	0.1947	0.0177	0.0006	0.0	0.0
25	250	0.0070	0.0210	0.3810	0.0018	0.0011	0.2126	0.0179	0.0011	0.1	0.0
26	260	0.0070	0.0210	0.4020	0.0034	0.0016	0.2308	0.0182	0.0016	0.1	0.0
27	270	0.0070	0.0210	0.4230	0.0055	0.0021	0.2491	0.0184	0.0021	0.1	0.1
28	280	0.0070	0.0210	0.4440	0.0080	0.0025	0.2677	0.0185	0.0025	0.2	0.1
29	290	0.0082	0.0246	0.4686	0.0116	0.0035	0.2896	0.0219	0.0035	0.2	0.1
30	300	0.0082	0.0246	0.4932	0.0156	0.0041	0.3117	0.0221	0.0041	0.3	0.1
31	310	0.0082	0.0246	0.5178	0.0203	0.0047	0.3341	0.0223	0.0047	0.3	0.2
32	320	0.0082	0.0246	0.5424	0.0255	0.0052	0.3565	0.0225	0.0052	0.3	0.2
33	330	0.0082	0.0246	0.5670	0.0312	0.0057	0.3791	0.0226	0.0057	0.4	0.2
34	340	0.0082	0.0246	0.5916	0.0374	0.0062	0.4019	0.0227	0.0062	0.4	0.3
35	350	0.0095	0.0285	0.6201	0.0451	0.0078	0.4284	0.0265	0.0078	0.5	0.3
36	360	0.0095	0.0285	0.6486	0.0535	0.0084	0.4550	0.0266	0.0084	0.6	0.4
37	370	0.0095	0.0285	0.6771	0.0624	0.0089	0.4818	0.0268	0.0089	0.6	0.4
38	380	0.0095	0.0285	0.7056	0.0719	0.0095	0.5086	0.0269	0.0095	0.6	0.5
39	390	0.0095	0.0285	0.7341	0.0820	0.0100	0.5356	0.0270	0.0100	0.7	0.5
40	400	0.0095	0.0285	0.7626	0.0925	0.0105	0.5627	0.0271	0.0105	0.7	0.5
41	410	0.0134	0.0402	0.8028	0.1082	0.0157	0.6010	0.0383	0.0157	1.0	0.6
42	420	0.0134	0.0402	0.8430	0.1248	0.0166	0.6395	0.0385	0.0166	1.1	0.7
43	430	0.0134	0.0402	0.8832	0.1423	0.0175	0.6781	0.0386	0.0175	1.2	0.8
44	440	0.0180	0.0540	0.9372	0.1670	0.0248	0.7301	0.0520	0.0248	1.6	1.0
45	450	0.0180	0.0540	0.9912	0.1932	0.0261	0.7824	0.0522	0.0261	1.7	1.1
46	460	0.0340	0.1020	1.0932	0.2460	0.0528	0.8815	0.0991	0.0528	3.5	1.5
47	470	0.0540	0.1620	1.2552	0.3379	0.0919	1.0397	0.1582	0.0919	6.1	2.2
48	480	0.0270	0.0810	1.3362	0.3871	0.0492	1.1191	0.0794	0.0492	3.3	2.8
49	490	0.0180	0.0540	1.3902	0.4209	0.0339	1.1721	0.0530	0.0339	2.2	2.8
50	500	0.0134	0.0402	1.4304	0.4467	0.0257	1.2116	0.0395	0.0257	1.7	2.6
51	510	0.0134	0.0402	1.4706	0.4728	0.0261	1.2512	0.0396	0.0261	1.7	2.4
52	520	0.0134	0.0402	1.5108	0.4994	0.0265	1.2908	0.0396	0.0265	1.8	2.2
53	530	0.0088	0.0264	1.5372	0.5170	0.0176	1.3168	0.0260	0.0176	1.2	2.1
54	540	0.0088	0.0264	1.5636	0.5348	0.0178	1.3428	0.0260	0.0178	1.2	1.9
55	550	0.0088	0.0264	1.5900	0.5528	0.0180	1.3689	0.0260	0.0180	1.2	1.7
56	560	0.0088	0.0264	1.6164	0.5709	0.0181	1.3949	0.0260	0.0181	1.2	1.6
57	570	0.0088	0.0264	1.6428	0.5891	0.0183	1.4210	0.0261	0.0183	1.2	1.5
58	580	0.0088	0.0264	1.6692	0.6075	0.0184	1.4470	0.0261	0.0184	1.2	1.4
59	590	0.0088	0.0264	1.6956	0.6261	0.0185	1.4731	0.0261	0.0185	1.2	1.4
60	600	0.0088	0.0264	1.7220	0.6448	0.0187	1.4992	0.0261	0.0187	1.2	1.3
61	610	0.0088	0.0264	1.7484	0.6636	0.0188	1.5253	0.0261	0.0188	1.2	1.3
62	620	0.0088	0.0264	1.7748	0.6825	0.0189	1.5514	0.0261	0.0189	1.3	1.3
63	630	0.0088	0.0264	1.8012	0.7016	0.0191	1.5775	0.0261	0.0191	1.3	1.3
64	640	0.0088	0.0264	1.8276	0.7208	0.0192	1.6036	0.0261	0.0192	1.3	1.3
65	650	0.0072	0.0216	1.8492	0.7366	0.0158	1.6250	0.0214	0.0158	1.0	1.3
66	660	0.0072	0.0216	1.8708	0.7525	0.0159	1.6464	0.0214	0.0159	1.0	1.2
67	670	0.0072	0.0216	1.8924	0.7684	0.0160	1.6678	0.0214	0.0160	1.1	1.2
68	680	0.0072	0.0216	1.9140	0.7845	0.0160	1.6892	0.0214	0.0160	1.1	1.1

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (in)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (In)	(9) Incre-mental Runoff (In)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
69	690	0.0072	0.0216	1.9356	0.8006	0.0161	1.7105	0.0214	0.0161	1.1	1.1
70	700	0.0072	0.0216	1.9572	0.8167	0.0162	1.7319	0.0214	0.0162	1.1	1.1
71	710	0.0072	0.0216	1.9788	0.8330	0.0162	1.7533	0.0214	0.0162	1.1	1.1

(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
72	720	0.0072	0.0216	2.0004	0.8493	0.0163	1.7748	0.0214	0.0163	1.1	1.1
73	730	0.0072	0.0216	2.0220	0.8657	0.0164	1.7962	0.0214	0.0164	1.1	1.1
74	740	0.0072	0.0216	2.0436	0.8821	0.0165	1.8176	0.0214	0.0165	1.1	1.1
75	750	0.0072	0.0216	2.0652	0.8987	0.0165	1.8390	0.0214	0.0165	1.1	1.1
76	760	0.0072	0.0216	2.0868	0.9152	0.0166	1.8604	0.0214	0.0166	1.1	1.1
77	770	0.0057	0.0171	2.1039	0.9284	0.0132	1.8774	0.0170	0.0132	0.9	1.1
78	780	0.0057	0.0171	2.1210	0.9416	0.0132	1.8943	0.0170	0.0132	0.9	1.0
79	790	0.0057	0.0171	2.1381	0.9549	0.0133	1.9113	0.0170	0.0133	0.9	1.0
80	800	0.0057	0.0171	2.1552	0.9682	0.0133	1.9283	0.0170	0.0133	0.9	1.0
81	810	0.0057	0.0171	2.1723	0.9815	0.0133	1.9452	0.0170	0.0133	0.9	0.9
82	820	0.0057	0.0171	2.1894	0.9949	0.0134	1.9622	0.0170	0.0134	0.9	0.9
83	830	0.0057	0.0171	2.2065	1.0083	0.0134	1.9792	0.0170	0.0134	0.9	0.9
84	840	0.0057	0.0171	2.2236	1.0217	0.0134	1.9962	0.0170	0.0134	0.9	0.9
85	850	0.0057	0.0171	2.2407	1.0352	0.0135	2.0131	0.0170	0.0135	0.9	0.9
86	860	0.0057	0.0171	2.2578	1.0487	0.0135	2.0301	0.0170	0.0135	0.9	0.9
87	870	0.0057	0.0171	2.2749	1.0622	0.0135	2.0471	0.0170	0.0135	0.9	0.9
88	880	0.0057	0.0171	2.2920	1.0758	0.0136	2.0641	0.0170	0.0136	0.9	0.9
89	890	0.0050	0.0150	2.3070	1.0877	0.0119	2.0790	0.0149	0.0119	0.8	0.9
90	900	0.0050	0.0150	2.3220	1.0997	0.0120	2.0939	0.0149	0.0120	0.8	0.9
91	910	0.0050	0.0150	2.3370	1.1117	0.0120	2.1088	0.0149	0.0120	0.8	0.8
92	920	0.0050	0.0150	2.3520	1.1237	0.0120	2.1237	0.0149	0.0120	0.8	0.8
93	930	0.0050	0.0150	2.3670	1.1357	0.0120	2.1386	0.0149	0.0120	0.8	0.8
94	940	0.0050	0.0150	2.3820	1.1478	0.0121	2.1535	0.0149	0.0121	0.8	0.8
95	950	0.0050	0.0150	2.3970	1.1599	0.0121	2.1684	0.0149	0.0121	0.8	0.8
96	960	0.0050	0.0150	2.4120	1.1720	0.0121	2.1833	0.0149	0.0121	0.8	0.8
97	970	0.0050	0.0150	2.4270	1.1841	0.0121	2.1982	0.0149	0.0121	0.8	0.8
98	980	0.0050	0.0150	2.4420	1.1963	0.0122	2.2131	0.0149	0.0122	0.8	0.8
99	990	0.0050	0.0150	2.4570	1.2084	0.0122	2.2280	0.0149	0.0122	0.8	0.8
100	1000	0.0050	0.0150	2.4720	1.2206	0.0122	2.2429	0.0149	0.0122	0.8	0.8
101	1010	0.0040	0.0120	2.4840	1.2304	0.0098	2.2548	0.0119	0.0098	0.6	0.8
102	1020	0.0040	0.0120	2.4960	1.2402	0.0098	2.2668	0.0119	0.0098	0.6	0.8
103	1030	0.0040	0.0120	2.5080	1.2500	0.0098	2.2787	0.0119	0.0098	0.6	0.7
104	1040	0.0040	0.0120	2.5200	1.2598	0.0098	2.2906	0.0119	0.0098	0.6	0.7
105	1050	0.0040	0.0120	2.5320	1.2697	0.0098	2.3026	0.0119	0.0098	0.7	0.7
106	1060	0.0040	0.0120	2.5440	1.2795	0.0098	2.3145	0.0119	0.0098	0.7	0.7
107	1070	0.0040	0.0120	2.5560	1.2894	0.0099	2.3264	0.0119	0.0099	0.7	0.7
108	1080	0.0040	0.0120	2.5680	1.2992	0.0099	2.3384	0.0119	0.0099	0.7	0.7
109	1090	0.0040	0.0120	2.5800	1.3091	0.0099	2.3503	0.0119	0.0099	0.7	0.7
110	1100	0.0040	0.0120	2.5920	1.3190	0.0099	2.3622	0.0119	0.0099	0.7	0.7
111	1110	0.0040	0.0120	2.6040	1.3289	0.0099	2.3742	0.0119	0.0099	0.7	0.7
112	1120	0.0040	0.0120	2.6160	1.3388	0.0099	2.3861	0.0119	0.0099	0.7	0.7
113	1130	0.0040	0.0120	2.6280	1.3488	0.0099	2.3980	0.0119	0.0099	0.7	0.7
114	1140	0.0040	0.0120	2.6400	1.3587	0.0099	2.4100	0.0119	0.0099	0.7	0.7
115	1150	0.0040	0.0120	2.6520	1.3687	0.0100	2.4219	0.0119	0.0100	0.7	0.7
116	1160	0.0040	0.0120	2.6640	1.3787	0.0100	2.4338	0.0119	0.0100	0.7	0.7
117	1170	0.0040	0.0120	2.6760	1.3886	0.0100	2.4458	0.0119	0.0100	0.7	0.7
118	1180	0.0040	0.0120	2.6880	1.3986	0.0100	2.4577	0.0119	0.0100	0.7	0.7
119	1190	0.0040	0.0120	2.7000	1.4086	0.0100	2.4696	0.0119	0.0100	0.7	0.7
120	1200	0.0040	0.0120	2.7120	1.4187	0.0100	2.4816	0.0119	0.0100	0.7	0.7
121	1210	0.0040	0.0120	2.7240	1.4287	0.0100	2.4935	0.0119	0.0100	0.7	0.7
122	1220	0.0040	0.0120	2.7360	1.4387	0.0100	2.5055	0.0119	0.0100	0.7	0.7
123	1230	0.0040	0.0120	2.7480	1.4488	0.0101	2.5174	0.0119	0.0101	0.7	0.7
124	1240	0.0040	0.0120	2.7600	1.4589	0.0101	2.5293	0.0119	0.0101	0.7	0.7
125	1250	0.0040	0.0120	2.7720	1.4689	0.0101	2.5413	0.0119	0.0101	0.7	0.7
126	1260	0.0040	0.0120	2.7840	1.4790	0.0101	2.5532	0.0119	0.0101	0.7	0.7
127	1270	0.0040	0.0120	2.7960	1.4891	0.0101	2.5652	0.0119	0.0101	0.7	0.7
128	1280	0.0040	0.0120	2.8080	1.4992	0.0101	2.5771	0.0119	0.0101	0.7	0.7
129	1290	0.0040	0.0120	2.8200	1.5094	0.0101	2.5891	0.0119	0.0101	0.7	0.7
130	1300	0.0040	0.0120	2.8320	1.5195	0.0101	2.6010	0.0119	0.0101	0.7	0.7
131	1310	0.0040	0.0120	2.8440	1.5297	0.0101	2.6130	0.0119	0.0101	0.7	0.7
132	1320	0.0040	0.0120	2.8560	1.5398	0.0102	2.6249	0.0119	0.0102	0.7	0.7
133	1330	0.0040	0.0120	2.8680	1.5500	0.0102	2.6368	0.0119	0.0102	0.7	0.7
134	1340	0.0040	0.0120	2.8800	1.5601	0.0102	2.6488	0.0119	0.0102	0.7	0.7
135	1350	0.0040	0.0120	2.8920	1.5703	0.0102	2.6607	0.0119	0.0102	0.7	0.7
136	1360	0.0040	0.0120	2.9040	1.5805	0.0102	2.6727	0.0119	0.0102	0.7	0.7
137	1370	0.0040	0.0120	2.9160	1.5907	0.0102	2.6846	0.0119	0.0102	0.7	0.7
138	1380	0.0040	0.0120	2.9280	1.6010	0.0102	2.6966	0.0119	0.0102	0.7	0.7
139	1390	0.0040	0.0120	2.9400	1.6112	0.0102	2.7085	0.0119	0.0102	0.7	0.7
140	1400	0.0040	0.0120	2.9520	1.6214	0.0102	2.7205	0.0119	0.0102	0.7	0.7
141	1410	0.0040	0.0120	2.9640	1.6317	0.0102	2.7324	0.0119	0.0102	0.7	0.7

(1) Time Increment	(2) Time	(3) Rainfall Distribution	(4) Incremental Rainfall	(5) Accumulated Rainfall	(6) Accumulated Runoff	(7) Incremental Runoff	(8) Accumulated Runoff	(9) Incremental Runoff	(10) Total Runoff	(11) Instant Hydrograph	(12) Design Hydrograph
	(Min)	(% of Pt)	(in)	(In)	(in)	(in)	(in)	(In)	(In)	(cfs)	(cfs)
142	1420	0.0040	0.0120	2.9760	1.6419	0.0103	2.7444	0.0119	0.0103	0.7	0.7
143	1430	0.0040	0.0120	2.9880	1.6522	0.0103	2.7563	0.0119	0.0103	0.7	0.7
144	1440	0.0040	0.0120	3.0000	1.6625	0.0103	2.7683	0.0119	0.0103	0.7	0.7
	Total	1.0000	3.0000						Hydrograph Volume (Cubic Feet)		64416

CES|NW

SANTA BARBARA URBAN HYDROGRAPH
SCS TYPE 1A 24-HOUR DISTRIBUTION

Project: *White Hawk*
Project Number: *1910*
Date: *Apr 28, 2015*

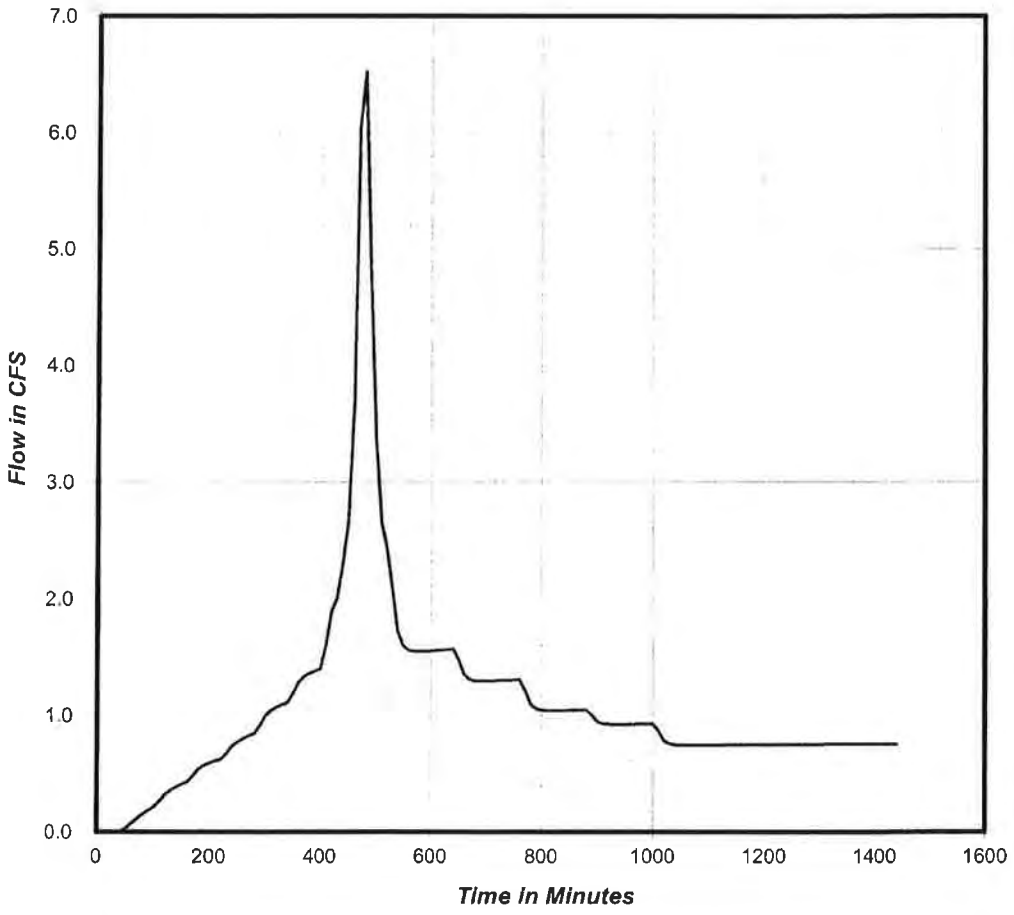
Basin: *Apartments*
Event: *10 Year Post*

Given:

Area = 10.93 acres
Pt = 3 inches
dt = 10 min.
Tc = 10 min.
w = 0.3333 routing constant

Pervious Area		**Impervious Area**		**HYDROGRAPH RESULTS**	
Area =	3.75 acres	Area =	7.18 acres	Peak Runof	6.5 cfs
CN =	86	CN =	98	Total Vol. :	94330 cf
S =	1.63	S =	0.20		
0.2S =	0.33	0.2S =	0.04		

Peak Runoff Hydrograph



					Pervious Area		Impervious Area				
(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
1	10	0.0040	0.0120	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0120	0.0240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0120	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
4	40	0.0040	0.0120	0.0480	0.0000	0.0000	0.0002	0.0002	0.0002	0.0	0.0
5	50	0.0040	0.0120	0.0600	0.0000	0.0000	0.0016	0.0014	0.0009	0.1	0.0
6	60	0.0040	0.0120	0.0720	0.0000	0.0000	0.0041	0.0025	0.0016	0.1	0.1
7	70	0.0040	0.0120	0.0840	0.0000	0.0000	0.0075	0.0034	0.0022	0.1	0.1
8	80	0.0040	0.0120	0.0960	0.0000	0.0000	0.0117	0.0042	0.0028	0.2	0.1
9	90	0.0040	0.0120	0.1080	0.0000	0.0000	0.0166	0.0049	0.0032	0.2	0.2
10	100	0.0040	0.0120	0.1200	0.0000	0.0000	0.0221	0.0055	0.0036	0.2	0.2
11	110	0.0050	0.0150	0.1350	0.0000	0.0000	0.0297	0.0076	0.0050	0.3	0.3
12	120	0.0050	0.0150	0.1500	0.0000	0.0000	0.0381	0.0083	0.0055	0.4	0.3
13	130	0.0050	0.0150	0.1650	0.0000	0.0000	0.0470	0.0089	0.0059	0.4	0.4
14	140	0.0050	0.0150	0.1800	0.0000	0.0000	0.0564	0.0095	0.0062	0.4	0.4
15	150	0.0050	0.0150	0.1950	0.0000	0.0000	0.0664	0.0099	0.0065	0.4	0.4
16	160	0.0050	0.0150	0.2100	0.0000	0.0000	0.0767	0.0103	0.0068	0.4	0.4
17	170	0.0060	0.0180	0.2280	0.0000	0.0000	0.0895	0.0129	0.0085	0.6	0.5
18	180	0.0060	0.0180	0.2460	0.0000	0.0000	0.1029	0.0133	0.0087	0.6	0.5
19	190	0.0060	0.0180	0.2640	0.0000	0.0000	0.1166	0.0137	0.0090	0.6	0.6
20	200	0.0060	0.0180	0.2820	0.0000	0.0000	0.1306	0.0141	0.0092	0.6	0.6
21	210	0.0060	0.0180	0.3000	0.0000	0.0000	0.1450	0.0144	0.0094	0.6	0.6
22	220	0.0060	0.0180	0.3180	0.0000	0.0000	0.1596	0.0146	0.0096	0.6	0.6
23	230	0.0070	0.0210	0.3390	0.0001	0.0001	0.1770	0.0174	0.0115	0.8	0.7
24	240	0.0070	0.0210	0.3600	0.0007	0.0006	0.1947	0.0177	0.0118	0.8	0.7
25	250	0.0070	0.0210	0.3810	0.0018	0.0011	0.2126	0.0179	0.0122	0.8	0.8
26	260	0.0070	0.0210	0.4020	0.0034	0.0016	0.2308	0.0182	0.0125	0.8	0.8
27	270	0.0070	0.0210	0.4230	0.0055	0.0021	0.2491	0.0184	0.0128	0.8	0.8
28	280	0.0070	0.0210	0.4440	0.0080	0.0025	0.2677	0.0185	0.0130	0.9	0.8
29	290	0.0082	0.0246	0.4686	0.0116	0.0035	0.2896	0.0219	0.0156	1.0	0.9
30	300	0.0082	0.0246	0.4932	0.0156	0.0041	0.3117	0.0221	0.0159	1.1	1.0
31	310	0.0082	0.0246	0.5178	0.0203	0.0047	0.3341	0.0223	0.0163	1.1	1.0
32	320	0.0082	0.0246	0.5424	0.0255	0.0052	0.3565	0.0225	0.0165	1.1	1.1
33	330	0.0082	0.0246	0.5670	0.0312	0.0057	0.3791	0.0226	0.0168	1.1	1.1
34	340	0.0082	0.0246	0.5916	0.0374	0.0062	0.4019	0.0227	0.0171	1.1	1.1
35	350	0.0095	0.0285	0.6201	0.0451	0.0078	0.4284	0.0265	0.0201	1.3	1.2
36	360	0.0095	0.0285	0.6486	0.0535	0.0084	0.4550	0.0266	0.0204	1.3	1.3
37	370	0.0095	0.0285	0.6771	0.0624	0.0089	0.4818	0.0268	0.0206	1.4	1.3
38	380	0.0095	0.0285	0.7056	0.0719	0.0095	0.5086	0.0269	0.0209	1.4	1.4
39	390	0.0095	0.0285	0.7341	0.0820	0.0100	0.5356	0.0270	0.0212	1.4	1.4
40	400	0.0095	0.0285	0.7626	0.0925	0.0105	0.5627	0.0271	0.0214	1.4	1.4
41	410	0.0134	0.0402	0.8028	0.1082	0.0157	0.6010	0.0383	0.0306	2.0	1.6
42	420	0.0134	0.0402	0.8430	0.1248	0.0166	0.6395	0.0385	0.0310	2.0	1.9
43	430	0.0134	0.0402	0.8832	0.1423	0.0175	0.6781	0.0386	0.0314	2.1	2.0
44	440	0.0180	0.0540	0.9372	0.1670	0.0248	0.7301	0.0520	0.0427	2.8	2.3
45	450	0.0180	0.0540	0.9912	0.1932	0.0261	0.7824	0.0522	0.0433	2.9	2.7
46	460	0.0340	0.1020	1.0932	0.2460	0.0528	0.8815	0.0991	0.0832	5.5	3.7
47	470	0.0540	0.1620	1.2552	0.3379	0.0919	1.0397	0.1582	0.1355	9.0	6.0
48	480	0.0270	0.0810	1.3362	0.3871	0.0492	1.1191	0.0794	0.0690	4.6	6.5
49	490	0.0180	0.0540	1.3902	0.4209	0.0339	1.1721	0.0530	0.0465	3.1	4.7
50	500	0.0134	0.0402	1.4304	0.4467	0.0257	1.2116	0.0395	0.0348	2.3	3.4
51	510	0.0134	0.0402	1.4706	0.4728	0.0261	1.2512	0.0396	0.0350	2.3	2.7
52	520	0.0134	0.0402	1.5108	0.4994	0.0265	1.2908	0.0396	0.0351	2.3	2.4
53	530	0.0088	0.0264	1.5372	0.5170	0.0176	1.3168	0.0260	0.0231	1.5	2.1
54	540	0.0088	0.0264	1.5636	0.5348	0.0178	1.3428	0.0260	0.0232	1.5	1.7
55	550	0.0088	0.0264	1.5900	0.5528	0.0180	1.3689	0.0260	0.0233	1.5	1.6
56	560	0.0088	0.0264	1.6164	0.5709	0.0181	1.3949	0.0260	0.0233	1.5	1.6
57	570	0.0088	0.0264	1.6428	0.5891	0.0183	1.4210	0.0261	0.0234	1.5	1.5
58	580	0.0088	0.0264	1.6692	0.6075	0.0184	1.4470	0.0261	0.0234	1.5	1.5
59	590	0.0088	0.0264	1.6956	0.6261	0.0185	1.4731	0.0261	0.0235	1.6	1.6
60	600	0.0088	0.0264	1.7220	0.6448	0.0187	1.4992	0.0261	0.0235	1.6	1.6
61	610	0.0088	0.0264	1.7484	0.6636	0.0188	1.5253	0.0261	0.0236	1.6	1.6
62	620	0.0088	0.0264	1.7748	0.6825	0.0189	1.5514	0.0261	0.0236	1.6	1.6
63	630	0.0088	0.0264	1.8012	0.7016	0.0191	1.5775	0.0261	0.0237	1.6	1.6
64	640	0.0088	0.0264	1.8276	0.7208	0.0192	1.6036	0.0261	0.0237	1.6	1.6
65	650	0.0072	0.0216	1.8492	0.7366	0.0158	1.6250	0.0214	0.0195	1.3	1.5
66	660	0.0072	0.0216	1.8708	0.7525	0.0159	1.6464	0.0214	0.0195	1.3	1.4
67	670	0.0072	0.0216	1.8924	0.7684	0.0160	1.6678	0.0214	0.0195	1.3	1.3
68	680	0.0072	0.0216	1.9140	0.7845	0.0160	1.6892	0.0214	0.0196	1.3	1.3

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (In)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (In)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
69	690	0.0072	0.0216	1.9356	0.8006	0.0161	1.7105	0.0214	0.0196	1.3	1.3
70	700	0.0072	0.0216	1.9572	0.8167	0.0162	1.7319	0.0214	0.0196	1.3	1.3
71	710	0.0072	0.0216	1.9788	0.8330	0.0162	1.7533	0.0214	0.0196	1.3	1.3

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (in)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
72	720	0.0072	0.0216	2.0004	0.8493	0.0163	1.7748	0.0214	0.0197	1.3	1.3
73	730	0.0072	0.0216	2.0220	0.8657	0.0164	1.7962	0.0214	0.0197	1.3	1.3
74	740	0.0072	0.0216	2.0436	0.8821	0.0165	1.8176	0.0214	0.0197	1.3	1.3
75	750	0.0072	0.0216	2.0652	0.8987	0.0165	1.8390	0.0214	0.0197	1.3	1.3
76	760	0.0072	0.0216	2.0868	0.9152	0.0166	1.8604	0.0214	0.0198	1.3	1.3
77	770	0.0057	0.0171	2.1039	0.9284	0.0132	1.8774	0.0170	0.0157	1.0	1.2
78	780	0.0057	0.0171	2.1210	0.9416	0.0132	1.8943	0.0170	0.0157	1.0	1.1
79	790	0.0057	0.0171	2.1381	0.9549	0.0133	1.9113	0.0170	0.0157	1.0	1.1
80	800	0.0057	0.0171	2.1552	0.9682	0.0133	1.9283	0.0170	0.0157	1.0	1.0
81	810	0.0057	0.0171	2.1723	0.9815	0.0133	1.9452	0.0170	0.0157	1.0	1.0
82	820	0.0057	0.0171	2.1894	0.9949	0.0134	1.9622	0.0170	0.0157	1.0	1.0
83	830	0.0057	0.0171	2.2065	1.0083	0.0134	1.9792	0.0170	0.0157	1.0	1.0
84	840	0.0057	0.0171	2.2236	1.0217	0.0134	1.9962	0.0170	0.0158	1.0	1.0
85	850	0.0057	0.0171	2.2407	1.0352	0.0135	2.0131	0.0170	0.0158	1.0	1.0
86	860	0.0057	0.0171	2.2578	1.0487	0.0135	2.0301	0.0170	0.0158	1.0	1.0
87	870	0.0057	0.0171	2.2749	1.0622	0.0135	2.0471	0.0170	0.0158	1.0	1.0
88	880	0.0057	0.0171	2.2920	1.0758	0.0136	2.0641	0.0170	0.0158	1.0	1.0
89	890	0.0050	0.0150	2.3070	1.0877	0.0119	2.0790	0.0149	0.0139	0.9	1.0
90	900	0.0050	0.0150	2.3220	1.0997	0.0120	2.0939	0.0149	0.0139	0.9	0.9
91	910	0.0050	0.0150	2.3370	1.1117	0.0120	2.1088	0.0149	0.0139	0.9	0.9
92	920	0.0050	0.0150	2.3520	1.1237	0.0120	2.1237	0.0149	0.0139	0.9	0.9
93	930	0.0050	0.0150	2.3670	1.1357	0.0120	2.1386	0.0149	0.0139	0.9	0.9
94	940	0.0050	0.0150	2.3820	1.1478	0.0121	2.1535	0.0149	0.0139	0.9	0.9
95	950	0.0050	0.0150	2.3970	1.1599	0.0121	2.1684	0.0149	0.0139	0.9	0.9
96	960	0.0050	0.0150	2.4120	1.1720	0.0121	2.1833	0.0149	0.0139	0.9	0.9
97	970	0.0050	0.0150	2.4270	1.1841	0.0121	2.1982	0.0149	0.0140	0.9	0.9
98	980	0.0050	0.0150	2.4420	1.1963	0.0122	2.2131	0.0149	0.0140	0.9	0.9
99	990	0.0050	0.0150	2.4570	1.2084	0.0122	2.2280	0.0149	0.0140	0.9	0.9
100	1000	0.0050	0.0150	2.4720	1.2206	0.0122	2.2429	0.0149	0.0140	0.9	0.9
101	1010	0.0040	0.0120	2.4840	1.2304	0.0098	2.2548	0.0119	0.0112	0.7	0.9
102	1020	0.0040	0.0120	2.4960	1.2402	0.0098	2.2668	0.0119	0.0112	0.7	0.8
103	1030	0.0040	0.0120	2.5080	1.2500	0.0098	2.2787	0.0119	0.0112	0.7	0.8
104	1040	0.0040	0.0120	2.5200	1.2598	0.0098	2.2906	0.0119	0.0112	0.7	0.7
105	1050	0.0040	0.0120	2.5320	1.2697	0.0098	2.3026	0.0119	0.0112	0.7	0.7
106	1060	0.0040	0.0120	2.5440	1.2795	0.0098	2.3145	0.0119	0.0112	0.7	0.7
107	1070	0.0040	0.0120	2.5560	1.2894	0.0099	2.3264	0.0119	0.0112	0.7	0.7
108	1080	0.0040	0.0120	2.5680	1.2992	0.0099	2.3384	0.0119	0.0112	0.7	0.7
109	1090	0.0040	0.0120	2.5800	1.3091	0.0099	2.3503	0.0119	0.0112	0.7	0.7
110	1100	0.0040	0.0120	2.5920	1.3190	0.0099	2.3622	0.0119	0.0112	0.7	0.7
111	1110	0.0040	0.0120	2.6040	1.3289	0.0099	2.3742	0.0119	0.0112	0.7	0.7
112	1120	0.0040	0.0120	2.6160	1.3388	0.0099	2.3861	0.0119	0.0112	0.7	0.7
113	1130	0.0040	0.0120	2.6280	1.3488	0.0099	2.3980	0.0119	0.0112	0.7	0.7
114	1140	0.0040	0.0120	2.6400	1.3587	0.0099	2.4100	0.0119	0.0113	0.7	0.7
115	1150	0.0040	0.0120	2.6520	1.3687	0.0100	2.4219	0.0119	0.0113	0.7	0.7
116	1160	0.0040	0.0120	2.6640	1.3787	0.0100	2.4338	0.0119	0.0113	0.7	0.7
117	1170	0.0040	0.0120	2.6760	1.3886	0.0100	2.4458	0.0119	0.0113	0.7	0.7
118	1180	0.0040	0.0120	2.6880	1.3986	0.0100	2.4577	0.0119	0.0113	0.7	0.7
119	1190	0.0040	0.0120	2.7000	1.4086	0.0100	2.4696	0.0119	0.0113	0.7	0.7
120	1200	0.0040	0.0120	2.7120	1.4187	0.0100	2.4816	0.0119	0.0113	0.7	0.7
121	1210	0.0040	0.0120	2.7240	1.4287	0.0100	2.4935	0.0119	0.0113	0.7	0.7
122	1220	0.0040	0.0120	2.7360	1.4387	0.0100	2.5055	0.0119	0.0113	0.7	0.7
123	1230	0.0040	0.0120	2.7480	1.4488	0.0101	2.5174	0.0119	0.0113	0.7	0.7
124	1240	0.0040	0.0120	2.7600	1.4589	0.0101	2.5293	0.0119	0.0113	0.7	0.7
125	1250	0.0040	0.0120	2.7720	1.4689	0.0101	2.5413	0.0119	0.0113	0.7	0.7
126	1260	0.0040	0.0120	2.7840	1.4790	0.0101	2.5532	0.0119	0.0113	0.7	0.7
127	1270	0.0040	0.0120	2.7960	1.4891	0.0101	2.5652	0.0119	0.0113	0.7	0.7
128	1280	0.0040	0.0120	2.8080	1.4992	0.0101	2.5771	0.0119	0.0113	0.7	0.7
129	1290	0.0040	0.0120	2.8200	1.5094	0.0101	2.5891	0.0119	0.0113	0.7	0.7
130	1300	0.0040	0.0120	2.8320	1.5195	0.0101	2.6010	0.0119	0.0113	0.7	0.7
131	1310	0.0040	0.0120	2.8440	1.5297	0.0101	2.6130	0.0119	0.0113	0.7	0.7
132	1320	0.0040	0.0120	2.8560	1.5398	0.0102	2.6249	0.0119	0.0113	0.7	0.7
133	1330	0.0040	0.0120	2.8680	1.5500	0.0102	2.6368	0.0119	0.0113	0.7	0.7
134	1340	0.0040	0.0120	2.8800	1.5601	0.0102	2.6488	0.0119	0.0113	0.7	0.7
135	1350	0.0040	0.0120	2.8920	1.5703	0.0102	2.6607	0.0119	0.0113	0.8	0.7
136	1360	0.0040	0.0120	2.9040	1.5805	0.0102	2.6727	0.0119	0.0113	0.8	0.8
137	1370	0.0040	0.0120	2.9160	1.5907	0.0102	2.6846	0.0119	0.0114	0.8	0.8
138	1380	0.0040	0.0120	2.9280	1.6010	0.0102	2.6966	0.0119	0.0114	0.8	0.8
139	1390	0.0040	0.0120	2.9400	1.6112	0.0102	2.7085	0.0119	0.0114	0.8	0.8
140	1400	0.0040	0.0120	2.9520	1.6214	0.0102	2.7205	0.0119	0.0114	0.8	0.8
141	1410	0.0040	0.0120	2.9640	1.6317	0.0102	2.7324	0.0119	0.0114	0.8	0.8

(1) Time Incre-ment	(2) Time	(3) Rainfall Distri-bution	(4) Incre-mental Rainfall	(5) Accumu-lated Rainfall	(6) Accumu-lated Runoff	(7) Incre-mental Runoff	(8) Accumu-lated Runoff	(9) Incre-mental Runoff	(10) Total Runoff	(11) Instant Hydro-graph	(12) Design Hydro-graph
	(Min)	(% of Pt)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(cfs)	(cfs)
142	1420	0.0040	0.0120	2.9760	1.6419	0.0103	2.7444	0.0119	0.0114	0.8	0.8
143	1430	0.0040	0.0120	2.9880	1.6522	0.0103	2.7563	0.0119	0.0114	0.8	0.8
144	1440	0.0040	0.0120	3.0000	1.6625	0.0103	2.7683	0.0119	0.0114	0.8	0.8
	Total	1.0000	3.0000						Hydrograph Volume (Cubic Feet)		94330

CES|NW

SANTA BARBARA URBAN HYDROGRAPH
SCS TYPE 1A 24-HOUR DISTRIBUTION

Project: *White Hawk*
Project Number: *1910*
Date: *Apr 28, 2015*

Basin: *Row Homes*
Event: *10 Year Pre*

Given:

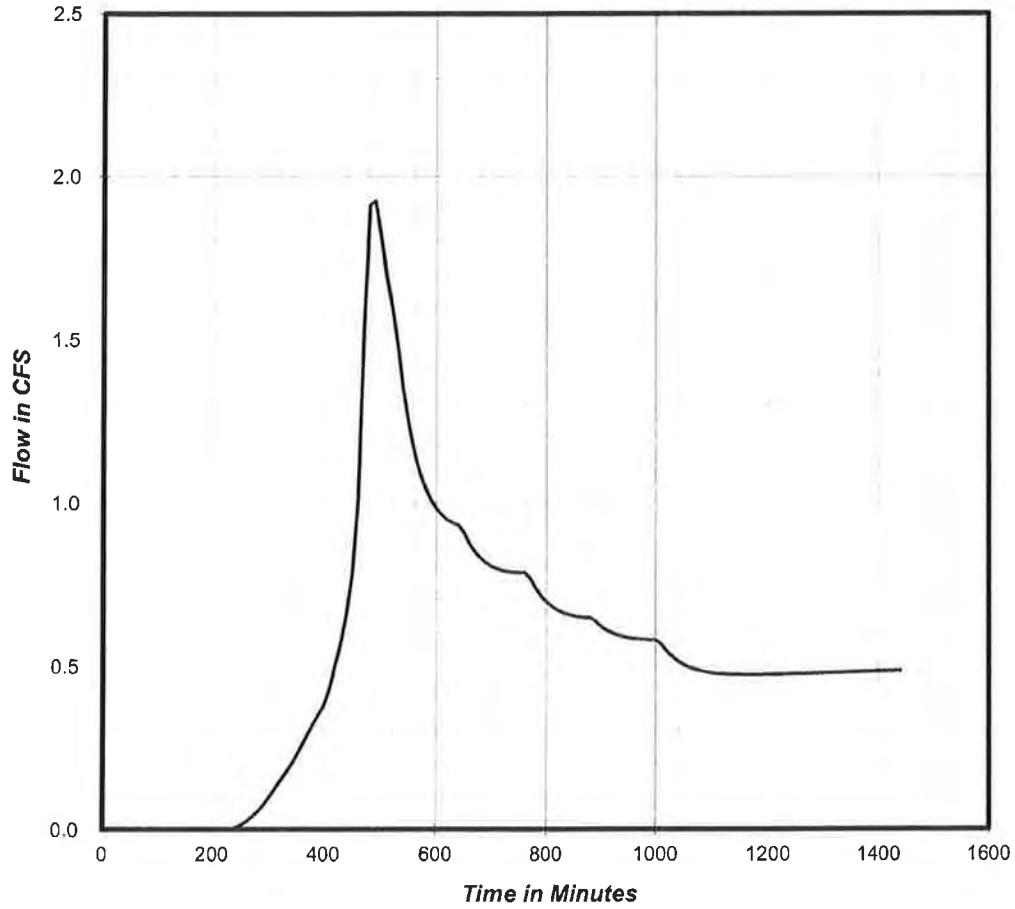
Area = 7.84 acres
Pt = 3 inches
dt = 10 min.
Tc = 42 min.
w = 0.1064 routing constant

Pervious Area		**Impervious Area**	
Area =	7.84 acres	Area =	0 acres
CN =	86	CN =	98
S =	1.63	S =	0.20
0.2S =	0.33	0.2S =	0.04

HYDROGRAPH RESULTS

Peak Runot 1.9 cfs
Total Vol. : 46089 cf

Peak Runoff Hydrograph



					Pervious Area		Impervious Area				
(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
1	10	0.0040	0.0120	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0120	0.0240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0120	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
4	40	0.0040	0.0120	0.0480	0.0000	0.0000	0.0002	0.0002	0.0000	0.0	0.0
5	50	0.0040	0.0120	0.0600	0.0000	0.0000	0.0016	0.0014	0.0000	0.0	0.0
6	60	0.0040	0.0120	0.0720	0.0000	0.0000	0.0041	0.0025	0.0000	0.0	0.0
7	70	0.0040	0.0120	0.0840	0.0000	0.0000	0.0075	0.0034	0.0000	0.0	0.0
8	80	0.0040	0.0120	0.0960	0.0000	0.0000	0.0117	0.0042	0.0000	0.0	0.0
9	90	0.0040	0.0120	0.1080	0.0000	0.0000	0.0166	0.0049	0.0000	0.0	0.0
10	100	0.0040	0.0120	0.1200	0.0000	0.0000	0.0221	0.0055	0.0000	0.0	0.0
11	110	0.0050	0.0150	0.1350	0.0000	0.0000	0.0297	0.0076	0.0000	0.0	0.0
12	120	0.0050	0.0150	0.1500	0.0000	0.0000	0.0381	0.0083	0.0000	0.0	0.0
13	130	0.0050	0.0150	0.1650	0.0000	0.0000	0.0470	0.0089	0.0000	0.0	0.0
14	140	0.0050	0.0150	0.1800	0.0000	0.0000	0.0564	0.0095	0.0000	0.0	0.0
15	150	0.0050	0.0150	0.1950	0.0000	0.0000	0.0664	0.0099	0.0000	0.0	0.0
16	160	0.0050	0.0150	0.2100	0.0000	0.0000	0.0767	0.0103	0.0000	0.0	0.0
17	170	0.0060	0.0180	0.2280	0.0000	0.0000	0.0895	0.0129	0.0000	0.0	0.0
18	180	0.0060	0.0180	0.2460	0.0000	0.0000	0.1029	0.0133	0.0000	0.0	0.0
19	190	0.0060	0.0180	0.2640	0.0000	0.0000	0.1166	0.0137	0.0000	0.0	0.0
20	200	0.0060	0.0180	0.2820	0.0000	0.0000	0.1306	0.0141	0.0000	0.0	0.0
21	210	0.0060	0.0180	0.3000	0.0000	0.0000	0.1450	0.0144	0.0000	0.0	0.0
22	220	0.0060	0.0180	0.3180	0.0000	0.0000	0.1596	0.0146	0.0000	0.0	0.0
23	230	0.0070	0.0210	0.3390	0.0001	0.0001	0.1770	0.0174	0.0001	0.0	0.0
24	240	0.0070	0.0210	0.3600	0.0007	0.0006	0.1947	0.0177	0.0006	0.0	0.0
25	250	0.0070	0.0210	0.3810	0.0018	0.0011	0.2126	0.0179	0.0011	0.1	0.0
26	260	0.0070	0.0210	0.4020	0.0034	0.0016	0.2308	0.0182	0.0016	0.1	0.0
27	270	0.0070	0.0210	0.4230	0.0055	0.0021	0.2491	0.0184	0.0021	0.1	0.0
28	280	0.0070	0.0210	0.4440	0.0080	0.0025	0.2677	0.0185	0.0025	0.1	0.1
29	290	0.0082	0.0246	0.4686	0.0116	0.0035	0.2896	0.0219	0.0035	0.2	0.1
30	300	0.0082	0.0246	0.4932	0.0156	0.0041	0.3117	0.0221	0.0041	0.2	0.1
31	310	0.0082	0.0246	0.5178	0.0203	0.0047	0.3341	0.0223	0.0047	0.2	0.1
32	320	0.0082	0.0246	0.5424	0.0255	0.0052	0.3565	0.0225	0.0052	0.2	0.1
33	330	0.0082	0.0246	0.5670	0.0312	0.0057	0.3791	0.0226	0.0057	0.3	0.2
34	340	0.0082	0.0246	0.5916	0.0374	0.0062	0.4019	0.0227	0.0062	0.3	0.2
35	350	0.0095	0.0285	0.6201	0.0451	0.0078	0.4284	0.0265	0.0078	0.4	0.2
36	360	0.0095	0.0285	0.6486	0.0535	0.0084	0.4550	0.0266	0.0084	0.4	0.3
37	370	0.0095	0.0285	0.6771	0.0624	0.0089	0.4818	0.0268	0.0089	0.4	0.3
38	380	0.0095	0.0285	0.7056	0.0719	0.0095	0.5086	0.0269	0.0095	0.5	0.3
39	390	0.0095	0.0285	0.7341	0.0820	0.0100	0.5356	0.0270	0.0100	0.5	0.4
40	400	0.0095	0.0285	0.7626	0.0925	0.0105	0.5627	0.0271	0.0105	0.5	0.4
41	410	0.0134	0.0402	0.8028	0.1082	0.0157	0.6010	0.0383	0.0157	0.7	0.4
42	420	0.0134	0.0402	0.8430	0.1248	0.0166	0.6395	0.0385	0.0166	0.8	0.5
43	430	0.0134	0.0402	0.8832	0.1423	0.0175	0.6781	0.0386	0.0175	0.8	0.6
44	440	0.0180	0.0540	0.9372	0.1670	0.0248	0.7301	0.0520	0.0248	1.2	0.7
45	450	0.0180	0.0540	0.9912	0.1932	0.0261	0.7824	0.0522	0.0261	1.2	0.8
46	460	0.0340	0.1020	1.0932	0.2460	0.0528	0.8815	0.0991	0.0528	2.5	1.0
47	470	0.0540	0.1620	1.2552	0.3379	0.0919	1.0397	0.1582	0.0919	4.4	1.5
48	480	0.0270	0.0810	1.3362	0.3871	0.0492	1.1191	0.0794	0.0492	2.3	1.9
49	490	0.0180	0.0540	1.3902	0.4209	0.0339	1.1721	0.0530	0.0339	1.6	1.9
50	500	0.0134	0.0402	1.4304	0.4467	0.0257	1.2116	0.0395	0.0257	1.2	1.8
51	510	0.0134	0.0402	1.4706	0.4728	0.0261	1.2512	0.0396	0.0261	1.2	1.7
52	520	0.0134	0.0402	1.5108	0.4994	0.0265	1.2908	0.0396	0.0265	1.3	1.6
53	530	0.0088	0.0264	1.5372	0.5170	0.0176	1.3168	0.0260	0.0176	0.8	1.5
54	540	0.0088	0.0264	1.5636	0.5348	0.0178	1.3428	0.0260	0.0178	0.8	1.3
55	550	0.0088	0.0264	1.5900	0.5528	0.0180	1.3689	0.0260	0.0180	0.9	1.2
56	560	0.0088	0.0264	1.6164	0.5709	0.0181	1.3949	0.0260	0.0181	0.9	1.2
57	570	0.0088	0.0264	1.6428	0.5891	0.0183	1.4210	0.0261	0.0183	0.9	1.1
58	580	0.0088	0.0264	1.6692	0.6075	0.0184	1.4470	0.0261	0.0184	0.9	1.0
59	590	0.0088	0.0264	1.6956	0.6261	0.0185	1.4731	0.0261	0.0185	0.9	1.0
60	600	0.0088	0.0264	1.7220	0.6448	0.0187	1.4992	0.0261	0.0187	0.9	1.0
61	610	0.0088	0.0264	1.7484	0.6636	0.0188	1.5253	0.0261	0.0188	0.9	1.0
62	620	0.0088	0.0264	1.7748	0.6825	0.0189	1.5514	0.0261	0.0189	0.9	0.9
63	630	0.0088	0.0264	1.8012	0.7016	0.0191	1.5775	0.0261	0.0191	0.9	0.9
64	640	0.0088	0.0264	1.8276	0.7208	0.0192	1.6036	0.0261	0.0192	0.9	0.9
65	650	0.0072	0.0216	1.8492	0.7366	0.0158	1.6250	0.0214	0.0158	0.7	0.9
66	660	0.0072	0.0216	1.8708	0.7525	0.0159	1.6464	0.0214	0.0159	0.8	0.9
67	670	0.0072	0.0216	1.8924	0.7684	0.0160	1.6678	0.0214	0.0160	0.8	0.9
68	680	0.0072	0.0216	1.9140	0.7845	0.0160	1.6892	0.0214	0.0160	0.8	0.8

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (In)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
69	690	0.0072	0.0216	1.9356	0.8006	0.0161	1.7105	0.0214	0.0161	0.8	0.8
70	700	0.0072	0.0216	1.9572	0.8167	0.0162	1.7319	0.0214	0.0162	0.8	0.8
71	710	0.0072	0.0216	1.9788	0.8330	0.0162	1.7533	0.0214	0.0162	0.8	0.8

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (in)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
72	720	0.0072	0.0216	2.0004	0.8493	0.0163	1.7748	0.0214	0.0163	0.8	0.8
73	730	0.0072	0.0216	2.0220	0.8657	0.0164	1.7962	0.0214	0.0164	0.8	0.8
74	740	0.0072	0.0216	2.0436	0.8821	0.0165	1.8176	0.0214	0.0165	0.8	0.8
75	750	0.0072	0.0216	2.0652	0.8987	0.0165	1.8390	0.0214	0.0165	0.8	0.8
76	760	0.0072	0.0216	2.0868	0.9152	0.0166	1.8604	0.0214	0.0166	0.8	0.8
77	770	0.0057	0.0171	2.1039	0.9284	0.0132	1.8774	0.0170	0.0132	0.6	0.8
78	780	0.0057	0.0171	2.1210	0.9416	0.0132	1.8943	0.0170	0.0132	0.6	0.7
79	790	0.0057	0.0171	2.1381	0.9549	0.0133	1.9113	0.0170	0.0133	0.6	0.7
80	800	0.0057	0.0171	2.1552	0.9682	0.0133	1.9283	0.0170	0.0133	0.6	0.7
81	810	0.0057	0.0171	2.1723	0.9815	0.0133	1.9452	0.0170	0.0133	0.6	0.7
82	820	0.0057	0.0171	2.1894	0.9949	0.0134	1.9622	0.0170	0.0134	0.6	0.7
83	830	0.0057	0.0171	2.2065	1.0083	0.0134	1.9792	0.0170	0.0134	0.6	0.7
84	840	0.0057	0.0171	2.2236	1.0217	0.0134	1.9962	0.0170	0.0134	0.6	0.7
85	850	0.0057	0.0171	2.2407	1.0352	0.0135	2.0131	0.0170	0.0135	0.6	0.7
86	860	0.0057	0.0171	2.2578	1.0487	0.0135	2.0301	0.0170	0.0135	0.6	0.7
87	870	0.0057	0.0171	2.2749	1.0622	0.0135	2.0471	0.0170	0.0135	0.6	0.6
88	880	0.0057	0.0171	2.2920	1.0758	0.0136	2.0641	0.0170	0.0136	0.6	0.6
89	890	0.0050	0.0150	2.3070	1.0877	0.0119	2.0790	0.0149	0.0119	0.6	0.6
90	900	0.0050	0.0150	2.3220	1.0997	0.0120	2.0939	0.0149	0.0120	0.6	0.6
91	910	0.0050	0.0150	2.3370	1.1117	0.0120	2.1088	0.0149	0.0120	0.6	0.6
92	920	0.0050	0.0150	2.3520	1.1237	0.0120	2.1237	0.0149	0.0120	0.6	0.6
93	930	0.0050	0.0150	2.3670	1.1357	0.0120	2.1386	0.0149	0.0120	0.6	0.6
94	940	0.0050	0.0150	2.3820	1.1478	0.0121	2.1535	0.0149	0.0121	0.6	0.6
95	950	0.0050	0.0150	2.3970	1.1599	0.0121	2.1684	0.0149	0.0121	0.6	0.6
96	960	0.0050	0.0150	2.4120	1.1720	0.0121	2.1833	0.0149	0.0121	0.6	0.6
97	970	0.0050	0.0150	2.4270	1.1841	0.0121	2.1982	0.0149	0.0121	0.6	0.6
98	980	0.0050	0.0150	2.4420	1.1963	0.0122	2.2131	0.0149	0.0122	0.6	0.6
99	990	0.0050	0.0150	2.4570	1.2084	0.0122	2.2280	0.0149	0.0122	0.6	0.6
100	1000	0.0050	0.0150	2.4720	1.2206	0.0122	2.2429	0.0149	0.0122	0.6	0.6
101	1010	0.0040	0.0120	2.4840	1.2304	0.0098	2.2548	0.0119	0.0098	0.5	0.6
102	1020	0.0040	0.0120	2.4960	1.2402	0.0098	2.2668	0.0119	0.0098	0.5	0.5
103	1030	0.0040	0.0120	2.5080	1.2500	0.0098	2.2787	0.0119	0.0098	0.5	0.5
104	1040	0.0040	0.0120	2.5200	1.2598	0.0098	2.2906	0.0119	0.0098	0.5	0.5
105	1050	0.0040	0.0120	2.5320	1.2697	0.0098	2.3026	0.0119	0.0098	0.5	0.5
106	1060	0.0040	0.0120	2.5440	1.2795	0.0098	2.3145	0.0119	0.0098	0.5	0.5
107	1070	0.0040	0.0120	2.5560	1.2894	0.0099	2.3264	0.0119	0.0099	0.5	0.5
108	1080	0.0040	0.0120	2.5680	1.2992	0.0099	2.3384	0.0119	0.0099	0.5	0.5
109	1090	0.0040	0.0120	2.5800	1.3091	0.0099	2.3503	0.0119	0.0099	0.5	0.5
110	1100	0.0040	0.0120	2.5920	1.3190	0.0099	2.3622	0.0119	0.0099	0.5	0.5
111	1110	0.0040	0.0120	2.6040	1.3289	0.0099	2.3742	0.0119	0.0099	0.5	0.5
112	1120	0.0040	0.0120	2.6160	1.3388	0.0099	2.3861	0.0119	0.0099	0.5	0.5
113	1130	0.0040	0.0120	2.6280	1.3488	0.0099	2.3980	0.0119	0.0099	0.5	0.5
114	1140	0.0040	0.0120	2.6400	1.3587	0.0099	2.4100	0.0119	0.0099	0.5	0.5
115	1150	0.0040	0.0120	2.6520	1.3687	0.0100	2.4219	0.0119	0.0100	0.5	0.5
116	1160	0.0040	0.0120	2.6640	1.3787	0.0100	2.4338	0.0119	0.0100	0.5	0.5
117	1170	0.0040	0.0120	2.6760	1.3886	0.0100	2.4458	0.0119	0.0100	0.5	0.5
118	1180	0.0040	0.0120	2.6880	1.3986	0.0100	2.4577	0.0119	0.0100	0.5	0.5
119	1190	0.0040	0.0120	2.7000	1.4086	0.0100	2.4696	0.0119	0.0100	0.5	0.5
120	1200	0.0040	0.0120	2.7120	1.4187	0.0100	2.4816	0.0119	0.0100	0.5	0.5
121	1210	0.0040	0.0120	2.7240	1.4287	0.0100	2.4935	0.0119	0.0100	0.5	0.5
122	1220	0.0040	0.0120	2.7360	1.4387	0.0100	2.5055	0.0119	0.0100	0.5	0.5
123	1230	0.0040	0.0120	2.7480	1.4488	0.0101	2.5174	0.0119	0.0101	0.5	0.5
124	1240	0.0040	0.0120	2.7600	1.4589	0.0101	2.5293	0.0119	0.0101	0.5	0.5
125	1250	0.0040	0.0120	2.7720	1.4689	0.0101	2.5413	0.0119	0.0101	0.5	0.5
126	1260	0.0040	0.0120	2.7840	1.4790	0.0101	2.5532	0.0119	0.0101	0.5	0.5
127	1270	0.0040	0.0120	2.7960	1.4891	0.0101	2.5652	0.0119	0.0101	0.5	0.5
128	1280	0.0040	0.0120	2.8080	1.4992	0.0101	2.5771	0.0119	0.0101	0.5	0.5
129	1290	0.0040	0.0120	2.8200	1.5094	0.0101	2.5891	0.0119	0.0101	0.5	0.5
130	1300	0.0040	0.0120	2.8320	1.5195	0.0101	2.6010	0.0119	0.0101	0.5	0.5
131	1310	0.0040	0.0120	2.8440	1.5297	0.0101	2.6130	0.0119	0.0101	0.5	0.5
132	1320	0.0040	0.0120	2.8560	1.5398	0.0102	2.6249	0.0119	0.0102	0.5	0.5
133	1330	0.0040	0.0120	2.8680	1.5500	0.0102	2.6368	0.0119	0.0102	0.5	0.5
134	1340	0.0040	0.0120	2.8800	1.5601	0.0102	2.6488	0.0119	0.0102	0.5	0.5
135	1350	0.0040	0.0120	2.8920	1.5703	0.0102	2.6607	0.0119	0.0102	0.5	0.5
136	1360	0.0040	0.0120	2.9040	1.5805	0.0102	2.6727	0.0119	0.0102	0.5	0.5
137	1370	0.0040	0.0120	2.9160	1.5907	0.0102	2.6846	0.0119	0.0102	0.5	0.5
138	1380	0.0040	0.0120	2.9280	1.6010	0.0102	2.6966	0.0119	0.0102	0.5	0.5
139	1390	0.0040	0.0120	2.9400	1.6112	0.0102	2.7085	0.0119	0.0102	0.5	0.5
140	1400	0.0040	0.0120	2.9520	1.6214	0.0102	2.7205	0.0119	0.0102	0.5	0.5
141	1410	0.0040	0.0120	2.9640	1.6317	0.0102	2.7324	0.0119	0.0102	0.5	0.5

(1) Time Increment	(2) Time	(3) Rainfall Distribution	(4) Incremental Rainfall	(5) Accumulated Rainfall	(6) Accumulated Runoff	(7) Incremental Runoff	(8) Accumulated Runoff	(9) Incremental Runoff	(10) Total Runoff	(11) Instant Hydrograph	(12) Design Hydrograph
	(Min)	(% of Pt)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(cfs)	(cfs)
142	1420	0.0040	0.0120	2.9760	1.6419	0.0103	2.7444	0.0119	0.0103	0.5	0.5
143	1430	0.0040	0.0120	2.9880	1.6522	0.0103	2.7563	0.0119	0.0103	0.5	0.5
144	1440	0.0040	0.0120	3.0000	1.6625	0.0103	2.7683	0.0119	0.0103	0.5	0.5
	Total	1.0000	3.0000						Hydrograph Volume (Cubic Feet)		46089

CES|NW

SANTA BARBARA URBAN HYDROGRAPH
SCS TYPE 1A 24-HOUR DISTRIBUTION

Project: *White Hawk*
Project Number: *1910*
Date: *Aug 22, 2014*

Basin: *Row Homes*
Event: *10 Year Post*

Given:

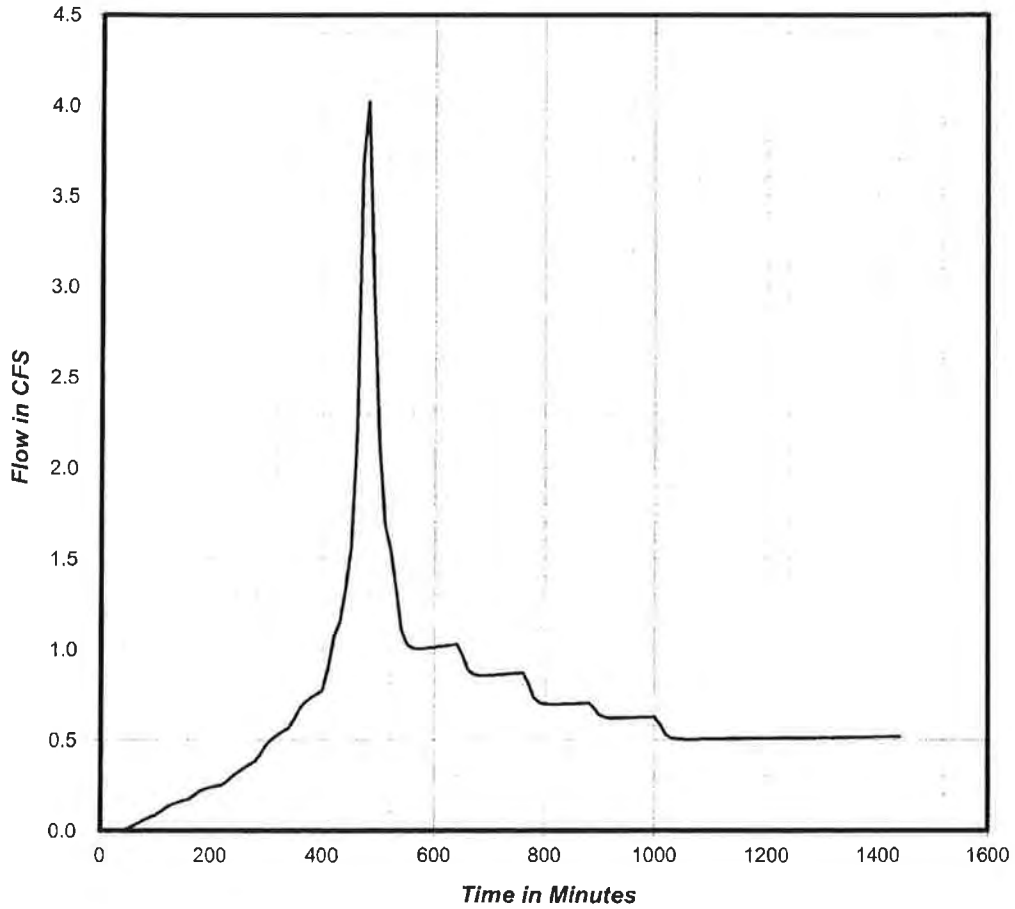
Area = 7.84 acres
Pt = 3 inches
dt = 10 min.
Tc = 10 min.
w = 0.3333 routing constant

Pervious Area		**Impervious Area**	
Area =	4.95 acres	Area =	2.89 acres
CN =	86	CN =	98
S =	1.63	S =	0.20
0.2S =	0.33	0.2S =	0.04

HYDROGRAPH RESULTS

Peak Runoff 4.0 cfs
Total Vol. : 58603 cf

Peak Runoff Hydrograph

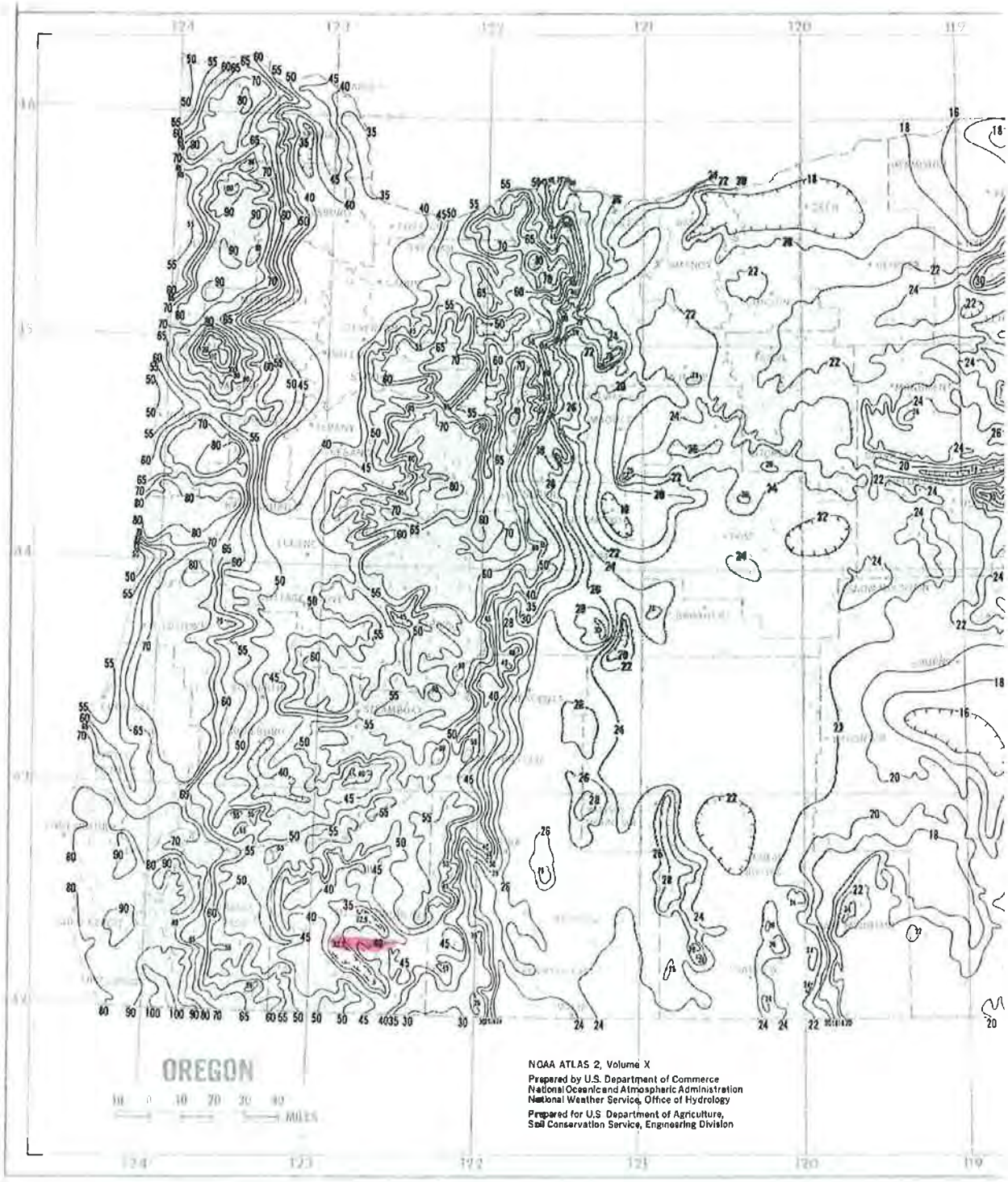


					Pervious Area		Impervious Area				
(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (in)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
1	10	0.0040	0.0120	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0120	0.0240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0120	0.0360	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
4	40	0.0040	0.0120	0.0480	0.0000	0.0000	0.0002	0.0002	0.0001	0.0	0.0
5	50	0.0040	0.0120	0.0600	0.0000	0.0000	0.0016	0.0014	0.0005	0.0	0.0
6	60	0.0040	0.0120	0.0720	0.0000	0.0000	0.0041	0.0025	0.0009	0.0	0.0
7	70	0.0040	0.0120	0.0840	0.0000	0.0000	0.0075	0.0034	0.0013	0.1	0.0
8	80	0.0040	0.0120	0.0960	0.0000	0.0000	0.0117	0.0042	0.0015	0.1	0.1
9	90	0.0040	0.0120	0.1080	0.0000	0.0000	0.0166	0.0049	0.0018	0.1	0.1
10	100	0.0040	0.0120	0.1200	0.0000	0.0000	0.0221	0.0055	0.0020	0.1	0.1
11	110	0.0050	0.0150	0.1350	0.0000	0.0000	0.0297	0.0076	0.0028	0.1	0.1
12	120	0.0050	0.0150	0.1500	0.0000	0.0000	0.0381	0.0083	0.0031	0.1	0.1
13	130	0.0050	0.0150	0.1650	0.0000	0.0000	0.0470	0.0089	0.0033	0.2	0.1
14	140	0.0050	0.0150	0.1800	0.0000	0.0000	0.0564	0.0095	0.0035	0.2	0.2
15	150	0.0050	0.0150	0.1950	0.0000	0.0000	0.0664	0.0099	0.0037	0.2	0.2
16	160	0.0050	0.0150	0.2100	0.0000	0.0000	0.0767	0.0103	0.0038	0.2	0.2
17	170	0.0060	0.0180	0.2280	0.0000	0.0000	0.0895	0.0129	0.0047	0.2	0.2
18	180	0.0060	0.0180	0.2460	0.0000	0.0000	0.1029	0.0133	0.0049	0.2	0.2
19	190	0.0060	0.0180	0.2640	0.0000	0.0000	0.1166	0.0137	0.0051	0.2	0.2
20	200	0.0060	0.0180	0.2820	0.0000	0.0000	0.1306	0.0141	0.0052	0.2	0.2
21	210	0.0060	0.0180	0.3000	0.0000	0.0000	0.1450	0.0144	0.0053	0.3	0.2
22	220	0.0060	0.0180	0.3180	0.0000	0.0000	0.1596	0.0146	0.0054	0.3	0.3
23	230	0.0070	0.0210	0.3390	0.0001	0.0001	0.1770	0.0174	0.0065	0.3	0.3
24	240	0.0070	0.0210	0.3600	0.0007	0.0006	0.1947	0.0177	0.0069	0.3	0.3
25	250	0.0070	0.0210	0.3810	0.0018	0.0011	0.2126	0.0179	0.0073	0.3	0.3
26	260	0.0070	0.0210	0.4020	0.0034	0.0016	0.2308	0.0182	0.0077	0.4	0.3
27	270	0.0070	0.0210	0.4230	0.0055	0.0021	0.2491	0.0184	0.0081	0.4	0.4
28	280	0.0070	0.0210	0.4440	0.0080	0.0025	0.2677	0.0185	0.0084	0.4	0.4
29	290	0.0082	0.0246	0.4686	0.0116	0.0035	0.2896	0.0219	0.0103	0.5	0.4
30	300	0.0082	0.0246	0.4932	0.0156	0.0041	0.3117	0.0221	0.0107	0.5	0.5
31	310	0.0082	0.0246	0.5178	0.0203	0.0047	0.3341	0.0223	0.0112	0.5	0.5
32	320	0.0082	0.0246	0.5424	0.0255	0.0052	0.3565	0.0225	0.0116	0.5	0.5
33	330	0.0082	0.0246	0.5670	0.0312	0.0057	0.3791	0.0226	0.0119	0.6	0.5
34	340	0.0082	0.0246	0.5916	0.0374	0.0062	0.4019	0.0227	0.0123	0.6	0.6
35	350	0.0095	0.0285	0.6201	0.0451	0.0078	0.4284	0.0265	0.0147	0.7	0.6
36	360	0.0095	0.0285	0.6486	0.0535	0.0084	0.4550	0.0266	0.0151	0.7	0.7
37	370	0.0095	0.0285	0.6771	0.0624	0.0089	0.4818	0.0268	0.0155	0.7	0.7
38	380	0.0095	0.0285	0.7056	0.0719	0.0095	0.5086	0.0269	0.0159	0.8	0.7
39	390	0.0095	0.0285	0.7341	0.0820	0.0100	0.5356	0.0270	0.0163	0.8	0.8
40	400	0.0095	0.0285	0.7626	0.0925	0.0105	0.5627	0.0271	0.0166	0.8	0.8
41	410	0.0134	0.0402	0.8028	0.1082	0.0157	0.6010	0.0383	0.0240	1.1	0.9
42	420	0.0134	0.0402	0.8430	0.1248	0.0166	0.6395	0.0385	0.0247	1.2	1.1
43	430	0.0134	0.0402	0.8832	0.1423	0.0175	0.6781	0.0386	0.0253	1.2	1.1
44	440	0.0180	0.0540	0.9372	0.1670	0.0248	0.7301	0.0520	0.0348	1.7	1.3
45	450	0.0180	0.0540	0.9912	0.1932	0.0261	0.7824	0.0522	0.0358	1.7	1.6
46	460	0.0340	0.1020	1.0932	0.2460	0.0528	0.8815	0.0991	0.0699	3.3	2.2
47	470	0.0540	0.1620	1.2552	0.3379	0.0919	1.0397	0.1582	0.1164	5.5	3.7
48	480	0.0270	0.0810	1.3362	0.3871	0.0492	1.1191	0.0794	0.0603	2.9	4.0
49	490	0.0180	0.0540	1.3902	0.4209	0.0339	1.1721	0.0530	0.0409	1.9	2.9
50	500	0.0134	0.0402	1.4304	0.4467	0.0257	1.2116	0.0395	0.0308	1.5	2.1
51	510	0.0134	0.0402	1.4706	0.4728	0.0261	1.2512	0.0396	0.0311	1.5	1.7
52	520	0.0134	0.0402	1.5108	0.4994	0.0265	1.2908	0.0396	0.0314	1.5	1.5
53	530	0.0088	0.0264	1.5372	0.5170	0.0176	1.3168	0.0260	0.0207	1.0	1.3
54	540	0.0088	0.0264	1.5636	0.5348	0.0178	1.3428	0.0260	0.0208	1.0	1.1
55	550	0.0088	0.0264	1.5900	0.5528	0.0180	1.3689	0.0260	0.0209	1.0	1.0
56	560	0.0088	0.0264	1.6164	0.5709	0.0181	1.3949	0.0260	0.0210	1.0	1.0
57	570	0.0088	0.0264	1.6428	0.5891	0.0183	1.4210	0.0261	0.0211	1.0	1.0
58	580	0.0088	0.0264	1.6692	0.6075	0.0184	1.4470	0.0261	0.0212	1.0	1.0
59	590	0.0088	0.0264	1.6956	0.6261	0.0185	1.4731	0.0261	0.0213	1.0	1.0
60	600	0.0088	0.0264	1.7220	0.6448	0.0187	1.4992	0.0261	0.0214	1.0	1.0
61	610	0.0088	0.0264	1.7484	0.6636	0.0188	1.5253	0.0261	0.0215	1.0	1.0
62	620	0.0088	0.0264	1.7748	0.6825	0.0189	1.5514	0.0261	0.0216	1.0	1.0
63	630	0.0088	0.0264	1.8012	0.7016	0.0191	1.5775	0.0261	0.0217	1.0	1.0
64	640	0.0088	0.0264	1.8276	0.7208	0.0192	1.6036	0.0261	0.0217	1.0	1.0
65	650	0.0072	0.0216	1.8492	0.7366	0.0158	1.6250	0.0214	0.0179	0.8	1.0
66	660	0.0072	0.0216	1.8708	0.7525	0.0159	1.6464	0.0214	0.0179	0.8	0.9
67	670	0.0072	0.0216	1.8924	0.7684	0.0160	1.6678	0.0214	0.0180	0.9	0.9
68	680	0.0072	0.0216	1.9140	0.7845	0.0160	1.6892	0.0214	0.0180	0.9	0.9

(1) Time Increment	(2) Time (Min)	(3) Rainfall Distribution (% of Pt)	(4) Incremental Rainfall (in)	(5) Accumulated Rainfall (in)	(6) Accumulated Runoff (in)	(7) Incremental Runoff (in)	(8) Accumulated Runoff (in)	(9) Incremental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydrograph (cfs)	(12) Design Hydrograph (cfs)
69	690	0.0072	0.0216	1.9356	0.8006	0.0161	1.7105	0.0214	0.0181	0.9	0.9
70	700	0.0072	0.0216	1.9572	0.8167	0.0162	1.7319	0.0214	0.0181	0.9	0.9
71	710	0.0072	0.0216	1.9788	0.8330	0.0162	1.7533	0.0214	0.0181	0.9	0.9

(1) Time Incre-ment	(2) Time (Min)	(3) Rainfall Distri-bution (% of Pt)	(4) Incre-mental Rainfall (in)	(5) Accumu-lated Rainfall (in)	(6) Accumu-lated Runoff (in)	(7) Incre-mental Runoff (in)	(8) Accumu-lated Runoff (in)	(9) Incre-mental Runoff (in)	(10) Total Runoff (in)	(11) Instant Hydro-graph (cfs)	(12) Design Hydro-graph (cfs)
72	720	0.0072	0.0216	2.0004	0.8493	0.0163	1.7748	0.0214	0.0182	0.9	0.9
73	730	0.0072	0.0216	2.0220	0.8657	0.0164	1.7962	0.0214	0.0182	0.9	0.9
74	740	0.0072	0.0216	2.0436	0.8821	0.0165	1.8176	0.0214	0.0183	0.9	0.9
75	750	0.0072	0.0216	2.0652	0.8987	0.0165	1.8390	0.0214	0.0183	0.9	0.9
76	760	0.0072	0.0216	2.0868	0.9152	0.0166	1.8604	0.0214	0.0184	0.9	0.9
77	770	0.0057	0.0171	2.1039	0.9284	0.0132	1.8774	0.0170	0.0146	0.7	0.8
78	780	0.0057	0.0171	2.1210	0.9416	0.0132	1.8943	0.0170	0.0146	0.7	0.7
79	790	0.0057	0.0171	2.1381	0.9549	0.0133	1.9113	0.0170	0.0146	0.7	0.7
80	800	0.0057	0.0171	2.1552	0.9682	0.0133	1.9283	0.0170	0.0146	0.7	0.7
81	810	0.0057	0.0171	2.1723	0.9815	0.0133	1.9452	0.0170	0.0147	0.7	0.7
82	820	0.0057	0.0171	2.1894	0.9949	0.0134	1.9622	0.0170	0.0147	0.7	0.7
83	830	0.0057	0.0171	2.2065	1.0083	0.0134	1.9792	0.0170	0.0147	0.7	0.7
84	840	0.0057	0.0171	2.2236	1.0217	0.0134	1.9962	0.0170	0.0147	0.7	0.7
85	850	0.0057	0.0171	2.2407	1.0352	0.0135	2.0131	0.0170	0.0148	0.7	0.7
86	860	0.0057	0.0171	2.2578	1.0487	0.0135	2.0301	0.0170	0.0148	0.7	0.7
87	870	0.0057	0.0171	2.2749	1.0622	0.0135	2.0471	0.0170	0.0148	0.7	0.7
88	880	0.0057	0.0171	2.2920	1.0758	0.0136	2.0641	0.0170	0.0148	0.7	0.7
89	890	0.0050	0.0150	2.3070	1.0877	0.0119	2.0790	0.0149	0.0130	0.6	0.7
90	900	0.0050	0.0150	2.3220	1.0997	0.0120	2.0939	0.0149	0.0130	0.6	0.6
91	910	0.0050	0.0150	2.3370	1.1117	0.0120	2.1088	0.0149	0.0131	0.6	0.6
92	920	0.0050	0.0150	2.3520	1.1237	0.0120	2.1237	0.0149	0.0131	0.6	0.6
93	930	0.0050	0.0150	2.3670	1.1357	0.0120	2.1386	0.0149	0.0131	0.6	0.6
94	940	0.0050	0.0150	2.3820	1.1478	0.0121	2.1535	0.0149	0.0131	0.6	0.6
95	950	0.0050	0.0150	2.3970	1.1599	0.0121	2.1684	0.0149	0.0131	0.6	0.6
96	960	0.0050	0.0150	2.4120	1.1720	0.0121	2.1833	0.0149	0.0131	0.6	0.6
97	970	0.0050	0.0150	2.4270	1.1841	0.0121	2.1982	0.0149	0.0132	0.6	0.6
98	980	0.0050	0.0150	2.4420	1.1963	0.0122	2.2131	0.0149	0.0132	0.6	0.6
99	990	0.0050	0.0150	2.4570	1.2084	0.0122	2.2280	0.0149	0.0132	0.6	0.6
100	1000	0.0050	0.0150	2.4720	1.2206	0.0122	2.2429	0.0149	0.0132	0.6	0.6
101	1010	0.0040	0.0120	2.4840	1.2304	0.0098	2.2548	0.0119	0.0106	0.5	0.6
102	1020	0.0040	0.0120	2.4960	1.2402	0.0098	2.2668	0.0119	0.0106	0.5	0.5
103	1030	0.0040	0.0120	2.5080	1.2500	0.0098	2.2787	0.0119	0.0106	0.5	0.5
104	1040	0.0040	0.0120	2.5200	1.2598	0.0098	2.2906	0.0119	0.0106	0.5	0.5
105	1050	0.0040	0.0120	2.5320	1.2697	0.0098	2.3026	0.0119	0.0106	0.5	0.5
106	1060	0.0040	0.0120	2.5440	1.2795	0.0098	2.3145	0.0119	0.0106	0.5	0.5
107	1070	0.0040	0.0120	2.5560	1.2894	0.0099	2.3264	0.0119	0.0106	0.5	0.5
108	1080	0.0040	0.0120	2.5680	1.2992	0.0099	2.3384	0.0119	0.0106	0.5	0.5
109	1090	0.0040	0.0120	2.5800	1.3091	0.0099	2.3503	0.0119	0.0106	0.5	0.5
110	1100	0.0040	0.0120	2.5920	1.3190	0.0099	2.3622	0.0119	0.0106	0.5	0.5
111	1110	0.0040	0.0120	2.6040	1.3289	0.0099	2.3742	0.0119	0.0107	0.5	0.5
112	1120	0.0040	0.0120	2.6160	1.3388	0.0099	2.3861	0.0119	0.0107	0.5	0.5
113	1130	0.0040	0.0120	2.6280	1.3488	0.0099	2.3980	0.0119	0.0107	0.5	0.5
114	1140	0.0040	0.0120	2.6400	1.3587	0.0099	2.4100	0.0119	0.0107	0.5	0.5
115	1150	0.0040	0.0120	2.6520	1.3687	0.0100	2.4219	0.0119	0.0107	0.5	0.5
116	1160	0.0040	0.0120	2.6640	1.3787	0.0100	2.4338	0.0119	0.0107	0.5	0.5
117	1170	0.0040	0.0120	2.6760	1.3886	0.0100	2.4458	0.0119	0.0107	0.5	0.5
118	1180	0.0040	0.0120	2.6880	1.3986	0.0100	2.4577	0.0119	0.0107	0.5	0.5
119	1190	0.0040	0.0120	2.7000	1.4086	0.0100	2.4696	0.0119	0.0107	0.5	0.5
120	1200	0.0040	0.0120	2.7120	1.4187	0.0100	2.4816	0.0119	0.0107	0.5	0.5
121	1210	0.0040	0.0120	2.7240	1.4287	0.0100	2.4935	0.0119	0.0107	0.5	0.5
122	1220	0.0040	0.0120	2.7360	1.4387	0.0100	2.5055	0.0119	0.0107	0.5	0.5
123	1230	0.0040	0.0120	2.7480	1.4488	0.0101	2.5174	0.0119	0.0108	0.5	0.5
124	1240	0.0040	0.0120	2.7600	1.4589	0.0101	2.5293	0.0119	0.0108	0.5	0.5
125	1250	0.0040	0.0120	2.7720	1.4689	0.0101	2.5413	0.0119	0.0108	0.5	0.5
126	1260	0.0040	0.0120	2.7840	1.4790	0.0101	2.5532	0.0119	0.0108	0.5	0.5
127	1270	0.0040	0.0120	2.7960	1.4891	0.0101	2.5652	0.0119	0.0108	0.5	0.5
128	1280	0.0040	0.0120	2.8080	1.4992	0.0101	2.5771	0.0119	0.0108	0.5	0.5
129	1290	0.0040	0.0120	2.8200	1.5094	0.0101	2.5891	0.0119	0.0108	0.5	0.5
130	1300	0.0040	0.0120	2.8320	1.5195	0.0101	2.6010	0.0119	0.0108	0.5	0.5
131	1310	0.0040	0.0120	2.8440	1.5297	0.0101	2.6130	0.0119	0.0108	0.5	0.5
132	1320	0.0040	0.0120	2.8560	1.5398	0.0102	2.6249	0.0119	0.0108	0.5	0.5
133	1330	0.0040	0.0120	2.8680	1.5500	0.0102	2.6368	0.0119	0.0108	0.5	0.5
134	1340	0.0040	0.0120	2.8800	1.5601	0.0102	2.6488	0.0119	0.0108	0.5	0.5
135	1350	0.0040	0.0120	2.8920	1.5703	0.0102	2.6607	0.0119	0.0108	0.5	0.5
136	1360	0.0040	0.0120	2.9040	1.5805	0.0102	2.6727	0.0119	0.0108	0.5	0.5
137	1370	0.0040	0.0120	2.9160	1.5907	0.0102	2.6846	0.0119	0.0108	0.5	0.5
138	1380	0.0040	0.0120	2.9280	1.6010	0.0102	2.6966	0.0119	0.0109	0.5	0.5
139	1390	0.0040	0.0120	2.9400	1.6112	0.0102	2.7085	0.0119	0.0109	0.5	0.5
140	1400	0.0040	0.0120	2.9520	1.6214	0.0102	2.7205	0.0119	0.0109	0.5	0.5
141	1410	0.0040	0.0120	2.9640	1.6317	0.0102	2.7324	0.0119	0.0109	0.5	0.5

(1) Time Incre-ment	(2) Time	(3) Rainfall Distri-bution	(4) Incre-mental Rainfall	(5) Accumu-lated Rainfall	(6) Accumu-lated Runoff	(7) Incre-mental Runoff	(8) Accumu-lated Runoff	(9) Incre-mental Runoff	(10) Total Runoff	(11) Instant Hydro-graph	(12) Design Hydro-graph
	(Min)	(% of Pt)	(in)	(in)	(In)	(In)	(In)	(in)	(In)	(cfs)	(cfs)
142	1420	0.0040	0.0120	2.9760	1.6419	0.0103	2.7444	0.0119	0.0109	0.5	0.5
143	1430	0.0040	0.0120	2.9880	1.6522	0.0103	2.7563	0.0119	0.0109	0.5	0.5
144	1440	0.0040	0.0120	3.0000	1.6625	0.0103	2.7683	0.0119	0.0109	0.5	0.5
	Total	1.0000	3.0000						Hydrograph Volume (Cubic Feet)		58603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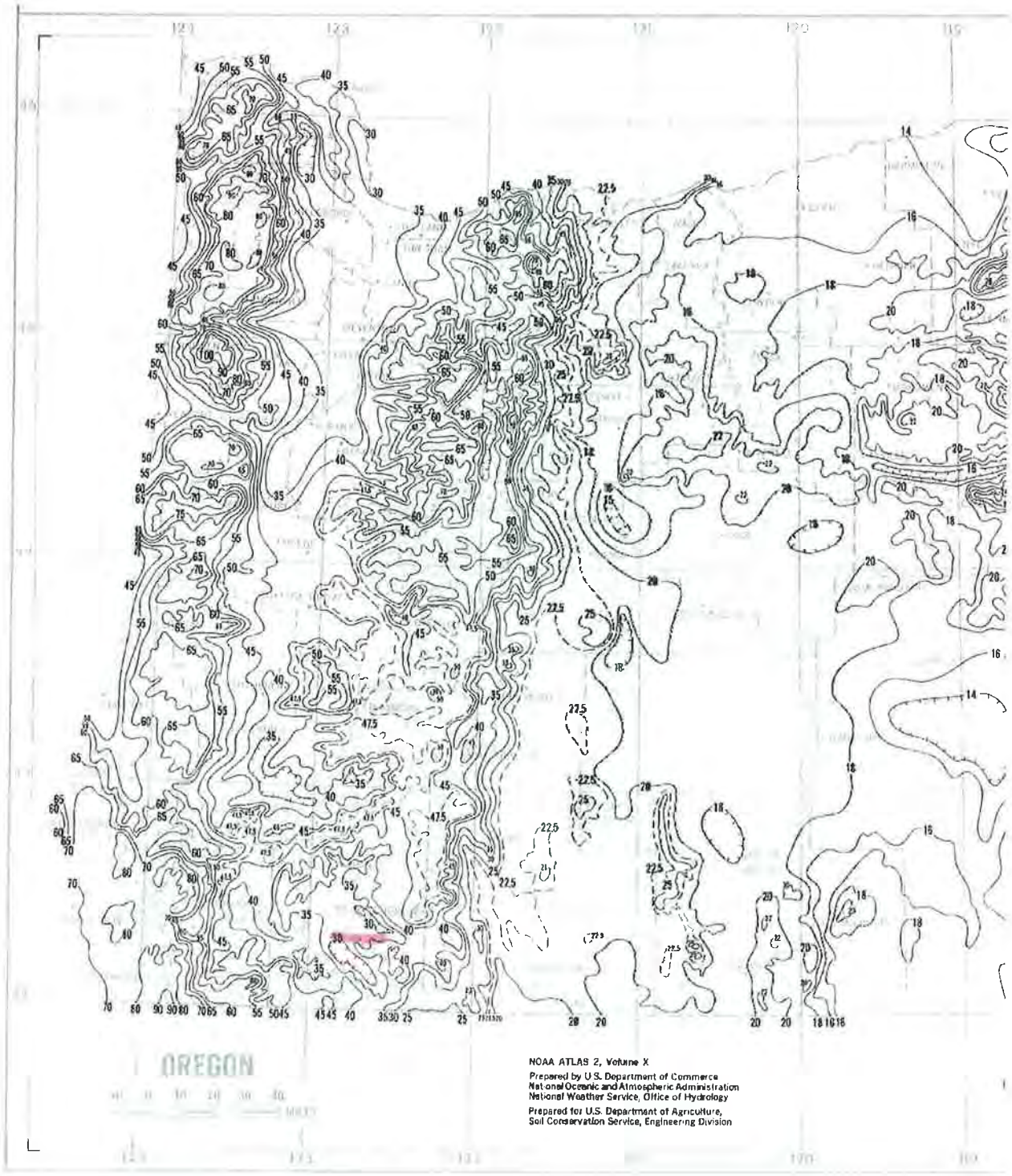
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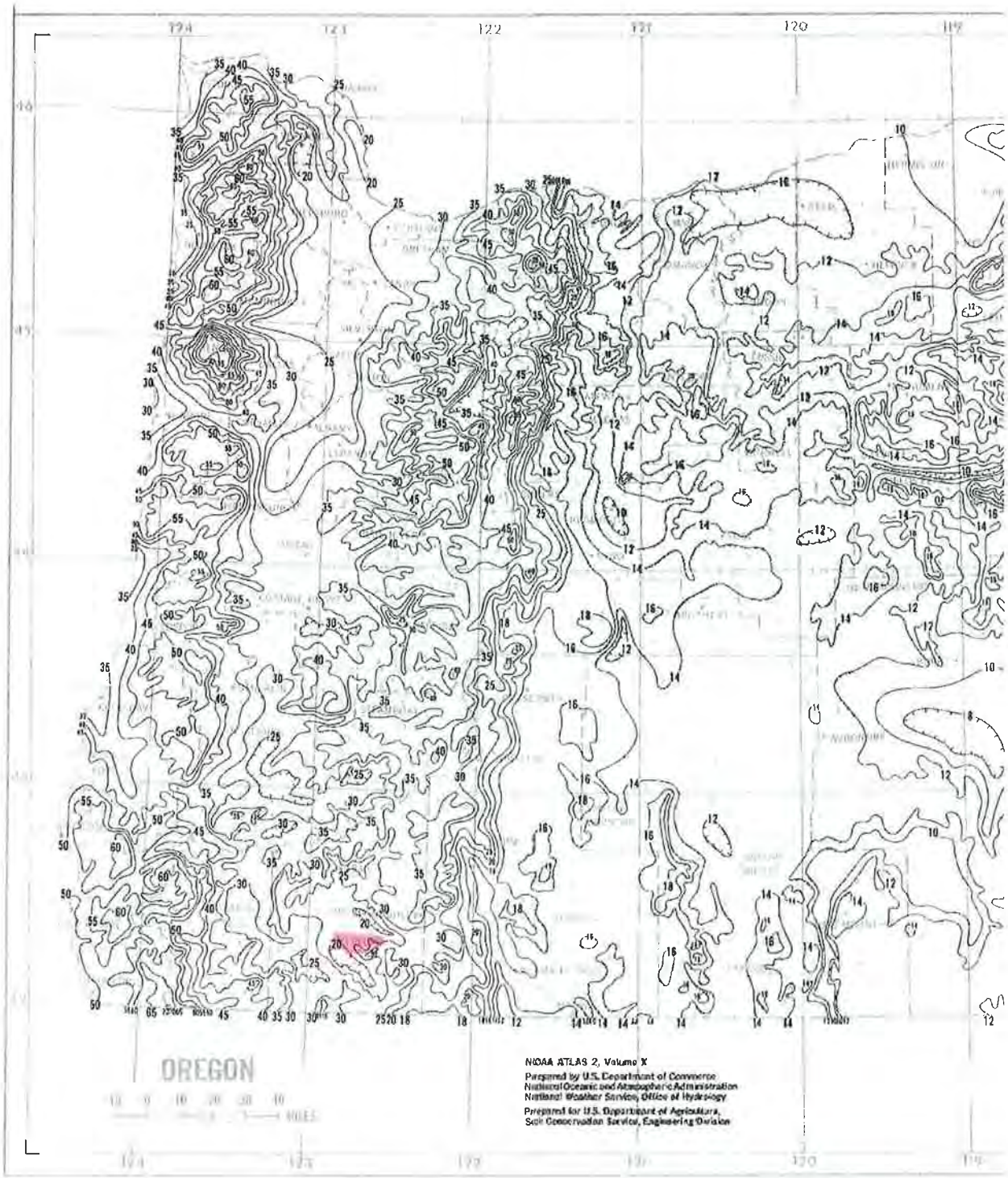
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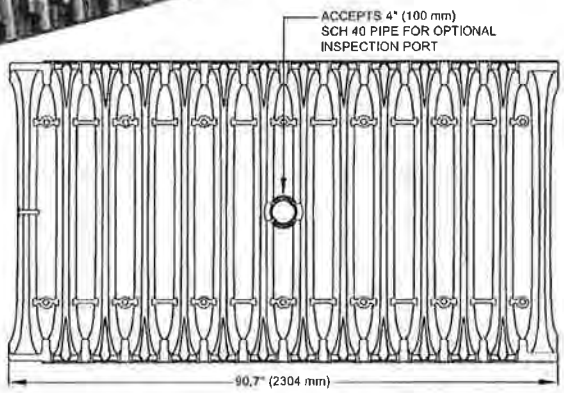
StormTech DC-780 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.

StormTech®
Detention • Retention • Recharge
Subsurface Stormwater Management℠

- **12'** Deep Cover applications.
- Designed in accordance with **ASTM F 2787** and produced to meet the **ASTM F 2418** product standard.
- **AASHTO** safety factors provided for AASHTO Design Truck (H20) and deep cover conditions



StormTech DC-780 Chamber
(not to scale)

Nominal Chamber Specifications

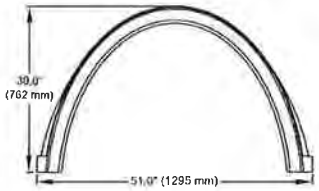
Size (L x W x H)
85.4" x 51.0" x 30.0"
(2169 x 1295 x 762 mm)

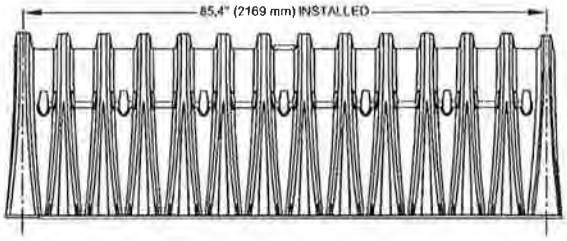
Chamber Storage
46.2 ft³ (1.3 m³)

Minimum Installed Storage*
78.4 ft³ (2.2 m³)

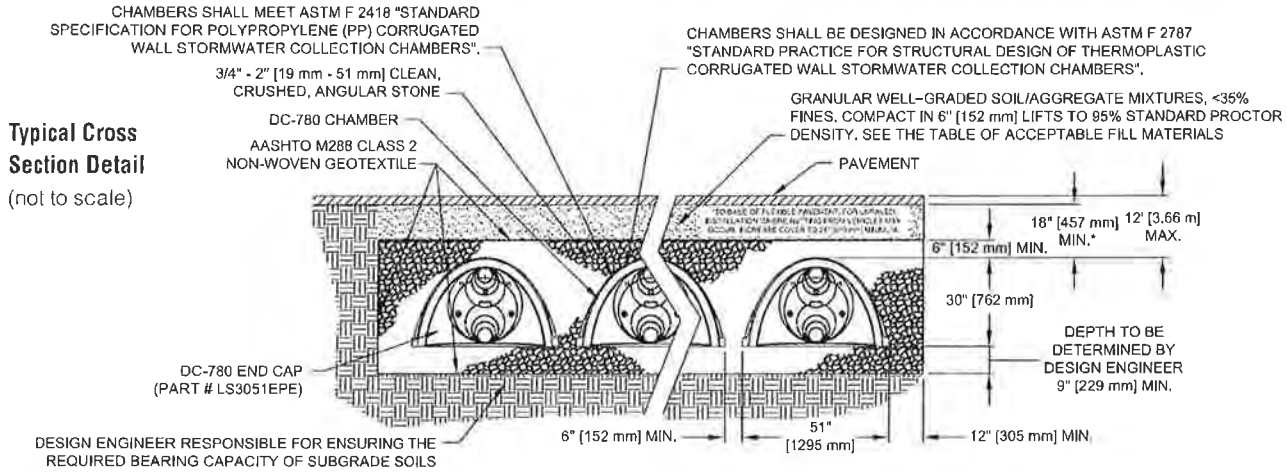
Shipping
24 chambers/pallet
60 end caps/pallet
12 pallets/truck

* Assumes 9" (229 mm) stone below, 6" (152 mm) stone above, 6" (152 mm) row spacing and 40% stone porosity.





Typical Cross Section Detail
(not to scale)



THIS CROSS SECTION DETAILS THE REQUIREMENTS NECESSARY TO SATISFY THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS USING STORMTECH CHAMBERS

DC-780 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 9' (229 mm) Stone Base Under the Chambers

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
45 (1143)	46.27 (1.310)	78.47 (2.222)
44 (1118)	46.27 (1.310)	77.34 (2.190)
43 (1092)	Stone 46.27 (1.310)	76.21 (2.158)
42 (1067)	Cover 46.27 (1.310)	75.09 (2.126)
41 (1041)	46.27 (1.310)	73.96 (2.094)
40 (1016)	46.27 (1.310)	72.83 (2.062)
39 (991)	46.27 (1.310)	71.71 (2.030)
38 (965)	46.21 (1.309)	70.54 (1.998)
37 (940)	46.04 (1.304)	69.32 (1.963)
36 (914)	45.76 (1.296)	68.02 (1.926)
35 (889)	45.15 (1.278)	66.53 (1.884)
34 (864)	44.34 (1.255)	64.91 (1.838)
33 (838)	43.38 (1.228)	63.21 (1.790)
32 (813)	42.29 (1.198)	61.43 (1.740)
31 (787)	41.11 (1.164)	59.59 (1.688)
30 (762)	39.83 (1.128)	57.70 (1.634)
29 (737)	38.47 (1.089)	55.76 (1.579)
28 (711)	37.01 (1.048)	53.76 (1.522)
27 (686)	35.49 (1.005)	51.72 (1.464)
26 (660)	33.90 (0.960)	49.63 (1.405)
25 (635)	32.24 (0.913)	47.52 (1.346)
24 (610)	30.54 (0.865)	45.36 (1.285)
23 (584)	28.77 (0.815)	43.18 (1.223)
22 (559)	26.96 (0.763)	40.97 (1.160)
21 (533)	25.10 (0.711)	38.72 (1.096)
20 (508)	23.19 (0.657)	36.45 (1.032)
19 (483)	21.25 (0.602)	34.16 (0.967)
18 (457)	19.26 (0.545)	31.84 (0.902)
17 (432)	17.24 (0.488)	29.50 (0.835)
16 (406)	15.19 (0.430)	27.14 (0.769)
15 (381)	13.10 (0.371)	24.76 (0.701)
14 (356)	10.98 (0.311)	22.36 (0.633)
13 (330)	8.83 (0.250)	19.95 (0.565)
12 (305)	6.66 (0.189)	17.52 (0.496)

DC-780 Cumulative Storage Volumes Per Chamber (cont.)

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
11 (279)	4.46 (0.126)	15.07 (0.427)
10 (254)	2.24 (0.064)	12.61 (0.357)
9 (229)	0	10.14 (0.287)
8 (203)	0	9.01 (0.255)
7 (178)	Stone 0	7.89 (0.223)
6 (152)	Foundation 0	6.76 (0.191)
5 (127)	0	5.63 (0.160)
4 (102)	0	4.51 (0.128)
3 (76)	0	3.38 (0.096)
2 (51)	0	2.25 (0.064)
1 (25)	0	1.13 (0.032)

Note: Add 1.13 cu. ft. (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Volume- Stone Foundation Depth		
		9" (229 mm)	12" (305 mm)	18" (457 mm)
StormTech DC-780	46.2 (1.3)	78.4 (2.2)	81.8 (2.3)	88.6 (2.5)

Note: Assumes 40% porosity for the stone, the bare chamber volume, 6" (152 mm) stone above, and 6" (152 mm) row spacing.

Amount of Stone Per Chamber

	Stone Foundation Depth		
ENGLISH TONS (CUBIC YARDS)	9"	12"	18"
StormTech DC-780	4.2 (3.0 yd³)	4.7 (3.3 yd³)	5.6 (3.9 yd³)
METRIC KILOGRAMS (METER³)	229 mm	305 mm	457 mm
StormTech DC-780	3810 (2.3 m³)	4264 (2.5 m³)	5080 (3.0 m³)

Note: Assumes 6" (152 mm) of stone above, and between chambers.

Volume of Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	9" (229 mm)	12" (305 mm)	18" (457 mm)
StormTech DC-780	5.9 (4.5)	6.3 (4.8)	6.9 (5.3)

Note: Assumes 6" (152 mm) of separation between chamber rows and 18" (457 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

Cover Ft. (m)	Minimum Required Bearing Resistance for Service Loads ksf (kPa)																					
	4.1 (196)	4.0 (192)	3.9 (187)	3.8 (182)	3.7 (177)	3.6 (172)	3.5 (168)	3.4 (163)	3.3 (158)	3.2 (153)	3.1 (148)	3.0 (144)	2.9 (139)	2.8 (134)	2.7 (129)	2.6 (124)	2.5 (120)	2.4 (115)	2.3 (110)	2.2 (105)	2.1 (101)	2.0 (96)
8.5 (2.59)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)
9.0 (2.74)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)
9.5 (2.90)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	33 (838)
10.0 (3.05)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	33 (838)	36 (915)
10.5 (3.20)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	30 (762)	33 (838)	36 (915)		
11.0 (3.35)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	27 (686)	30 (762)	33 (838)	36 (915)	39 (991)	
11.5 (3.50)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	27 (686)	30 (762)	33 (838)	36 (915)	39 (991)	42 (1067)		
12.0 (3.66)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	30 (762)	33 (838)	36 (915)	39 (991)	42 (1067)		

NOTE: The design engineer is solely responsible for assessing the bearing resistance (allowable bearing capacity) of the subgrade soils and determining the depth of foundation stone. Subgrade bearing resistance should be assessed with consideration for the range of soil moisture conditions expected under a stormwater system.

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WASHINGTON STATE DEPARTMENT OF ECOLOGY

January 2013

GENERAL USE LEVEL DESIGNATION FOR BASIC TREATMENT

For

Royal Environmental Systems, Inc. ecoStorm/ecoStorm *plus* Treatment Train

Ecology's Decision:

1. **Based on Royal Environmental's application submissions, including the Final Technical Evaluation Report (TER) dated July 2012, and recommendations by the Board of External Reviewers (BER), Ecology hereby issues a general use level designation (GULD) for the ecoStorm/ecoStorm *plus* treatment train:**

   - **As a basic stormwater treatment device for total suspended solids (TSS) removal,**
   - **Using the Standard concrete filter for the ecoStorm *plus*,**
   - **As part of a treatment train that includes an upstream ecoStorm unit.**

2. **Ecology approves the ecoStorm/ecoStorm plus treatment train units using the Standard concrete filter for treatment at the water quality design flow rate per filter listed below. The water quality design flow rates are calculated using the following procedures:**

   - **Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.**

   - **Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.**

   - **Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.**

3. **This designation has no expiration date, but Ecology may amend or revoke it, and it is subject to the conditions specified below.**

Ecology's Conditions of Use:

1. **The ecoStorm component of the treatment train shall comply with the following conditions:**

   - **Design, assemble, install, operate, and maintain the ecoStorm units in accordance with Royal Environmental Systems Inc.'s applicable manuals and documents and the Ecology Decision.**

   - **Owners must install appropriately sized ecoStorm unit or units upstream of the ecoStorm plus unit(s).**

   - **ecoStorm units range from 4 to 12 feet in diameter with a design treatment flow of 30 GPM (0.067 cfs) per sf. See table below.**

ecoStorm Model Number	Diameter (feet)	Surface Area (sf)	Treatment Flow Rate (gpm)	Maximum number of ecoStorm *plus* units [a]
0.5	4	12.57	377	2
0.75	5	19.63	588	3
1	6	28.27	848	4
1.5	7	38.48	1,153	6
2	8	50.27	1,508	8
3	10	78.54	2,356	13
4	12	113.1	3,393	18

sf: square feet
gpm: gallons per minute
[a] Calculated as ecoStorm flow rate/ecoStorm *plus* design flow (0.40 cfs). Can also be calculated using a surface area ratio of 0.7 ecoStorm/ecoStorm *plus*.

2. **The ecoStorm plus component of the treatment train shall comply with the following conditions:**

   - **Design, assemble, install, operate, and maintain ecoStorm plus units in accordance with Royal Environmental Systems Inc.'s applicable manuals and documents and the Ecology Decision.**
   - **Size the ecoStorm *plus* units at a design rate of 180 gallons per minute (0.40 cfs) per 5-ft. diameter filter (19.63 square feet surface area).**

3. **Operators must lower Effluent pH from the ecoStorm plus unit if necessary to meet water quality standards using passive pH adjustment with ascorbic acid tablets or sodium bisulfate or by installing a CO2 sparging system or other equivalent method.**

4. **Replacement ecoStorm plus filters shall be available for installation within 3 days after identifying that the filters need replacement.**

The following conditions apply to the combined treatment system (ecoStorm/ecoStorm *plus* treatment train):

1. **To determine site-specific maintenance schedules for installed ecoStorm/ecoStorm *plus* treatment trains, the presence and frequency of all system bypasses shall be monitored by a water sensor (presence/absence or level) and logging device.**

2. **The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured treatment device.**

    - **Testing results provided to Ecology for the Basic Treatment GULD approval indicate that the treatment system required backflushing on average every 1.3 months and filter replacement after 9.3 months on average at the specific test installation. Indicators of the need for maintenance included:**

        - **Decreased flow through filter**
        - **Increased incidence of bypass**
        - **Visual build-up of material on surface of filter**

    - **This particular maintenance interval does not necessarily determine the overall maintenance frequency for all ecoStorm/ecoStorm plus treatment trains.**

    - **Owners/operators must inspect ecoStorm/ecoStorm *plus* treatment trains systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. Inspection frequency shall be as stated below. After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.**

    - **Conduct inspections by qualified personnel pursuant to manufacturer's guidelines, and use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.**

3. **Records of maintenance, bypass flows, and local rain gage data shall be submitted to Ecology on a quarterly basis until site-specific maintenance schedules for the installed ecoStorm/ecoStorm *plus* treatment train can be determined. Bypass data must be downloaded at least monthly to evaluate system performance relative to the goal of treating 91 percent of the average annual runoff volume.**

4. **Owners of ecoStorm/ecoStorm *plus* treatment trains shall submit a letter to Ecology committing to a schedule of required maintenance inspections as follows:**

    - **From October 1st to April 30th: inspections shall occur once every two weeks or after every 2 inches of rainfall, whichever occurs first.**

- **From May 1st to September 30th inspections shall occur at least monthly and/or in conjunction with a storm event of > 0.5 inches in 24 hours.**

5. **Discharges from the ecoStorm/ecoStorm *plus* treatment train shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant: Royal Environmental Systems Inc.

Applicant's Address: 30622 Forest Blvd, PO Box 430
Stacy, MN, 55079

Application Documents:

- Draft ecoStorm/ecoStorm *plus* Treatment Train Evaluation Technical Evaluation Report, Herrera Environmental Consultants (October 2011)
- Final ecoStorm/ecoStorm *plus* Treatment Train Evaluation Technical Evaluation Report, Herrera Environmental Consultants (August 2012)
- Responses to BER comments, Water Tectonics and Herrera Environmental Consultants (August 2012)
- ecoStorm *plus* CULD Request: Supplemental information/clarification as requested in Ecology's December 21, 2010 letter and use level designation extension request. Memorandum prepared by WaterTectonics (January 19, 2011).
- Request for Conditional Use Level Designation for the ecoStorm *plus*™ unit, memorandum prepared by Royal Environmental Systems, Inc. (October 21, 2010).
    a. ecoStorm *plus*™ Product Information for Washington State Department of Ecology Use Designation Determination (September 29, 2010)
    b. Herrera Environmental Consultants Memorandum – Update on Water Tectonics TAPE process for the ecoStorm *plus* filter system (September 8, 2010)
    c. Water Tectonics, Inc. – Internal Memorandum McRedmond ecoStorm *plus* Data Collection, (October 5, 2010)
    d. Herrera Environmental Consultants – McRedmond TSS Discrete Analysis (2010 Data)
    e. Herrera Environmental Consultants – McRedmond TSS Composite Analysis (2010 Data)
    f. Herrera Environmental Consultants – Third Party Technical Review City of Redmond ecoStorm *plus* Monitoring Project, January 8, 2010 (2009 Data)
- QAPP ecoStorm *plus*™ McRedmond RWQF – Addendum 4 (March 1, 2010)
- QAPP ecoStorm *plus*™ McRedmond RWQF – Addendum 3 (September 1, 2009)
- QAPP ecoStorm *plus*™ McRedmond RWQF – Addendum 2 (August 1, 2009)
- QAPP ecoStorm *plus*™ McRedmond RWQF – Addendum 1 (April 8, 2009)

- Quality Assurance Project Plan (QAPP) ecoStorm *plus*™ McRedmond Regional Water Quality Facility (RWQF), prepared by Water Tectonics and Royal Environmental Systems, Inc. (March 18, 2008)
- ecoStorm *plus*™ Quality Assurance Project Plan (QAPP) for Basic, Enhanced & Phosphorus Treatment (Rev04), prepared by Water Tectonics and Royal Environmental Systems, Inc. (August, 28, 2007)
- Product Information for Washington State Department of Ecology Use Designation Determination, prepared by Water Tectonics (July 2006)
- ecoStorm *plus* Lab Scale Testing Final Report, prepared by Water Tectonics (July 2006)
- Report on investigations into retention of pollutants in rainfall runoff from a concrete plant using a ecoStorm *plus* filter pit prepared by: Dr. Dierkes (August 2004)

Applicant's Use Level Request:

General Use Level Designation as a Basic Treatment device.

Applicant's Performance Claims:

- Average of 80% removal of TSS.

Findings of Fact:

1. Monitoring for this project occurred at the McRedmond Regional Water Quality Facility (McRedmond Facility) installed in 2007 at the Luke McRedmond Park in Redmond, Washington.
2. WaterTectonics collected water quality data from 31 storm events (15 composite sampling events and 16 discrete sampling events) over a 27-month period (March 2009 through June 2011).
3. WaterTectonics collected a total of 15 valid TSS composite samples: 10 samples were in the 20 to 99 mg/L influent TSS range, 3 samples were in the 100 to 200 mg/L influent TSS range, and 2 samples were in the > 200 mg/L TSS range. Since a majority of the samples were in the 20 to less than 100 mg/L influent range, this was the only performance goal statistically evaluated.
4. To evaluate this goal, WaterTectonics computed a bootstrapped estimate of the upper 95 percent confidence limit around the mean from the 10 valid samples in the 20 to less than 100 mg/L influent TSS range; they compared this value (9.7 mg/L) to the 20 mg/L effluent goal. Because the upper confidence limit is lower than the effluent goal of 20 mg/L, it can be concluded that the ecoStorm/ecoStorm *plus* treatment train met the basic treatment goal with a confidence level of 95 percent.
5. Although there were not enough samples in the other two size ranges to demonstrate statistical significance, the mean TSS percent removal was 84 percent in the 100 to 200 mg/L influent TSS range and 85 percent in the > 200 mg/L TSS range.

6. In order to evaluate pollutant removal performance as a function of flow rate, WaterTectonics performed a regression analysis using pooled effluent TSS concentration data from composite and discrete samples collected from the ecoStorm/ecoStorm *plus* treatment train. Aliquot-weighted flow rates for the composite sampling ranged from 39.3 to 318 gpm. Instantaneous flow rates for the discrete sampling ranged from 12.3 to 257 gpm. This analysis showed there was no significant relationship between flow rate and effluent TSS concentrations, demonstrating that the measured pollutant removal performance can be applied to the range of flow rates monitored during this study (12.3 to 318 gpm).
7. WaterTectonics evaluated data from the continuous pH record to determine if there were differences in average daily pH influent and effluent values before and after initiation of CO_2 sparging. The average daily influent pH value was 6.85 before and after sparging. However, the average daily effluent pH value was reduced from 9.25 before CO_2 sparging to 8.01 after CO_2 sparging.

Other ecoStorm/ecoStorm *plus* Treatment Train Related Issues to be Addressed By the Company:

1. Develop easy-to-implement methods of determining when an ecoStorm/ecoStorm *plus* treatment train requires maintenance (cleaning and filter replacement).

Technology Description: Download at www.royalenterprises.net

Contact Information:

Applicant:
Liisa Doty
WaterTectonics, Inc.
6300 Merrill Creek Parkway
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Applicant website: www.royalenterprises.net
Ecology web link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html
Ecology:
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Water Quality Program
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Revision History

Date	Revision
December 2009	PULD granted
February 2011	CULD granted
July 2012	GULD granted for Basic Treatment, added Revision Table
January 2013	Modified Design Storm Description, revised format to match Ecology standard

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Jackson County Area, Oregon, Parts of Jackson and Klamath Counties

White Hawk

August 22, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

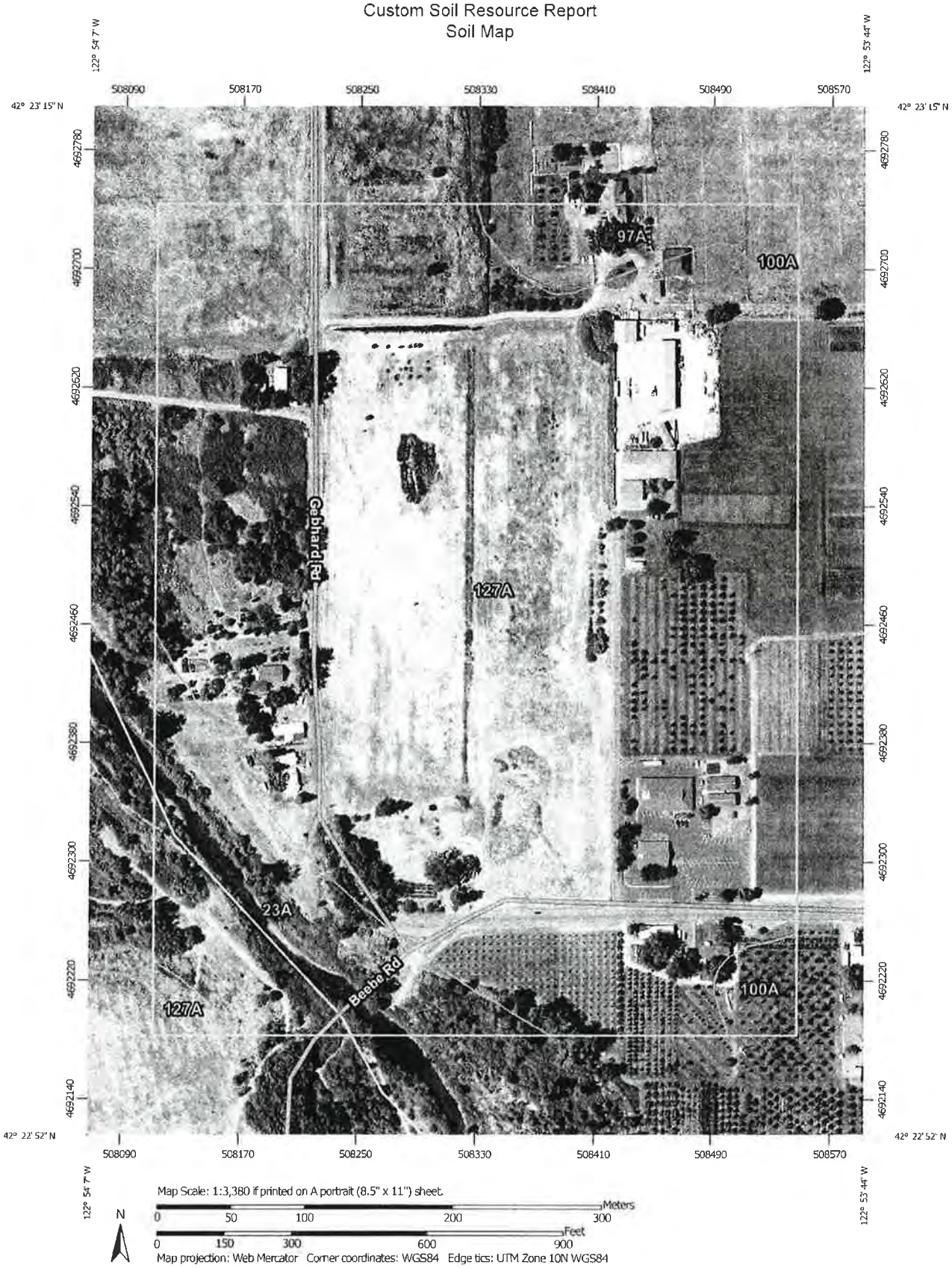
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Jackson County Area, Oregon, Parts of Jackson and Klamath Counties
Survey Area Data: Version 10, Dec 4, 2013

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

Date(s) aerial images were photographed: Jun 28, 2010—Jul 17, 2010

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

Map Unit Legend

Jackson County Area, Oregon, Parts of Jackson and Klamath Counties (OR632)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
23A	Camas-Newberg-Evans complex, 0 to 3 percent slopes	6.7	11.1%
97A	Kerby loam, 0 to 3 percent slopes	2.1	3.4%
100A	Kubli loam, 0 to 3 percent slopes	1.1	1.8%
127A	Medford silty clay loam, 0 to 3 percent slopes	50.8	83.7%
Totals for Area of Interest		**60.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that

have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jackson County Area, Oregon, Parts of Jackson and Klamath Counties

23A—Camas-Newberg-Evans complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hrrs
Elevation: 1,000 to 3,000 feet
Mean annual precipitation: 18 to 40 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Camas and similar soils: 40 percent
Newberg and similar soils: 30 percent
Evans and similar soils: 19 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Camas

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium

Typical profile

H1 - 0 to 10 inches: gravelly sandy loam
H2 - 10 to 60 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 9 to 17 inches to strongly contrasting textural stratification
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A
Ecological site: Loamy flood plain 18-30 pz (R005XY028OR)

Description of Newberg

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Alluvium

Typical profile

H1 - 0 to 17 inches: fine sandy loam
H2 - 17 to 30 inches: sandy loam
H3 - 30 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Ecological site: Loamy flood plain 18-30 pz (R005XY028OR)

Description of Evans

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Recent alluvium

Typical profile

H1 - 0 to 38 inches: loam
H2 - 38 to 60 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B
Ecological site: Loamy flood plain 18-30 pz (R005XY028OR)

Minor Components

Aquolls

Percent of map unit: 2 percent
Landform: Flood plains

Cove

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Poorly drained bottom (R005XY016OR)

Riverwash

Percent of map unit: 1 percent
Landform: Flood plains

97A—Kerby loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hrw8
Elevation: 1,000 to 2,000 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Kerby and similar soils: 80 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kerby

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 54 inches: loam
H3 - 54 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: Deep loamy terrace 18-28 pz (R005XY036OR)

Minor Components

Gregory

Percent of map unit: 4 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Poorly drained bottom (R005XY016OR)

Aquepts

Percent of map unit: 1 percent
Landform: Terraces

100A—Kubli loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hrlv
Elevation: 1,000 to 2,300 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Kubli and similar soils: 90 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kubli

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 15 inches: loam
H2 - 15 to 31 inches: loam

H3 - 31 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: Deep loamy terrace 18-28 pz (R005XY036OR)

Minor Components

Aquolls

Percent of map unit: 2 percent
Landform: Terraces

Gregory

Percent of map unit: 1 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Poorly drained bottom (R005XY016OR)

127A—Medford silty clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hrn5
Elevation: 1,000 to 4,000 feet
Mean annual precipitation: 18 to 35 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 125 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Medford and similar soils: 85 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Medford

Setting

Landform: Stream terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metavolcanics and/or metasedimentary rock

Typical profile

H1 - 0 to 12 inches: silty clay loam
H2 - 12 to 22 inches: silty clay
H3 - 22 to 53 inches: silty clay loam
H4 - 53 to 71 inches: stratified sandy clay loam to silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: C
Ecological site: Deep loamy terrace 18-28 pz (R005XY036OR)

Minor Components

Gregory

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Poorly drained bottom (R005XY016OR)

Aquolls

Percent of map unit: 1 percent
Landform: Mountains

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Appendix D

DRAFT

Independent Cleanup Program Results Report
718 Beebe Road
Central Point, Oregon

Prepared for:
Duncan Development LLC

October 17, 2006
1141-00

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

DRAFT

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Executive Summary

Duncan Development LLC plans to purchase and develop the property at 718 Beebe Road, Central Point, Oregon for use as a high density residential development and landscaped recreational use park. This Independent Cleanup Pathway Report was prepared for and is submitted on behalf of Duncan Development LLC, following Oregon Department of Environmental Quality guidance for ICP Report preparation.

Historically, a portion of the property was used as a fruit orchard from at least 1939 to approximately 1970. During that period of time, lead arsenate was often used as a pesticide on orchards. Soil and groundwater sampling events were conducted to evaluate the extent to which the historic use of the site as an orchard has impacted the property.

In November 2005, soil samples were collected from the area of the property that was formerly used as an orchard. The results of that soil sampling event indicated arsenic concentrations above regional background in the vicinity of the former orchard. A second soil sampling event was conducted in April 2006. That sampling event focused on the area of the property that was not used as an orchard. Results indicate that soil directly adjacent to the former orchard area has been impacted by the lead arsenate usage, but soil farther than approximately 120 feet from the orchard and gravel access road bounding the site on the north has not been impacted. A groundwater sampling event was conducted in June 2006. The results of that sampling event show that groundwater has not been impacted by the use of lead-arsenate at the site.

Based on a comparison of the 90 percent upper confidence levels (90UCL) of the mean concentration of arsenic to U.S. Environmental Protection Agency (EPA) Region 9 residential preliminary remediation goals (PRGs), there is potentially unacceptable risk, as defined by Oregon Administrative Rules (OAR 340-122-115[2; b]), posed by the soil impacted with arsenic in and adjacent to the former orchard area to future site residents.

A focused feasibility study of appropriate remedial alternatives was conducted for the soil in and near the former orchard area that has been impacted by the former lead arsenate usage. Based on the focused feasibility study, the following remedial action plan is recommended:

- Removal of impacted soil adjacent to the proposed park and placement in the proposed park area;
- Regrading of non-impacted soil from the southern portion of the site into the removal areas to achieve development grades;
- Capping of the park with 2 feet of imported fill soil in landscaped areas, or by asphalt or concrete in hardscape areas; and
- Development of a long-term cap maintenance plan for the park.

A deed restriction would likely be required for the park to ensure that the cap maintenance plan is continued into the future.

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1.0 Introduction

1.1 Project Introduction

Duncan Development LLC plans to purchase and develop the property at 718 Beebe Road, Central Point, Oregon (the site) for use as a high density residential development (townhomes). This Independent Cleanup Pathway (ICP) Report was prepared for and is submitted on behalf of Duncan Development LLC, following Oregon Department of Environmental Quality (DEQ) guidance for ICP Report preparation.

1.2 Purpose and Objectives

Phase I and Phase II Environmental Site Assessments were completed by others, and identified that the northeast corner of the site was formerly used as an orchard. Lead arsenate was used as a pesticide in the orchard area. In 2005, limited site investigations were conducted and some metals and low concentrations of pesticides were detected in surface soil in the former orchard area. In particular, arsenic was detected above U.S. Environmental Protection Agency (EPA) Region 9 residential Preliminary Remediation Goals (PRGs).

Duncan Development LLC has entered the ICP to obtain DEQ review and approval of proposed risk management measures to be implemented to mitigate potential unacceptable risk posed by arsenic in site soil in and near the former orchard area. This report summarizes the results of previous and recent site characterization activities, risk-screening of the site data, risk assessment of arsenic concentrations in soil, and an assessment of remedial options completed to select an appropriate risk management approach.

2.0 Site Background

2.1 Site Location

The site is located at 718 Beebe Road in Central Point, Oregon (Figure 1).

2.2 Site Description

The site is approximately 20 acres in size and is located in an agricultural/residential area (Figure 2). The site is bounded to the north by a pasture and private residence. It is bordered to the south by Beebe Road, with an orchard across the road. The site is bounded to the east by a church, a young peach orchard and construction yard, and to the west by Gebhard Road, with residences and vacant county land across the road. A house is located in the southwest corner of the site.

2.3 Site History and Facility Operations

2.3.1 Ownership History

The site is currently owned by Albert McMurray, who purchased the site in 1998. From 1939 to 1998, the site was owned by other members of the McMurray family.

2.3.2 Operating History

The site has been used exclusively for agricultural purposes since it was first occupied in approximately 1939. From at least 1939 to approximately 1970, a 4 acre portion of the property was used as a fruit orchard. The site was also used for pasture land, grain faming, and as a vineyard from 1999 to 2004. Currently, the site is vacant.

2.4 Regulatory History

The site was entered into the ICP in early 2006. Due to the presence of arsenic in site soil, the site was referred to the Voluntary Cleanup Program (VCP). The site was not regulated by the state or federal agencies prior to its entry into the VCP.

2.5 Previous Investigations

The following summarizes the investigations conducted by others at the site.

March 2005. An Environmental Transaction Screen was completed in March 2005 by Cascade Earth Services (CES) for Duncan Development LLC. CES concluded that no significant environmental concerns existed at the site. A storage shed where small quantities (containers of less than 5 gallons) of oil and gasoline were stored was identified. Evidence of small spills in the shed and near the heaters were noted and reported as *deminimis* in nature. A review of the environmental records of contaminated sites in the vicinity of the property indicated that the properties did not pose a significant environmental risk to the site, and that risk of contamination is low or unlikely. An irrigation pond was observed in the northeast corner of the site. The report recommended soil sampling for lead, arsenic, herbicide, and pesticide residues, given the historical use of the site as an orchard. A copy of the Environmental Transaction Screen is included in Appendix A.

April 2005. A limited soil sampling event and historical aerial photograph review were conducted by CES. The photograph review was conducted to determine where the former orchard had been located on the property and the period of time that the orchard had been in use. One composite sample was collected from the approximately 4-acre former orchard area and analyzed for arsenic, lead, and pesticides. Detected levels of pesticides and lead were below PRGs for residential soils. Arsenic was detected at concentrations

that were above the PRG for residential soils of 0.39 mg/kg (EPA, 2004). No map of, or information about, soil sampling locations were provided in the report. A copy of the letter report is included in Appendix B.

August 2005. Duncan Development LLC retained CES to conduct an additional soil sampling event. Twenty-five discrete samples were taken from six different locations at the property. Four locations were in the former orchard area, one location was in a former garden area near the house, and one sample location was taken on the property in an area not used as an orchard. The samples were collected at 6-inch intervals from the ground surface to a depth of 2 feet, resulting in four samples for every sample location. An additional surface soil sample was taken at a nearby property. Twenty-two of the 25 soil samples were submitted for laboratory analysis for arsenic. Arsenic was detected in all on- and off-site samples at levels that exceed the PRG for residential soils, with the highest arsenic levels being detected in the former orchard area. No information regarding, or map showing, soil sampling locations was provided in the report. A copy of the letter report is included in Appendix C.

3.0 Environmental Setting

3.1 Climate Information

Average annual precipitation in Central Point, Oregon is 18.37 inches (National Climatic Data Center website, 2005). The temperature ranges from an average low of approximately 37° F in January to an average high of approximately 68° F in July (National Climatic Data Center website, 2005).

3.2 Topography

The site is relatively flat and lies at an approximate elevation of 1,250 feet above mean sea level (MSL).

3.3 Surface Water Hydrology

Bear Creek is located approximately 150 feet from the southwestern corner of the site and approximately 850 feet from the former orchard (Figure 1).

3.4 Regional and Site Geology and Soils

The site is in the Bear Creek Valley region. The regional geology consists of quaternary older alluvium that is a mixture of unconsolidated gravel, sand, silt, and clay in varying proportions; thickness ranges up to 60 feet in the region (State of Oregon Department of Geology and Mineral Industries, 1977b). This quaternary older alluvium is possibly underlain by quaternary bench gravels that are a mixture of semi-consolidated gravel, sand, clay, and silt up to 70 feet thick. The bedrock geologic unit in the Bear Creek Valley is

cretaceous sedimentary rock consisting of hard conglomerate and sandstone overlain by mudstone with thick sandstone interbeds (State of Oregon Department of Geology and Mineral Industries, 1977a).

Soil encountered at the site to the depths explored (16 feet below grade) consisted of clay, with trace amounts of sand encountered in some areas.

3.5 Regional and Site Hydrogeology

Regionally, the quaternary older alluvium and bench gravels underlying the property contain restrictive soil layers and are subject to poor drainage, ponding, and high groundwater (State of Oregon Department of Geology and Mineral Industries, 1977a). The Bear Creek Valley has a shallow water-bearing zone, with groundwater encountered at less than 50 feet below the ground surface (bgs) on average (City of Medford Comprehensive Plan Environmental Element, 2003). The primary aquifer in the area is located in the alluvial deposits found in the region.

Groundwater at the site is encountered between 9 and 16 feet bgs. Based on the site topography and the presence of Bear Creek south and west of the site, groundwater at the site likely flows west or southwest, toward Bear Creek.

4.0 Site Investigation

The results of previous investigations indicated the presence of arsenic in site soil at concentrations exceeding EPA's residential PRG. Further characterization was needed to determine the extent of arsenic related to the former lead arsenate use in the former orchard area, and to assess what actions, if any, would be needed to mitigate risk sufficiently to support the proposed site development. Ash Creek Associates conducted several investigations to meet this objective.

4.1 Scope of Work

4.1.1 Soil Investigations

Ash Creek Associates conducted an initial soil sampling event from November 9 through 11, 2005. The objective of this sampling event was to assess the extent of the impact of lead arsenate or other pesticide use in the former orchard area, and to assess whether other areas adjacent to the former orchard area may have been impacted. The scope of work consisted of:

- Collecting surface and shallow soil samples from 11 test pit locations within the former orchard area;

- Collecting surface soil samples from 23 additional locations within or adjacent to the former orchard area; and
- Collecting surface soil samples from two locations in the southwest portion of the site and four locations off the property.

Sample locations are shown on Figure 3 as TP-1 through TP-11, SS-1 through SS-23, and BG-1 and BG-2. Samples BG-3 through BG-6 were collected off-site and are not shown on Figure 3.

On April 17, 2006, Ash Creek Associates conducted an additional soil sampling investigation at the site. The objective of this sampling event was to characterize the extent of arsenic and lead in soil outside of the former orchard area. Twenty-four test pits were dug by backhoe and sampled during the April 2006 event. Four test pits were hand dug and sampled during the April 2006 event. The April 2006 sampling locations are shown in Figure 3 as TP-12 through TP-39.

4.1.1 Groundwater Investigation

On June 29, 2006, a groundwater investigation was conducted at the site. The objective of this sampling event was to determine if the groundwater beneath the site had been impacted by historic lead arsenate application in the former orchard area. Groundwater was collected at four locations, B-1 through B-4, which are shown on Figure 3. The locations were chosen to determine arsenic and lead concentrations both in groundwater migrating onto the property and groundwater leaving the property. Boring locations B-3 and B-4 were completed upgradient of the site. The remaining two borings were completed on the property, downgradient of the former orchard area.

4.2 Methods and Procedures

4.2.1 Soil Sampling Procedures

Shallow soil samples (i.e., no deeper than 4.0 feet bgs) were collected from test pits excavated by a backhoe and operator. The soil samples were collected from the sidewall of the each test pit. Within the former orchard area, soil samples were taken at 6-inch intervals, from 0.5 foot to 4.0 feet bgs. Test pits outside the former orchard area were completed to 2.0 feet bgs, and samples were collected at 6-inch intervals, from 0.5 to 1.0 foot bgs and 1.5 to 2.0 feet bgs. For sampling locations in close proximity to the house and barn at the site (TP-32, TP-33, TP-36, and TP-37), the test pits were hand dug using a clean shovel to avoid utilities, and samples were collected at 6-inch intervals, from 0.5 to 1.0 foot bgs and 1.5 to 2.0 feet bgs, wherever possible. Surface soil samples were collected at 6-inch depth intervals, from the ground surface to 0.5 foot bgs.

A stainless steel spoon was used to collect each soil sample, and the samples were placed into laboratory supplied glass jars. The spoon was cleaned in an Alconox detergent solution and rinsed thoroughly with distilled water between sample collection intervals and sampling locations. The glass jars containing the samples were labeled with a unique identification numeral, date, location, and project name/number. The samples were then delivered to the analytical laboratory using chain of custody protocols.

4.2.2 Groundwater Sampling Procedures

Groundwater samples were collected by direct-push equipment at the four sampling locations shown on Figure 3. Soil was logged continuously over the depth of the borings. Boring logs are shown in Appendix D. Each boring was completed several feet below the first encountered groundwater and a temporary well point was installed in the boring. The temporary well point consisted of PVC pipe casing with a 5-foot screen at the bottom. Groundwater (as evidenced by wet soil) was encountered at approximately 10 feet below grade at borings B-2 and B-3, approximately 12 feet below grade at boring B-4, and approximately 15 feet below grade at boring B-1. Therefore, the screen was placed at a depth of 10 to 15 feet in borings B-2, B-3, and B-4, and at a depth of 15 to 20 feet below grade in boring B-1. Once the PVC was installed, groundwater equilibrated and depth to groundwater was measured and recorded on the boring log.

Groundwater samples were collected using a peristaltic pump with new tubing at each location. The groundwater samples were field filtered and carefully poured into laboratory supplied containers. The sample containers were labeled with sample ID, date, and project name/number. The samples were then delivered to the analytical laboratory using chain of custody protocols.

4.3 Chemical Analysis

Soil samples were submitted to TestAmerica, Inc. (formerly North Creek Analytical, Inc.) of Beaverton, Oregon for analysis. For the November 2005 soil sampling event, the samples were analyzed by EPA method 6020 for arsenic. Four of the samples were also analyzed for 17 metals by EPA Method 6020/7000 series and pesticides by EPA Method 8081A. For the April 2006 sampling event, the samples were analyzed for arsenic (EPA Method 6020); the 0.5 to 1.0 foot samples were also analyzed for lead (EPA Method 6020).

Groundwater samples were submitted to TestAmerica, Inc. in Beaverton, Oregon for analysis. The samples were analyzed for arsenic and lead by EPA Method 6020.

4.4 Results

4.4.1 Soil Sampling Results

Soil sampling results are listed in Tables 1 through 3; Table 1 lists the arsenic and lead results, Table 2 lists the results of the other metals analysis, and Table 3 lists the pesticide results. Figures 4 through 6 summarize arsenic and lead results.

Arsenic and lead were detected in all of the soil samples during both sampling events (Table 1). None of the lead concentrations exceeded the EPA residential PRG or the DEQ's risk-based concentration (RBC) for residential site use of 400 mg/kg. All of the arsenic concentrations exceeded the EPA residential PRG.

Several metals other than arsenic and lead were detected (Table 2). Four pesticide compounds (DDT, DDE, DDD, and dieldrin) were detected at low concentrations in three locations within the former orchard area.

The laboratory report and chain of custody documentation for the November 2005 sampling and analysis event are included in Appendix E; copies of the laboratory data sheets for the April 2006 sampling and analysis event are contained in Appendix F. An evaluation of the analytical results is provided in Section 5.2.

4.4.2 Groundwater Sampling Results

Groundwater samples were analyzed for lead and arsenic. Groundwater was not analyzed for other metals because the other metals appear to be naturally occurring (see Section 5.2 for more detail), and groundwater was not analyzed for pesticides because the detected pesticides are not readily leachable and will tend to adhere strongly to soil.

Lead was not detected in any of the groundwater samples. Arsenic was detected in the groundwater samples at low concentrations. Results of the analyses are summarized in Table 4 and on Figure 7. Arsenic concentrations in the samples collected upgradient of the site were essentially equivalent to concentrations downgradient of the former orchard area. Groundwater has not been impacted by the use of lead arsenate at the site. Copies of the laboratory data sheets are contained in Appendix G. A quality assurance/quality control (QA/QC) review of the laboratory data is included as Appendix H.

5.0 Sources, Nature, and Extent

Investigations at the property indicate the presence of lead and arsenic, as well as a few other metals and a few pesticides in shallow soil. Results of groundwater sampling show that the arsenic and lead in the shallow soil have not impacted groundwater, therefore this section describes the nature and extent in soil.

5.1 Nature and Source

Arsenic and lead are present in soil at the site (Table 1). In addition, several other metals (Table 2) and four pesticides were detected in soil.

Lead arsenate was used at the fruit orchard that was previously present in the northeast corner of the site and was sprayed directly onto the trees as a pesticide. Based on conversations with Mr. McMurray and a historical review of lead arsenate usage, the lead arsenate was likely used from 1939 until the late 1950s or early 1960s. Mr. McMurray was not aware of the usage of DDT or dieldrin in the orchard, or any activities that would have contributed metals other than arsenic and lead to the site soil.

5.2 Extent

Lead. Figure 4 summarizes the lead results. Lead concentrations within the former orchard area are significantly higher (an order of magnitude or more) than those detected outside of the former orchard area, and the extent of lead is consistent with the usage of lead arsenate within the former orchard area. However, lead concentrations both within and outside of the former orchard area are below the EPA Region 9 PRG.

Arsenic. Figure 5 presents the arsenic results from samples collected outside of the former orchard area, and Figure 6 presents the arsenic results from samples collected within the former orchard area. As shown on the figures, the arsenic concentrations are significantly higher in the soil within the former orchard area. Arsenic concentrations appear to decrease quickly outside of the former orchard area but still appear to be higher in soil directly adjacent to the orchard area and the northern boundary of the site (i.e., within 120 feet) than in other areas of the site more remote from the orchard.

All of the arsenic concentrations exceed the EPA residential PRG of 0.39 mg/kg. Arsenic occurs naturally in soil, and background concentrations of arsenic in the Pacific Northwest often exceed EPA residential PRGs. Washington Department of Ecology (WDOE) funded a study to determine typical background metal concentrations in soil in Washington (WDOE, 1994). Because soil types are similar in Washington and Oregon, the results are considered representative of the Pacific Northwest. The statewide average background concentration of arsenic determined in the study was 7 mg/kg. Therefore, site concentrations were compared to this background level (referred to herein as "regional background") to determine which

areas were impacted by the lead arsenate use and which areas have arsenic concentrations typical of regional background.

To assist in this analysis, the 90 percent upper confidence level of the mean arsenic concentration (90UCL) was estimated for different areas of the site. The US EPA's ProUCL analysis tool was used to estimate the 90UCLs. The highest concentrations were observed in the former orchard area and most concentrations exceeded regional background. The 90UCL for the former orchard area is approximately 33 mg/kg. Although not as elevated, most of the results within approximately 120 feet of the former orchard area and the gravel road that borders the site to the north, exceeded regional background. The 90UCL for this area is approximately 17 mg/kg. The arsenic concentrations across the remainder of the site are mostly below regional background and support that the activities in the former orchard area did not impact the soil in this area. The 90UCL of this remaining site area is 6.9 mg/kg, confirming that the arsenic levels in this soil fall within regional background levels. Copies of the input files and results of the 90UCL calculations produced from the ProUCL program are contained in Appendix I for reference.

Other Detected Metals. As shown in Table 2, several metals were detected in soil within the former orchard area (soil samples outside of the former orchard area were not analyzed for these 17 metals). With the exception of copper, the metals results are below regional background concentrations (using the Washington study described above) where detected; regional background concentrations for barium, cobalt, molybdenum, and vanadium were not available from the Washington study. The copper results were just slightly above regional background in three of the four samples (Table 2), and are likely consistent with regional background in the site vicinity. All of the metals (other than arsenic, as discussed above) are below EPA residential PRGs, with the exception of vanadium in two of the four samples. The detected vanadium concentrations ranged from 49 mg/kg to 82.3 mg/kg, with the maximum concentration just slightly above the residential PRG of 78 mg/kg. Regional background concentrations of vanadium in clayey alluvial soil typically ranges from 30 to 150 mg/kg, with a mean of 79 mg/kg (Kabata-Pendias and Pendias, 1984). Therefore, the vanadium levels in site soil appear to be within typical background concentrations. Based on this evaluation, it does not appear that previous activities in the former orchard area have contributed metals other than arsenic and lead to the surface soil.

Pesticides. Low concentrations of DDT, DDE, DDD, and dieldrin were detected in three locations within the former orchard area (Table 3). DDE (at one location) and dieldrin slightly exceed residential PRGs. The low concentrations indicate that the extent of pesticides are limited and would not be anticipated outside of the former orchard area.

6.0 Exposure Pathway Summary

6.1 Groundwater Pathways of Exposure

The results of groundwater sampling conducted at the site show that arsenic and lead in the surface soil of the former orchard area have not impacted the groundwater. The arsenic has been present in the site soil for 40 years or more and the site has been unpaved throughout that time. Therefore, sufficient time has passed for the presence of the arsenic to impact groundwater if the arsenic contained a leachable fraction. The lack of current impact to groundwater supports that the presence of arsenic will not cause future impacts. Therefore, there are no current or future potential groundwater pathways of exposure, to either humans or ecological aquatic receptors.

6.2 Direct Contact Soil Pathways of Exposure

The site is currently vacant, and redevelopment is being planned. The focus for this report is on potential future exposure pathways. Future human receptors include construction workers, site occupants and visitors in residential portions, and recreational users of the planned park (see Section 8 for more detail). Construction workers may be exposed to impacted soil at the site via direct contact or ingestion during future construction activities. There is also the potential for future residents and site visitors to be exposed to impacted soil at the site via direct contact or ingestion. Evaluation of the potential risk posed by these pathways is detailed in Section 9.0.

Future terrestrial receptors could be exposed to shallow soil in areas that have not been covered by pavement or buildings. However, given the nature of the redevelopment (high density residential with maintained landscaped areas and a landscaped and maintained park area), the potential for terrestrial receptors to access the site is limited, and this pathway is not considered complete.

6.3 Surface Water and Sediment Pathways of Exposure

The nearest surface water to the site is Bear Creek, located approximately 150 feet west-southwest of the site. Groundwater at the site has not been impacted; therefore, the surface water and sediment pathways of exposure are not complete.

6.4 Air Pathways of Exposure

The detected compounds would not volatilize and be transported by air, and therefore, potential air pathways of exposure by volatilization are not complete.

Future air pathways of exposure to impacted soil particulates are potentially complete. The potential exists for future construction workers, residents, and site visitors to be exposed to impacted soil at the site via

inhalation of particulates (i.e., dust). Evaluation of potential risk posed by this pathway is described in Section 9.0.

7.0 Fate and Transport

Although a few pesticides were detected at low concentrations in the former orchard area, the primary impact to site soil appears to be due to lead arsenate use. Therefore, this section focuses on the fate and transport of lead and arsenic.

7.1 Transport

The arsenic and lead present in the soil does not have significant potential to migrate beyond the site boundary. Arsenic and lead are primarily immobile in agricultural soil and tend to remain in the upper layers of soil indefinitely (U.S. Department of Health and Human Services, 2003a, U.S. Department of Health and Human Services, 2003b).

Arsenic and lead present in the soil at the site did not affect the groundwater, as demonstrated by groundwater sampling and analysis.

7.2 Degradation/Persistence

Arsenic is stable and does not readily degrade. Arsenic is not broken down or destroyed in the environment because it is an element, but can be transformed from one form to another. The range of the relative bioavailability of arsenic in residential soil used in risk assessments is typically 10 to 60 percent (Appendix J). Depending on soil conditions such as pH and oxidation-reduction potential, arsenic can exist at various oxidation states and as various chemical species in soil. The process by which arsenic is transformed between oxidation states and species is known as the arsenic cycle. This cycle is influenced by biotic and abiotic processes in the environment which control its overall fate (U.S. Department of Health and Human Services, 2003a). Most forms of arsenic are relatively immobile in soil. Based on groundwater sampling results, the form of arsenic present in the site soil is largely immobile and insoluble.

Like arsenic, lead is stable and does not readily degrade. Because it is an element, lead is not broken down or destroyed in the environment, but can be transformed from one form to another. Similar to arsenic, lead speciation in soils is influenced by the properties of the soil. Chemical and biotic processes transform anthropogenic sources (e.g. lead arsenate) of lead to forms which are adsorbed to the soil. (U.S. Department of Health and Human Services, 2003b). Similar to arsenic, most forms of lead are relatively immobile in soil. Based on groundwater sampling results, the form of lead present in the site soil is largely immobile and insoluble.

7.3 Demonstration of No Impact to Groundwater

As detailed in Section 4.3, the historical use of lead arsenate has not impacted the area groundwater. The pesticides detected in a few locations within the former orchard area (DDT, DDE, DDD and dieldrin) are not soluble, adhere strongly to soil, and would not be expected to impact groundwater at the low concentrations encountered. Table 4 presents the results of the groundwater sampling conducted on June 29, 2006.

7.4 Locality of the Facility

The locality of the facility (LOF) is limited to the site. Soil has limited ability to migrate and impact is limited to the former orchard area and within 120 feet of the orchard and gravel road that borders the site on the north. As discussed in Section 4.3 and above, the groundwater has not been impacted.

8.0 Land and Water Use Determinations

8.1 Current and Future Land Use

8.1.1 Current Site Use

The property is currently vacant and unused.

8.1.2 Current Land Use in Site Vicinity

Currently, the property is located in an agricultural/residential area. The site is bordered to the west by Gebhard Road, and to the south by Beebe Road. Across Gebhard Road to the west are single family homes and vacant land. Across Beebe Road to the south is an orchard. To the east of the property, there is a construction yard with an office building, a church, and a young peach orchard. One single family home and pasture is located to the north of the property. New medium- to high-density residential developments have been constructed within one half mile to the north and east of the property.

8.1.3 Future Site Use

A high-density residential development is planned at the site. Figure 8 shows a plan of the proposed development. The planned development consists of 68 townhomes and associated roadways and other infrastructure. A landscaped and maintained park is planned for the northeast corner of the site, in the approximate location of the former orchard.

Attachment "E"

Applicant's Findings

April 2015
2nd Submittal

APPLICATION AND FINDINGS FOR:

WHITE HAWK

EAST TRANSIT ORIENTED DEVELOPMENT
CENTRAL POINT, OREGON
CES #1910

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Project Site:	372W02 – TL 2700 & 2709 18.91 Acres
Zoning:	LMR & MMR (ETOD)
Request:	3-Lot Partition, Master Plan Approval

Project Description: The request is for Master Plan approval for an 18.9 acre parcel in the ETOD district, and a 3-lot partition. The site has two residential zoning designations, Low Mix Residential (LMR) and Medium Mix Residential (MMR). The Master Plan includes residential development with three housing types: 20 single-family attached rowhouses, 16 duplexes and 288 apartments for a total of 324 units. Included in the project is a 4.2 acre public park, along with associated infrastructure and landscaping.

The site is proposed to be developed in four phases - one phase each for the townhomes and duplexes, and the apartment portion in two phases. Based on discussions with City Staff the public park will be complete prior to the issuance of the 200th apartment building permit.

The partition plat will include the right-of-way dedications for the public streets. A subdivision land use approval/application will be required to construct any of the townhomes or duplexes and the associated street and utility improvements with be constructed then. The apartment site will also require another land use application/approval for the site design. Construction of the associated street and utility improvements will occur along with the apartment construction and after final site plan approval.

Title 16 - Subdivisions

16.10 Tentative Plans

16.10.040 Existing Conditions

A. The location, widths and names of all existing or platted streets or other public ways within or adjacent to the tract, easements, railroad rights-of-way and such other important features within or adjacent to the tract as may be required by the city;

B. Contour lines related to some established bench mark or other datum as approved by the city when the city determines that the nature of the topography or size of the subdivision requires such data. Contour lines shall have the following minimum intervals:

1. Two-foot contour intervals for ground slopes less than five percent;

2. Five-foot contour intervals for ground slopes exceeding five percent;

C. The location of at least one temporary bench mark within the plat boundaries;

D. Location and direction of all watercourses and drainage systems;

E. Natural features, such as rock outcroppings, marshes and wooded areas;

F. Existing uses of the property, including location of all existing structures which the subdivider proposes to leave on the property after platting;

G. The location within the subdivision and in the adjoining streets and property of existing sewers and water mains, culverts and drain pipes, and all other existing or proposed utilities to be used on the property to be subdivided and invert elevations of sewers at points of probable connections;

H. Zoning on and adjacent to the tract. (Ord. 1650(part), 1990).

Response: The specified items are illustrated on the Existing Conditions plan.

16.10.050 Additional Information

The following additional information shall also be included on the tentative plan:

A. Streets, showing location, width, proposed names, approximate grades and approximate radii of curves and the relationship of all streets to any projected streets as shown of any development plan adopted by the city;

B. Easements, showing the width and purpose;

C. Lots, showing approximate dimensions, area of smallest lot or lots and utility easements and building setback lines to be proposed, if any;

D. Sites, if any, proposed for purposes other than dwellings;

E. Area in square footage of each lot and the average lot area. (Ord. 1650(part), 1990).

Response: The specified information is included on the plans.

16.10.070 Explanatory Information

Any of the following information may be required by the city and if it cannot be shown practicably on the tentative plan, it shall be submitted in separate statements accompanying the tentative plan:

A. A vicinity map showing all existing subdivisions, streets and unsubdivided land ownerships adjacent to the proposed subdivision and showing how proposed streets may be connected to existing streets;

B. Proposed deed restrictions in outline form;

C. Approximate centerline profiles showing the proposed finished grade of all streets, including the extensions for a reasonable distance beyond the limits of the proposed subdivision;

D. The approximate location and size of all proposed and existing water and sewer lines and storm drainage systems. (Ord. 1650(part), 1990).

Response: Existing and proposed utilities are shown on the plans. The proposed street centerline profiles will generally follow the existing topography which is mildly sloped to flat. There are no adjacent subdivisions. An aerial photo is included to illustrate development and land uses in the area.

16.16 - Improvements

16.16.010 Standards and Procedures

All improvements shall conform to the requirements of this title and other improvement standards or specifications adopted by the city and conditions of tentative plan approval, and shall be installed in accordance with the following procedure:

A. Improvement work shall not be commenced until construction plans have been checked for adequacy and approved by the city. To the extent necessary for evaluation of the proposed subdivision, such plans may be required before approval of the final plat.

B. Improvement work shall not be commenced until the city has been notified in advance, and if work has been discontinued for any reason it shall not be resumed until the city has been notified.

C. Improvements shall be constructed under the inspection and to the satisfaction of the city. The city may require changes in typical sections and details if unusual conditions arise during construction to warrant such change in the public interest.

D. Underground utilities installed in streets by the subdivider shall be constructed prior to the surfacing of such streets. Stubs for service connections for underground utilities shall be placed to such length as will obviate the necessity for disturbing the street improvements when service connections are made.

E. A map showing public improvements as built shall be filed with the city upon completion of said improvements.

Response: Proposed utility and street improvements are shown on the plans, and are designed to be consistent with City standards. Construction plans will be reviewed and approved by the City prior to commencement of construction activities. As-builts will be filed with the City upon completion of improvements.

16.20 - Streets and Other Ways - Design Standards

16.20.010 Creation of Streets

A. Streets created by subdivisions and partitions shall be designed and constructed in conformance with the requirements of the city's comprehensive plan, this code, the city's public works standards, and all conditions established by the city.

B. The construction of streets shall include subgrade, base, asphaltic concrete surfacing, curbs, gutters, sidewalks, storm drainage, street signs, street lighting, and underground utilities.

C. All streets, including the entire right-of-way necessary for the installation of the items mentioned in the preceding paragraph, shall be dedicated to the city.

Response: Proposed street dedication is noted on the preliminary partition plat, street cross-sections are shown on the plans, and are designed to be consistent with the City's plans and codes. The applicant has reviewed the proposed street sections and locations with City Public Works Staff.

16.20.020 Streets Generally

The location, width, and grade of streets shall be considered in their relation to existing and planned streets, to topographical conditions as they relate to drainage and the operation of the water, sewer systems, to public convenience and safety and their appropriate relation to the proposed use of the land to be served by such streets. Where location is not shown in a development plan, the arrangement of streets in a subdivision shall either:

A. Provide for the continuation or appropriate projection of existing streets in surrounding areas; or

B. Conform to the plan for the neighborhood approved or adopted by the city to meet a particular situation where topographical or other conditions make continuance or conformance to existing streets impractical.

Response: The site is level, streets are stubbed to adjacent properties for future extension.

16.20.130 Sidewalks

Sidewalks shall be constructed in accordance with such standards as are adopted by the city. Sidewalk construction shall be completed on each individual lot prior to the city building inspector granting a certificate of occupancy for any construction upon said individual lot. No application for a building permit shall be granted without a requirement in the building permit for construction of sidewalks to city's standards. (Ord. 1650(part), 1990).

Response: As shown on the plans, sidewalks are proposed along all street frontages and are designed to be consistent with City standards. Sidewalks will be constructed in conjunction with each phase of the development.

16.36 - Major and Minor Land Partitions

16.36.030 Requirements

A. All major and minor land partitions may, as a condition of approval, provide for improvements including curbs, gutters, asphalt streets, sidewalks, underground utilities and such other improvements as shall be deemed appropriate and necessary by the city council as a condition of approval, with all such improvements to meet the standards required for subdivisions under this title.

Response: The partition is in conjunction with a master plan proposal which includes full street improvements within the development. The street right of ways will dedicated with the partition plat. Both townhomes/duplexes and apartment units will require another land use approval (subdivision for townhomes/duplexes and site plan architectural review for the apartments) prior to construction. Construction of the street improvements will not occur until after these approvals have been obtained.

B. In the case of major partitions, all streets or roads shall be improved to meet the standards required for subdivisions under this title, and shall be dedicated to the city in the same manner as subdivision roads and streets.

Response: The new streets will be dedicated with the partition plat but construction of these improvements will be deferred until after the subdivision approval for the townhomes/duplexes and site plan architectural review approval for the apartments.

C. Partition improvements shall be constructed prior to approval of the final partition plat unless, in the city's sole discretion, deferral is allowed. In all cases of deferral, the applicant shall either execute an agreement for improvements and comply with the bond requirements of Section 16.12.070 and 16.12.080 of this title, or shall execute a deferred improvement agreement, which shall be in a form and contain such terms as are specified by city and shall be recorded and be binding upon and run with the land and bind the applicant and all successors in interest. (Ord. 1650 (part), 1990).

Response: The applicant proposes to dedicate the streets with the partition plat and construct the improvements with each phase of the development. Once Master Plan and partition approval is obtained, the developer must apply for subdivision and site plan/architectural review approval before proceeding with any actual development.

16.36.050 Approval

Approval of applications for the partitioning of land, including approval of tentative plans and final plats and filing or recording, shall conform to all of the requirements and follow the same procedure applicable to those for the subdivision of land as set forth in this title. (Ord. 1650 (part), 1990).

Response: The proposed partition is consistent with the requirements for subdivisions and the ETOD zoning district.

Title 17 -Zoning

17.64 – Off-Street Parking and Loading

17.64.040 Off-Street Parking Requirements

A. Calculation of Required off-street parking...

Response: The ETOD standards supersede these standards for the multifamily portion of the project, and require 1.5 space per multifamily dwelling unit. The proposal is for 288 apartments with 478 parking spaces which exceeds the minimum requirement of 432 parking spaces. The duplexes and town homes will each have two-car garages and parking in the driveways in front of the garages.

C. Accessible Parking Requirements...

Response: A total of 10 accessible parking spaces will be provided, including 2 van accessible spaces.

I. Bicycle Parking. Bicycle parking shall be provided in accordance with Table 17.64.04, Bicycle Parking Requirements.

Response: Table 17.64.04 specifies one covered bicycle parking space per multifamily unit, which will be provided inside the units.

17.65 – TOD Districts and Corridors

17.65.025 Special Conditions

A. Eastside Transit Oriented Development District (ETOD) Trip Caps. Development within the ETOD shall be subject to the following schedule:

1. Development within the ETOD shall not cause the aggregated daily trips to exceed six thousand one hundred ADT for the entire ETOD area. This trip cap shall be removed at such time as the city amends the TSP to incorporate ODOT's IAMP 33 projects, including a financial plan for interchange projects necessary to support the ETOD district; and

2. The planning director, or designee, shall maintain an accounting of all ADT for all proposed development applications within the ETOD. Projects that will exceed the trip cap shall not be approved.

Response: This is the first development proposal within the ETOD district, it is expected to generate less than 2300 ADT.

B. Eastside Transit Oriented Development District (ETOD) Agricultural Mitigation. All development shall acknowledge the presence of active farm uses within the ETOD area by recording a right-to-farm disclosure statement as a condition of final plat, transfer of property, or site plan and architectural review approval. The ETOD agricultural mitigation shall be removed at such time as the urban growth boundary is incorporated and completely builds out.

Response: A right-to-farm disclosure statement will be recorded as conditioned.

C. Eastside Transit Oriented Development District (ETOD) Shallow Wells. Prior to development within the ETOD, a water table analysis shall be conducted to determine the local water table depth. Any development impacting the water table will require further analysis to determine the effect on neighboring wells and the development shall be expected to mitigate that impact.

Response: An engineering analysis conducted by APEX is included with the application materials. This analysis provides construction recommendations address impacts from the proposed sewer installation on nearby wells.

17.65.030 Conflict with other Regulations

Where there is a conflict between the provisions of this chapter and other requirements of this title, the provisions of this chapter shall govern.

17.65.040 Land Uses

Four special zone district categories are applied in the Central Point TOD districts. The characteristics of these zoning districts are summarized in subsections A through D of this section.

A. Residential (TOD).

1. LMR--Low Mix Residential. This is the lowest density residential zone in the district. Single-family detached residences are intended to be the primary housing type; however, attached single-family and lower density multifamily housing types are also allowed and encouraged.

2. MMR--Medium Mix Residential. This medium density residential zone focuses on higher density forms of residential living. The range of housing types includes higher density single-family and a variety of multifamily residences. Low impact commercial activities may also be allowed.

Response: The White Hawk Master Plan area contains lands designated LMR (2.71 ac) and MMR (16.20 ac).

17.65.050 Zoning Regulations - TOD District

A. Permitted Uses.

Response: Attached single family dwellings, and apartments are permitted uses.

D. Density

Response: The total site area is 18.91 acres, with two residential densities - LMR allows 12 units per net acre, and MMR allows 32 units per net acre. With public right-of-way dedication and private alley of 2.93 acres, the total maximum density allowed is 458 units, and the minimum is 175 units. The master plan proposes 324 units.

E. Dimensional Standards

Response:

	LMR	***MMR***	**Proposed**
Minimum Lot Area: *Attached:* *Multifamily:*	 *2,000 SF* *N/A*	 *1,500 SF* *N/A*	 Min. 2,304 SF
Average Minimum Lot Area: *Attached:* *Multifamily:*	 *2,500* *N/A*	 *2,000* *N/A*	 Ave. 2,800 SF
Minimum Lot Width: *Attached:*	 *24'*	 *22'*	 Minimum 24'

Multifamily:	*N/A*	*N/A*	
Minimum Lot Depth:	*50'*	*50'*	Minimum 96'
Setbacks:			
Front: (Min/Max)	*10'/15'*	*10'/15'*	10'/15'
Side:	*5', 0'*	*5', 0'*	5', 0'
Corner: (Min/Max)	*5'/10'*	*5'/10'*	5'/10'
Rear:	*15'*	*15'*	15'
Garage Entrance:	*Front Facade + 10'*	*Front Facade + 10'*	Front +10'
Height:	*35'*	*45'*	35' - 45'
Lot Coverage:	*80%*	*80%*	Maximum 80%
Min. Landscaped Area:	*20% of site area*	*20% of site area*	25% of TH/Du 40% of Apt (Does not include Park)

F. Development Standards

1. Housing Mix. The required housing mix for the TOD district is shown in Table 2.

Response: More than 40 units are proposed, therefore, 3 housing types are proposed - duplexes, townhomes and apartments.

2. Accessory Units. Accessory units are allowed as indicated in Table 1. Accessory units shall meet the following standards...

Response: Accessory units are not proposed at this time.

3. Parking Standards. The off-street parking and loading requirements in Chapter 17.64 shall apply to the TOD district and TOD corridor, except as modified by the standards in Table 3 of this section.

a. Fifty percent of all residential off-street parking areas shall be covered. Accessory unit parking spaces are not required to be covered.

b. Parking standards may be reduced when transit service is provided in the TOD district and TOD corridor and meets the following conditions:

i. Parking standards may be reduced up to twenty-five percent when transit service is provided in the TOD district and TOD corridor.

ii. Parking standards may be reduced up to fifty percent when transit service is provided in the TOD district and TOD corridor and when bus service includes fifteen-minute headways during the hours of seven to nine a.m. and four to six p.m.

c. Bicycle parking standards in Chapter 17.64 shall not be reduced at any time.

d. Shared parking easements or agreements with adjacent property owners are encouraged to satisfy a portion of the parking requirements for a particular use where compatibility is shown. Parking requirements may be reduced by the city when reciprocal agreements of shared parking are recorded by adjacent users.

Response: Table 3 specifies that single family dwellings of any type shall provide 2 spaces per unit, multi-family shall provide 1.5 spaces per unit. The duplexes and townhomes will have two-car garages and parking in front of the units on their driveways. The 288 apartments will require a minimum of 432 off-street spaces. The proposed apartment parking includes 478 spaces.

Cover parking is not proposed with this master plan. The design team believes covered parking will detract from the pedestrian feel and scale of the parking areas. It will also reduce the landscaping provide and interfere with sight lines. In order to emphasize the pedestrian scale of parking areas, the project includes parkway strips off the end of the parking stalls with a parallel sidewalk system. The parkway strips will include tree plantings to provide shade in lieu of covered parking structures. Covered parking could be provided if the Planning Commission determines they are preferred.

Table 17.64.04 requires 1 bicycle space per unit, which will be within the units, with guest bike parking racks outside of the buildings.

17.66 - Application Review Process for TOD Districts and Corridors

17.66.030 Application and Review

A. Application Types. There are four types of applications which are subject to review within the Central Point TOD district and corridor.

1. TOD District or Corridor Master Plan. Master plan approval shall be required for:

a. Development or land division applications which involve two or more acres of land; or

2. Site Plan and Architectural Review. The provisions of Chapter 17.72, Site Plan and Architectural Review, shall apply to permitted and limited uses within the TOD district and corridor. For site plan and architectural review applications involving two or more acres of land, a master plan approval, as provided in this chapter, shall be approved prior to, or concurrently with, a site plan and architectural review application.

3. Land Division. Partitions and subdivisions shall be reviewed as provided in Title 16, Subdivisions. For a land division application involving two or more acres of land, a master plan approval, as provided in this chapter, shall be approved prior to, or concurrently with, a land division application.

B. Submittal Requirements. A master plan shall include the following elements:

1. Introduction. A written narrative describing:

a. Duration of the master plan;

b. Site location map;

c. Land use and minimum and maximum residential densities proposed;

d. Identification of other approved master plans within the project area.

Response: The anticipated build-out of the proposed Master Plan is approximately five years over four phases. We would expect that a different developer could build the apartments verses the townhomes and duplexes. The partition plat approval would allow each developer to bring their project forward somewhat independently. We expect the apartment site to be developed in two phases. The townhomes and duplexes could also be developed in two phases. The specific timing of each phase is market driven. Since this application is only for the Master Plan Approval additional land use actions will be required for the subdivision and site plan/architectural review.

A vicinity map with the location of the project is shown on the drawings. Land use designations on the site are Low Mixed Residential and Medium Mixed Residential. The maximum density allowed on the 18.9 acre site is 458 units, minimum density is 175

units and 324 units are proposed. There are no other approved Master Plans in the immediate area.

2. *Site Analysis Map. A map and written narrative of the project area addressing site amenities and challenges on the project site and adjacent lands within one hundred feet of the project site.*

   a. *Master Utility Plan. A plan and narrative addressing existing and proposed utilities and utility extensions for water, sanitary sewer, storm water, gas, electricity, and agricultural irrigation.*

Response: All necessary utilities are available or can be made available to serve the project. Existing and proposed utilities are shown on the plans. There are existing sanitary sewer, water storm lines in Gebhard and Beebe Roads that will be extended as necessary to serve the site. Gas and electricity are available to serve the site as well. Storm water management will comply with the current RVSS standards. Biocells are proposed in the apartment parking lot landscape strips and courtyards for storm water treatment for roofs and parking areas. Planter boxes are being proposed in street right of way areas with some mechanical treatment devices being utilized in the townhome and duplex area. Storm water detention will be provided throughout.

   b. *Adjacent Land Use Plan. A map identifying adjacent land uses and structures within one hundred feet of the project perimeter and remedies for preservation of livability of adjacent land uses.*

Response: The aerial photo demonstrates surrounding land uses and structures. Lands north and east of the site are inside the UGB, City limits and ETOD district, across Beebe are inside the UGB but outside the City, and lands across Gebhard Road are outside the UGB and City limits. Except for the church near the southeast corner of the site, all of the surrounding lands within the City and UGB are currently underdeveloped, but are planned for development at similar intensity as the site. Proposed street improvements will serve to mitigate the impacts from increased traffic in the area.

3. *Transportation and Circulation Plan. A transportation impact analysis (TIA) identifying planned transportation facilities, services and networks to be provided concurrently with the development of the master plan and addressing Section17.67.040, Circulation and access standards.*

Response: A traffic analysis was conducted and included with the application package. Existing and proposed area circulation is demonstrated on the proposed site plan and circulation plan.

4. *Site Plan. A plan and narrative addressing Section17.67.050, Site design standards.*
5. *Recreation and Open Space Plan. A plan and narrative addressing Section 17.67.060, Public parks and open space design standards.*
6. *Building Design Plan. A written narrative and illustrations addressing Section 17.67.070, Building design standards.*

Response: The specified Code sections are addressed in this document and on the plans.

7. Transit Plan. A plan identifying proposed, or future, transit facilities (if any).

Response: Transit facilities are not proposed for this project. The City's TSP shows that Hamrick and Pine are the closest transit routes to the site.

8. Environmental Plan. A plan identifying environmental conditions such as wetlands, flood hazard areas, groundwater conditions, and hazardous sites on and adjacent to the project site.

Response: Environmental conditions on and within 100' of the site are shown on the plans. The site was found to have higher level of arsenic in the soils from past orchard activities. This area is located in the northeast quadrant of the site. The applicant has worked with DEQ on a plan to address this issue. There are two soil management areas shown on the existing conditions plan. Soil Management Area B will have the upper portion of the soil area removed and placed onto the Soil Management Area A. Soil Management Area A will have a 2-foot soil cap placed on top. The Soil Management Area A will be developed into the public park area shown on the master plan. There are no known wetlands or other conditions known on the site. The 100-year flood plain from Bear Creek is more than 100 feet from the the site, across Gebhard Road.

17.66.040 Parks and Open Spaces

Common park and open space shall be provided for all residential developments within a TOD district or corridor as per Section 17.67.060.

Response: A 4.2-acre public park as well as almost 2 acres of common open space on the apartment site are proposed, and further detailed in 17.67.060.

17.66.050 Application Approval Criteria

A. TOD District or Corridor Master Plan. A master plan shall be approved when the approval authority finds that the following criteria are satisfied or can be shown to be inapplicable:

1. Sections 17.65.040 and 17.65.050, relating to the TOD district;
2. Sections 17.65.060 and 17.65.070, relating to the TOD corridor;
3. Chapter 17.67, Design Standards--TOD District and TOD Corridor;
4. Chapter 17.60, General Regulations, unless superseded by sections 17.65.040 through 17.65.070;
5. Section 17.65.050, Table 3, TOD District and Corridor Parking Standards, and Chapter 17.65, Off-Street Parking and Loading;
6. Chapter 17.70, Historic Preservation Overlay Zone; and
7. Chapter 17.76, Conditional Use Permits, for any conditional uses proposed as part of the master plan.

Response: The proposal satisfies the applicable criteria, which are addressed in this document.

C. Land Division. A land division application shall be approved when the approval authority finds that the following criteria are satisfied or can be shown to be inapplicable:

1. The provisions of Title 16, Subdivisions; and

2. *The proposed land division complies with the approved TOD district or corridor master plan for the property, if required; and*
3. *Chapter 17.67, Design Standards--TOD District and TOD Corridor.*

Response: The proposed partition satisfies the applicable criteria, which are addressed in this document and demonstrated on the plans. The townhome and duplex phases will require an additional subdivision land use approval.

17.67 – Design Standards for TOD Districts and Corridors

17.67.030 Conflict with Other Regulations

When there is a conflict between the provisions of this chapter and other requirements of this title, the provisions of this chapter shall govern.

17.67.040 Circulation and Access Standards

A. Public Street Standards

1. *Except for specific transportation facilities identified in a TOD district or corridor master plan, the street dimensional standards set forth in the City of Central Point Department of Public Works Standard Specifications and Uniform Standard Details for Public Works Construction, Section 300, Street Construction shall apply for all development located within the TOD district and for development within the TOD corridor which is approved according to the provisions in Section 17.65.020 and Chapter 17.66.*

Response: Proposed street sections are shown on the plans and have been discussed with Public Works staff. Proposed right-of-way widths are as follows:

Street	R-O-W Width
Alley	22'
White Hawk Way, Beebe Park Drive & North (ST-15)	60'
Park Street (ST-10)	52'
Beebe Road (ST-21 Retrofit)	60'
Gebhard Road (ST-20 with R/W at ST-21)	71'

2. *Block perimeters shall not exceed two thousand feet measured along the public street right-of-way.*

Response: With the proposed pedestrian connection near Gebhard Road and Beebe Road, no block perimeter exceeds 2,000'.

3. *Block lengths for public streets shall not exceed six hundred feet between through streets, measured along street right-of-way.*

Response: All blocks are less than 600' except for Gebhard Road between Beebe Park Drive and Beebe Road which is just over 700'. The Gebhard/Beebe Park intersection is located north of the 600-foot parameter to improve site distance at this intersection. A pedestrian access is proposed to comply with the block length standard.

4. *Public alleys or major off-street bike/pedestrian pathways, designed as provided in this chapter, may be used to meet the block length or perimeter standards of this section.*

Response: A pedestrian connection is proposed near the intersection of Gebhard Road and Beebe Road to meet the block length/perimeter standards.

5. *The standards for block perimeters and lengths shall be modified to the minimum extent necessary based on findings that strict compliance with the standards is not reasonably practicable or appropriate due to:*
   - a. *Topographic constraints;*
   - b. *Existing development patterns on abutting property which preclude the logical connection of streets or accessways;*
   - c. *Railroads;*
   - d. *Traffic safety concerns;*
   - e. *Functional and operational needs to create a large building; or*
   - f. *Protection of significant natural resources.*

Response: The Gebhard/Beebe Park intersection is located north of the 600-foot parameter to improve site distance at this intersection. The proposed pedestrian connection near the intersection of Gebhard and Beebe Road allows the block perimeter and length standard to be met.

6. *All utility lines shall be underground but utility vault access lids may be located in the sidewalk area.*

Response: All utility lines are proposed to be underground.

7. *Connections shall be provided between new streets in a TOD district or corridor and existing local and minor collector streets.*

Response: There are no existing local or minor collector streets with which to connect, new streets are stubbed to the property lines for future extension.

8. *Pedestrian/Bike Accessways Within Public Street Right-of-Way.*
   - a. *Except for specific accessway facilities identified in a TOD district or corridor master plan, the following accessway dimensional standards set forth in the City of Central Point Department of Public Works Standard Specifications and Uniform Standard Details for Public Works Construction, Section 300, Street Construction shall apply for any development located within the TOD district and for development within the TOD corridor which is approved according to the provisions in Section 17.65.020 and Chapter 17.66.*
   - b. *In transit station areas, one or more pedestrian-scaled amenities shall be required with every one hundred square feet of the sidewalk area, including but not limited to:*
     - i. *Street furniture;*
     - ii. *Plantings;*
     - iii. *Distinctive paving;*
     - iv. *Drinking fountains; and*
     - v. *Sculpture.*
   - c. *Sidewalks adjacent to undeveloped parcels may be temporary.*

d. Public street, driveway, loading area, and surface parking lot crossings shall be clearly marked with textured accent paving or painted stripes.

e. The different zones of a sidewalk should be articulated using special paving or concrete scoring.

Response: The White Hawk Master Plan proposes sidewalks along all street frontages. The apartment site proposes several internal sidewalk connections with the public sidewalks within the right of way.

9. Public Off-Street Accessways.

a. Pedestrian accessways and greenways should be provided as needed to supplement pedestrian routes along public streets.

b. Off-street pedestrian accessways shall incorporate all of the following design criteria:

i. The applicable standards in the City of Central Point Department of Public Works Standard Specifications and Uniform Standard Details for Public Works Construction, Section 300, Street Construction;

ii. Minimum ten-foot vertical clearance;

iii. Minimum twenty-foot horizontal barrier clearance for pathway;

iv. Asphalt, concrete, gravel, or wood chip surface as approved by the city, with a compacted subgrade;

v. Nonskid boardwalks if wetland construction is necessary; and

vi. Minimum one hundred square feet of trailhead area at intersections with other pedestrian improvements. A trail map sign shall be provided at this location.

c. Minor off-street trails shall be a minimum of five feet wide, have a minimum vertical clearance of eight feet, a minimum two-foot horizontal clearance from edge of pathway and be constructed of gravel or wood chips, with a compacted subgrade.

Response: The townhomes and duplex lots all front the public sidewalks in the street right of way. The apartment site has an extensive internal sidewalk network. The public park will have internal sidewalks that connect to the public right of way sidewalks. With the required street block standards no additional pedestrian or trails were determined to be needed.

B. Parking Lot Driveways

1. Parking lot driveways that link public streets and/or private streets with parking stalls shall be designed as private streets, unless one of the following is met:

a. The parking lot driveway is less than one hundred feet long;

b. The parking lot driveway serves one or two residential units; or

c. The parking lot driveway provides direct access to angled parking stalls.

2. The number and width of driveways and curb cuts should be minimized and consolidated when possible.

3. Where possible, parking lots for new development shall be designed to provide vehicular and pedestrian connections to adjacent sites.

4. Large driveways should use distinctive paving patterns.

Response: A total of four driveways into the apartment complex are proposed for convenience of the future residents and for efficient fire protection access.

C. On-Site Pedestrian and Bicycle Circulation. Attractive access routes for pedestrian travel should be provided by:

1. Reducing distances between destinations or activity areas such as public sidewalks and building entrances. Where appropriate, develop pedestrian routes through sites and buildings to supplement the public right-of-way;

2. Providing an attractive, convenient pedestrian accessway to building entrances;

3. Bridging across barriers and obstacles such as fragmented pathway systems, wide streets, heavy vehicular traffic, and changes in level by connecting pedestrian pathways with clearly marked crossings and inviting sidewalk design;

4. Integrating signage and lighting system which offers interest and safety for pedestrians;

5. Connecting parking areas and destinations with pedestrian paths identified through use of distinctive paving materials, pavement stripings, grade separations, or landscaping.

Response: Pedestrian walkways are proposed throughout the apartment development, including connections to Gebhard Road, Beebe Park Drive and White Hawk Way. Based on the City's public works standards, bicycles share the road on local streets. Both Beebe Road and Gebhard Road will have bike lanes.

17.67.050 Site Design Standards

The following standards and criteria shall be addressed in the master plan, land division, and/or site plan review process;

A. Adjacent Off-Site Structures and Uses.

1. All off-site structures, including septic systems, drain fields, and domestic wells (within one hundred feet) shall be identified and addressed in the master plan, land division, or site plan process in a manner that preserves and enhances the livability and future development needs of off-site structures and uses consistent with the purpose of the TOD district and as necessary to improve the overall relationship of a development or an individual building to the surrounding context.

2. Specific infrastructure facilities identified on site in the master plan, land division, and/or site plan shall comply with the underground utility standards set forth in the City of Central Point Department of Public Works Standard Specifications and Uniform Standard Details for Public Works Construction, Section 400, Storm Water Sewer System and, more specifically, Section 420.10.02, Ground Water Control Plan, in order to safeguard the water resources of adjacent uses.

Response: The Adjacent Land Uses plan shows the adjacent uses and structures to the site. According RVSS information it appears the area adjacent to the project site is served with sanitary sewer. Therefore we don't anticipate any detrimental impacts to existing septic systems.

Well information from the Oregon Department of Water Resources is also shown (locations are approximate). An engineering analysis perform by Apex is included in the application to address shallow wells in the area. With the mitigation proposed in that analysis, no detrimental impacts to these wells is anticipated.

B. Natural Features.

1. *Buildings should be sited to preserve significant trees.*
2. *Buildings should be sited to avoid or lessen the impact of development on environmentally critical areas such as steep slopes, wetlands, and stream corridors.*
3. *Whenever possible, wetlands, groves, and natural areas should be maintained as public preserves and as open space opportunities in neighborhoods.*

Response: The site is an open field without significant trees or environmentally critical areas.

C. Topography.

1. *Buildings and other site improvements should reflect, rather than obscure, natural topography.*
2. *Buildings and parking lots should be designed to fit into hillsides, for instance, reducing the need for grading and filling.*
3. *Where neighboring buildings have responded to similar topographic conditions on their sites in a consistent and positive way, similar treatment for the new structure should be considered.*

Response: The site and surrounding area is level, as illustrated on the Existing Conditions plan.

D. Solar Orientation.

1. *The building design, massing and orientation should enhance solar exposure for the project, taking advantage of the climate of Central Point for sun-tempered design.*
2. *Where possible, the main elevation should be facing within twenty-five degrees of due south.*
3. *In residential developments, the location of rooms should be considered in view of solar exposure, e.g., primary living spaces should be oriented south, but a west facing kitchen should be avoided as it may result in summer overheating.*
4. *Outdoor spaces should be strategically sited for solar access and the cooling summer winds.*
5. *Shadow impacts, particularly in winter, on adjacent buildings and outdoor spaces should be avoided.*

Response: Where possible, the apartment buildings have been oriented to enhance solar exposure. TOD standards require buildings to "front" onto the streets, which in this case means that all of the townhomes and duplexes, and several of the apartment buildings are required to have a front elevation facing east or west, thereby reducing solar exposure opportunities.

E. Existing Buildings on the Site.

1. *Where a new building shares the site with an admirable existing building or is a major addition to such a building, the design of the new building should be compatible with the original.*
2. *New buildings proposed for existing neighborhoods with a well-defined and desirable character should be compatible with or complement the architectural character and siting pattern of neighboring buildings.*

Response: There are no existing buildings on the site to remain. The area is transitioning from rural to urban, there is no architectural character or siting pattern to emulate.

F. *New Prominent Structures. Key public or civic buildings, such as community centers, churches, schools, libraries, post offices, and museums, should be placed in prominent locations, such as fronting on public squares or where pedestrian street vistas terminate, in order to serve as landmarks and to symbolically reinforce their importance.*

Response: There are no prominent structures proposed for this project. The apartment office/community building is located at the intersection of Beebe Road and White Hawk Way.

G. *Views. The massing of individual buildings should be adjusted to preserve important views while benefiting new and existing occupants and surrounding neighborhoods.*

Response: There are no important views from the site.

H. *Adjoining Uses and Adjacent Services.*

1. *When more intensive uses, such as neighborhood commercial or multifamily dwellings, are within or adjacent to existing single-family neighborhoods, care should be taken to minimize the impact of noise, lighting, and traffic on adjacent dwellings.*
2. *Activity or equipment areas should be strategically located to avoid disturbing adjacent residents.*
3. *All on-site service areas, loading zones and outdoor storage areas, waste storage, disposal facilities, transformer and utility vaults, and similar activities shall be located in an area not visible from a street or urban space.*
4. *Screening shall be provided for activities, areas and equipment that will create noise, such as loading and vehicle areas, air conditioning units, heat pumps, exhaust fans, and garbage compactors, to avoid disturbing adjacent residents.*
5. *Group mailboxes are limited to the number of houses on any given block of development. Only those boxes serving the units may be located on the block. Multiple units of mailboxes may be combined within a centrally located building of four walls that meets the design guidelines for materials, entrance, roof form, windows, etc. The structure must have lighting both inside and out.*

Response: The townhomes and duplexes all have access to an alley for driveways and garbage service. The apartment site has a 15-foot or larger landscape buffer area surrounding the perimeter of the site. In addition, the apartment buildings generally front the public streets further screening the interior circulation and service needs from view.

I. *Transitions in Density.*

1. *Higher density, attached dwelling developments shall minimize impact on adjacent existing lower density, single-family dwelling neighborhoods by adjusting height, massing and materials and/or by providing adequate buffer strips with vegetative screens.*

Response: There are no existing lower density neighborhoods adjacent to the site, all of the adjoining lands are part of the same ETOD as the site and are planned for future intense development of similar pattern and density.

2. *Adequate buffer strips with vegetative screens shall be placed to mitigate the impact of higher density development on adjacent lower density development.*

3. *New residential buildings within fifty feet of existing low density residential development shall be no higher than thirty-five feet and shall be limited to single-family detached or attached units, duplexes, triplexes or fourplexes.*

Response: Across Gebhard road are 4 to 5 residences that are outside the City limits and the UGB. Considering the right-of-way separation is more than 50', all proposed buildings will be more than 70' from any existing residence.

4. *New commercial buildings within fifty feet of existing low density residential development shall be no higher than forty-five feet.*

Response: No new commercial buildings are proposed.

5. *Dwelling types in a TOD district or corridor shall be mixed to encourage interaction among people of varying backgrounds and income levels.*

Response: Three types of dwelling types are proposed within the White Hawk Master Plan area - townhomes, duplexes and apartments.

6. *Zoning changes should occur midblock, not at the street centerline, to ensure that compatible building types face along streets and within neighborhoods. When dissimilar building types face each other across the street because the zoning change is at the street centerline or more infill housing is desired (for instance, duplexes across the street from single dwellings), design shall ensure similarity in massing, setback, and character.*

Response: No zone changes are proposed.

7. *Density should be increased incrementally, to buffer existing neighborhoods from incompatible building types or densities. Sequence density, generally, as follows: large lot single dwelling, small lot single dwelling, duplex, townhomes, courtyard multifamily apartments, large multifamily apartments, and mixed use buildings.*

Response: The density of White Hawk increases incrementally from north to south, so similar densities anticipated for adjacent parcels are next to each other. The proposed large park provides a significant transition element.

J. *Parking.*

1. *Parking Lot Location.*
   a. *Off-street surface parking lots shall be located to the side or rear of buildings. Parking at midblock or behind buildings is preferred.*
   b. *Off-street surface parking lots shall not be located between a front facade of a building and a public street.*
   c. *If a building adjoins streets or accessways on two or more sides, off-street parking shall be allowed between the building and the pedestrian route in the following order of priority:*
      1st. Accessways;
      2nd. Streets that are nontransit streets;
      3rd. Streets that are transit streets.
   d. *Parking lots and garages should not be located within twenty feet of a street corner.*

Response: The apartment parking is located away from public streets as much as is practicable, no parking is located between a building front and a public street.

2. *Design.*
   a. *All perimeter and interior landscaped areas must have protective curbs along the edges. Trees must have adequate protection from car doors and bumpers.*
   b. *A portion of the standard parking space may be landscaped instead of paved. The landscaped area may be up to two feet in front of the space as measured from a line parallel to the direction of the bumper of a vehicle using the space. Landscaping must be ground cover plants. The landscaping does not apply towards any perimeter or interior parking lot landscaping requirements, but does count towards any overall site landscaping requirement.*
   c. *In order to control dust and mud, all vehicle areas must be paved.*
   d. *All parking areas must be striped in conformance with the city of Central Point parking dimension standards.*
   e. *Thoughtful siting of parking and vehicle access should be used to minimize the impact of automobiles on the pedestrian environment, adjacent properties, and pedestrian safety.*
   f. *Large parking lots should be divided into smaller areas, using, for example, landscaping or special parking patterns.*
   g. *Parking should be located in lower or upper building levels or in less visible portions of site.*

Response: The apartment parking area is proposed to be fully paved, with curbs and protected tree wells. Parking spaces will be striped to City parking dimension standards of 9-foot by 17-feet (2-foot overhang) with 24-footisle width, as specified in 17.75.039. Extensive landscaping and tree planting is proposed in the parking area to minimize the impact of automobiles and create a more pedestrian friendly environment.

3. *Additional Standards for LMR, MMR, and HMR Zones.*
   a. *When parking must be located to the side of buildings, parking frontage should be limited to approximately fifty percent of total site frontage.*
   b. *Where possible, alleys should be used to bring the vehicle access to the back of the site.*

Response: The apartment buildings are oriented to the public streets with very little parking on the side of buildings. An alley is proposed to access the duplexes and rowhouses so all of these lots will front public streets.

4. *For parking structures, see Section 17.67.070(H).*

Response: No parking structures are proposed.

K. *Landscaping.*

1. *Perimeter Screening and Planting.*
   a. *Landscaped buffers should be used to achieve sufficient screening while still preserving views to allow areas to be watched and guarded by neighbors.*
   b. *Landscaping should be used to screen and buffer unsightly uses and to separate such incompatible uses as parking areas and waste storage and pickup areas.*

Response: Landscaping will be used in the interior courtyards to preserve privacy for the individual unit. Appropriate landscaping at the perimeter of buildings will be used

to keep people from getting close to bedroom windows, while allowing site from inside the units to help visually patrol the immediate areas.

2. *Parking Lot Landscaping and Screening.*
   a. *Parking areas shall be screened with landscaping, fences, walls or a combination thereof.*
      i. *Trees shall be planted on the parking area perimeter and shall be spaced at thirty feet on center.*
      ii. *Live shrubs and ground cover plants shall be planted in the landscaped area.*
      iii. *Each tree shall be located in a four-foot by four-foot minimum planting area.*
      iv. *Shrub and ground cover beds shall be three feet wide minimum.*
      v. *Trees and shrubs must be fully protected from potential damage by vehicles.*

   Response: Extensive landscaping is proposed for the parking lot, including continuous planter strips and tree wells. Landscape areas are shown on the plans. Detailed landscape plans will be included at the time of site plan/architectural review.

   b. *Surface parking areas shall provide perimeter parking lot landscaping adjacent to a street that meets one of the following standards:*
      i. *A five-foot-wide planting strip between the right-of-way and the parking area. The planting strip may be interrupted by pedestrian-accessible and vehicular accessways. Planting strips shall be planted with an evergreen hedge. Hedges shall be no less than thirty-six inches and no more than forty-eight inches in height at maturity. Hedges and other landscaping shall be planted and maintained to afford adequate sight distance for vehicles entering and exiting the parking lot;*
      ii. *A solid decorative wall or fence a minimum of thirty-six inches and a maximum of forty-eight inches in height parallel to and not closer than two feet from the edge of right-of-way. The area between the wall or fence and the pedestrian accessway shall be landscaped. The required wall or screening shall be designed to allow for access to the site and sidewalk by pedestrians and shall be constructed and maintained to afford adequate sight distance as described above for vehicles entering and exiting the parking lot;*
      iii. *A transparent screen or grille forty-eight inches in height parallel to the edge of right-of-way. A two-foot minimum planting strip shall be located either inside the screen or between the screen and the edge of right-of-way. The planting strip shall be planted with a hedge or other landscaping. Hedges shall be a minimum thirty-six inches and a maximum of forty inches in height at maturity.*

   Response: The surface parking lot will have a five-foot or greater perimeter planter strip between the right-of-way and the parking area.

c. *Gaps in a building's frontage on a pedestrian street that are adjacent to off-street parking areas and which exceed sixty-five feet in length shall be reduced to no more than sixty-five feet in length through use of a minimum eight-foot-high screen wall. The screen wall shall be solid, grille, mesh or lattice that obscures at least thirty percent of the interior view (e.g., at least thirty percent solid material to seventy percent transparency).*

Response: Additional landscape screening will be provided along the street frontages where building gaps exceed 65 feet.

d. *Parking Area Interior Landscaping.*

i. *Amount of Landscaping. All surface parking areas with more than ten spaces must provide interior landscaping complying with one or both of the standards stated below.*

(A) *Standard 1. Interior landscaping must be provided at the rate of twenty square feet per stall. At least one tree must be planted for every two hundred square feet of landscaped area. Ground cover plants must completely cover the remainder of the landscaped area.*

(B) *Standard 2. One tree must be provided for every four parking spaces. If surrounded by cement, the tree planting area must have a minimum dimension of four feet. If surrounded by asphalt, the tree planting area must have a minimum dimension of three feet.*

ii. *Development Standards for Parking Area Interior Landscaping.*

(A) *All landscaping must comply with applicable standards. Trees and shrubs must be fully protected from potential damage by vehicles.*

(B) *Interior parking area landscaping must be dispersed throughout the parking area. Some trees may be grouped, but the groups must be dispersed.*

(C) *Perimeter landscaping may not substitute for interior landscaping. However, interior landscaping may join perimeter landscaping as long as it extends four feet or more into the parking area from the perimeter landscape line.*

(D) *Parking areas that are thirty feet or less in width may locate their interior landscaping around the edges of the parking area. Interior landscaping placed along an edge is in addition to any required perimeter landscaping.*

Response: Extensive landscaping is proposed throughout the parking area, including continuous planter strips with tree bump-outs. Parking lot landscape areas are shown on the plans, detailed landscape plans will be reviewed at the time of Site Plan/Architectural Review application.

3. *Landscaping Near Buildings. Landscaping shall serve as a screen or buffer to soften the appearance of structures or uses such as parking lots or large blank walls, or to increase the attractiveness of common open spaces.*

Response: Landscaping will be used as border plantings for the buildings, taller materials will be used to mark and emphasize entries to buildings and courtyards. Hedge materials and ground covers will be used to screen and soften parking areas. Detailed landscape plans will be a part of the architectural review process.

4. *Service Areas. Service areas, loading zones, waste disposal or storage areas must be fully screened from public view.*
    a. *Prohibited screening includes chainlink fencing with or without slats.*
    b. *Acceptable screening includes:*
        i. *A six-foot masonry enclosure, decorative metal fence enclosure, a wood enclosure, or other approved materials complementary to adjacent buildings; or*
        ii. *A six-foot solid hedge or other plant material screening as approved.*

Response: Services areas for storage and trash will be enclosed and screened with six foot minimum height masonry and/or wood or cementitious siding to match adjacent buildings. Landscape materials will be used to soften the utility structures. Location of the waste disposal areas will be determined by the waste hauler and shown in the site plan approval.

5. *Street Trees. Street trees shall be required along both sides of all public streets with a spacing of twenty feet to forty feet on center depending on the mature width of the tree crown, and planted a minimum of two feet from the back of curb. Trees in the right-of-way or sidewalk easements shall be approved according to size, quality, and tree well design, if applicable, and irrigation shall be required. Tree species shall be chosen from the city of Central Point approved street tree list.*

Response: Street trees will be selected from the approved street tree list, and planted along all public and private street frontages within the site as specified by the Code. Street trees details will be included on the construction plans.

L. *Lighting.*
1. *Minimum Lighting Levels. Minimum lighting levels shall be provided for public safety in all urban spaces open to public circulation.*
    a. *A minimum average light level of one and two-tenths footcandles is required for urban spaces and sidewalks.*
    b. *Metal-halide or lamps with similar color, temperature and efficiency ratings shall be used for general lighting at building exteriors, parking areas, and urban spaces. Sodium-based lamp elements are not allowed.*
    c. *Maximum lighting levels should not exceed six footcandles at intersections or one and one-half footcandles in parking areas.*

Response: LED lighting is proposed for general exterior lighting for energy efficiency. Minimum and maximum lighting levels throughout the development will be as specified by the Code, and will be detailed at the time of architectural review.

2. *Fixture Design in Public Rights-of-Way.*
    a. *Pedestrian-scale street lighting shall be provided including all pedestrian streets along arterials, major collectors, minor collectors and local streets.*

b. Pedestrian street lights shall be no taller than twenty feet along arterials and collectors, and sixteen feet along local streets.

Response: Pedestrian-scale street lights no taller than 20' will be provided along Gebhard Road and Beebe Road, which are designated as collectors.

3. On-Site Lighting. Lighting shall be incorporated into the design of a project so that it reinforces the pedestrian environment, provides continuity to an area, and enhances the drama and presence of architectural features. Street lighting should be provided along sidewalks and in medians. Selected street light standards should be appropriately scaled to the pedestrian environment. Adequate illumination should be provided for building entries, corners of buildings, courtyards, plazas and walkways.

a. Accessways through surface parking lots shall be well lighted with fixtures no taller than twenty feet.

b. Locate and design exterior lighting of buildings, signs, walkways, parking lots, and other areas to avoid casting light on nearby properties.

c. Fixture height and lighting levels shall be commensurate with their intended use and function and shall assure compatibility with neighboring land uses. Baffles shall be incorporated to minimize glare and to focus lighting on its intended area.

d. Additional pedestrian-oriented site lighting including step lights, well lights and bollards shall be provided along all courtyard lanes, alleys and off-street bike and pedestrian pathways.

e. In addition to lighting streets, sidewalks, and public spaces, additional project lighting is encouraged to highlight and illuminate building entrances, landscaping, parks, and special features.

Response: Lighting will be as specified by the Code, and will be detailed at the time of architectural review.

M. Signs.

1. The provisions of this section are to be used in conjunction with the city sign regulations in the Central Point Sign Code, Chapter 15.24. The sign requirements in Chapter 15.24 shall govern in the TOD district and corridor with the exception of the following:

a. The types of signs permitted shall be limited only to those signs described in this chapter.

b. All signs in the TOD district and corridor shall comply with the design standards described in this chapter.

c. Decorative exterior murals are allowed and are subject to review and criteria by planning commission or architectural review committee appointed by city council.

d. Signs that use images and icons to identify store uses and products are encouraged.

e. Projecting signs located to address the pedestrian are encouraged.

2. Sign Requirements. (See Table)

3. Sign Materials.

a. The base materials for a freestanding sign shall be natural materials including stone, brick, or aggregate.

b. Signs and supporting structural elements shall be constructed of metal or stone with wood or metal informational lettering. No plastics or synthetic material shall be allowed, except for projecting awning signs, which may be canvas or similar fabric.

c. Sign lettering shall be limited to sixteen inches maximum in height.

d. Sign illumination shall be limited to external illumination to include conventional lighting and neon, if neon is applied to the sign plane area. Internally illuminated signs are prohibited.

4. Prohibited Signs.

a. Internally illuminated signs;

b. Roof signs;

c. Reader boards;

d. Sidewalk A-board signs;

e. Flashing signs;

f. Electronic message/image signs;

g. Bench signs;

h. Balloons or streamers;

i. Temporary commercial banners.

Response: All signs in the White Hawk development will comply with City standards as defined for LMR and MMR zones. Potential sign locations are at the intersections of Beebe Park Drive/Gebhard Road and Beebe Road/White Hawk Way. Signs will be detailed at the time of architectural review.

17.67.060 Public Parks and Open Space Design Standards

A. General. Parks and open spaces shall be provided in the TOD districts and TOD corridors and shall be designed to accommodate a variety of activities ranging from active play to passive contemplation for all ages and accessibility.

Response: A 4.2 acre public park is proposed, as well as 80,300 SF of common open space on the apartment portion of the project results in 6 acres of park and open space or 32% of the project area.

B. Parks and Open Space Location.

1. Parks and open spaces shall be located within walking distance of all those living, working, and shopping in TOD districts.

Response: The 4.2 acre public park proposed for the northeast corner of the site will be within a five minute walk of any location within the ETOD.

Common courtyards between the buildings will serve as open space within the apartment complex.

2. Parks and open spaces shall be easily and safely accessed by pedestrians and bicyclists.

Response: The Master Plan proposes sidewalks for all street frontages within the development, including along two sides of the proposed park area. Bicycles will access the park via the public streets within the site.

3. *For security purposes, parks and open spaces shall be visible from nearby residences, stores or offices.*

Response: The public park is clearly visible from the duplexes and several of the apartment buildings. The common open spaces within the apartments are visible from nearby buildings and parking areas.

4. *Parks and open space shall be available for both passive and active use by people of all ages.*

Response: The proposed public park within the White Hawk Master Plan is level and large enough to provide a wide variety of active and passive recreation opportunities to people of all ages and abilities.

5. *Parks and open space in predominantly residential neighborhoods shall be located so that windows from the living areas (kitchens, family rooms, living rooms but not bedrooms or bathrooms) of a minimum of four residences face onto it.*

Response: All sixteen duplex units will having living areas that face onto the proposed public park, as well as numerous apartment units. Many of the apartment units will have visual access to the common courtyards between buildings.

C. *Parks and Open Space Amount and Size.*

1. *Common open spaces will vary in size depending on their function and location.*

Response: In addition to the 4.2 acre public park that will be enjoyed by future residents of the entire ETOD and more, each group of apartment buildings has a common courtyard of about 6000 square feet and a Community Building and pool.

2. *The total amount of common open space provided in a TOD district or corridor shall be adequate to meet the needs of those projected (at the time of build out) to live, work, shop, and recreate there.*

Response: A 4.2 acre public park together with 80,300 SF of common open space on the apartment portion of the project results in 6 acres of park and open space or 32% of the project area.

3. *All TOD projects requiring master plans shall be required to reserve, improve and/or establish parks and open space which, excluding schools and civic plazas, meet or exceed the following requirements:*
   a. *For single-family detached and attached residences, including duplex units, townhouses and row houses: four hundred square feet for each dwelling.*
   b. *For multifamily residences, including multistory apartments, garden apartments, and senior housing: six hundred square feet for each dwelling.*
   c. *Nonresidential development: at least ten percent of the development's site area.*

Response: The master plan proposes public, private and common open space areas within the development. The proposal is for 36 duplexes and townhomes, which require 14,400 square feet of park/open space; 288 apartments require 172,800 square feet, for a total of 187,200 square feet, or 4.3 acres. A total of 6 acres is being provided between the Public Park and apartment common areas.

	Public	Apartment Site (not incl. parking LS)	Townhome/ Duplex Lots	Total Open Space
Open Space Proposed:	4.2 ac	1.8 ac	0.25 ac (min)	6.25 ac

D. Parks and Open Space Design.

1. Parks and open spaces shall include a combination garbage/recycling bin and a drinking fountain at a frequency of one combination garbage/recycling bin and one drinking fountain per site or one combination garbage/recycling bin and one drinking fountain per two acres, whichever is less, and at least two of the following improvements:

a. Benches or a seating wall;
b. Public art such as a statue;
c. Water feature or decorative fountain;
d. Children's play structure including swing and slide;
e. Gazebo or picnic shelter;
f. Picnic tables with barbecue;
g. Open or covered outdoor sports court for one or more of the following: tennis, skateboard, basketball, volleyball, badminton, racquetball, handball/paddleball;
h. Open or covered outdoor swimming and/or wading pool or play fountain suitable for children to use; or
i. Outdoor athletic fields for one or more of the following: baseball, softball, Little League, soccer.

2. All multifamily buildings that exceed twenty-five units and may house children shall provide at least one children's play structure on site.

3. For safety and security purposes, parks and open spaces shall be adequately illuminated.

Response: The public park will contain a minimum of one combination garbage/recycling bin and a drinking fountain, as well as two benches and a children's play structure including a swing and a slide. The development of the park area will occur prior to the issuance of the 200th building permit for the apartments.

17.67.070 Building Design Standards

A. General Design Requirements.

1. In recognition of the need to use natural resources carefully and with maximum benefit, the use of "sustainable design" practices is strongly encouraged. In consideration of the climate and ecology of the Central Point area, a variety of strategies can be used to effectively conserve energy and resources:

a. Natural ventilation;
b. Passive heating and cooling;
c. Daylighting;
d. Sun-shading devices for solar control;
e. Water conservation;
f. Appropriate use of building mass and materials; and
g. Careful integration of landscape and buildings. It is recommended that an accepted industry standard such as the U.S. Green Building Council's

LEED™ program be used to identify the most effective strategies. (Information on the LEED™ program can be obtained from the U.S. Green Building Council's website,www.usgbc.org.)

Response: All development within the White Hawk Master Plan area will be designed to be energy efficient and may include such measures as quality windows, low flow plumbing fixtures and shower flow restrictors, and low water use landscape materials, among others. The buildings will be simply composed for cost efficiency and to avoid excessive waste of materials. Rather than pursue costly LEED certification, many of the LEED principles will be utilized to achieve an energy efficient and cost effective result, including investing in better fixtures, windows, insulation and venting.

2. *All development along pedestrian routes shall be designed to encourage use by pedestrians by providing a safe, comfortable, and interesting walking environment.*

Response: The buildings have been designed to have interesting massing and articulated elevations on all sides for an interesting, safe walking environment.

3. *Convenient, direct and identifiable building access shall be provided to guide pedestrians between pedestrian streets, accessways, transit facilities and adjacent buildings.*

Response: Access to the apartment units will be from breezeways, with walkways between the parking areas and other buildings. Townhomes and duplexes will have direct front door or garage door access.

4. *Adequate operable windows or roof-lights should be provided for ventilation and summer heat dissipation.*

Response: Except for a few "picture windows", all windows will be operable to selectively provide ventilation depending on the orientation of the building and time of year.

B. *Architectural Character.*

1. *General.*

a. *The architectural characteristics of surrounding buildings, including historic buildings, should be considered, especially if a consistent pattern is already established by similar or complementary building articulation, building scale and proportions, setbacks, architectural style, roof forms, building details and fenestration patterns, or materials. In some cases, the existing context is not well defined, or may be undesirable. In such cases, a well-designed new project can establish a pattern or identity from which future development can take its cues.*

Response: The area is in transition from rural to urban, therefore there is not a consistent architectural pattern in the area to emulate. The ETOD designation on the property mandates development at an urban scale. The intent with the architecture is to draw on local traditions and climatic conditions and develop a current architecture that is appropriate to the area. Conceptual building elevations are included with the application package.

b. Certain buildings, because of their size, purpose or location, should be given prominence and distinct architectural character, reflective of their special function or position. Examples of these special buildings include theaters, hotels, cultural centers, and civic buildings.

c. Attention should be paid to the following architectural elements:

i. Building forms and massing;

ii. Building height;

iii. Rooflines and parapet features;

iv. Special building features (e.g., towers, arcades, entries, canopies, signs, and artwork);

v. Window size, orientation and detailing;

vi. Materials and color; and

vii. The building's relationship to the site, climate, topography and surrounding buildings.

Response: The project is entirely residential, with minimal effect on commercial or civic buildings. As demonstrated by the conceptual building elevations, attention has been paid to the specified elements to create a design that is highly functional for the future residents and aesthetically pleasing to those driving or walking by.

C. Building Entries.

1. General.

a. The orientation of building entries shall:

i. Orient the primary entrance toward the street rather than the parking lot;

ii. Connect the building's main entrance to the sidewalk with a well-defined pedestrian walkway.

b. Building facades over two hundred feet in length facing a street shall provide two or more public building entrances off the street.

c. All entries fronting a pedestrian accessway shall be sheltered with a minimum four-foot overhang or shelter.

d. An exception to any part of the requirements of this section shall be allowed upon finding that:

i. The slope of the land between the building and the pedestrian street is greater than 1:12 for more than twenty feet and that a more accessible pedestrian route to the building is available from a different side of the building; or

ii. The access is to a courtyard or clustered development and identified pedestrian accessways are provided through a parking lot to directly connect the building complex to the most appropriate major pedestrian route(s).

Response: Building entries within the White Hawk Master Plan will be oriented to the street to the maximum extent possible, with sheltered entrances connected with a well defined pedestrian walkway. No facades are proposed to be more than 200 feet in length.

3. *Residential.*

   a. *The main entrance of each primary structure should face the street the site fronts on, except on corner lots, where the main entrance may face either of the streets or be oriented to the corner. For attached dwellings, duplexes, and multi-dwellings that have more than one main entrance, only one main entrance needs to meet this guideline. Entrances that face a shared landscaped courtyard are exempt.*

   Response: The front entrances of all duplex and townhouse units will face the street. Several of the apartment buildings have more than one main entrance, but at least one entrance per building with street frontage faces the street, where practicable.

   b. *Residential buildings fronting on a street shall have an entrance to the building opening on to the street.*

      i. *Single-family detached, attached and row house/townhouse residential units fronting on a pedestrian street shall have separate entries to each dwelling unit directly from the street.*

      ii. *Ground floor and upper story dwelling units in a multifamily building fronting a street may share one or more building entries accessible directly from the street, and shall not be accessed through a side yard except for an accessory unit to a single-family detached dwelling.*

   Response: Each duplex and townhouse unit will have a separate entry directly from the street.

   c. *The main entrances to houses and buildings should be prominent, interesting, and pedestrian-accessible. A porch should be provided to shelter the main entrance and create a transition from outdoor to indoor space.*

   Response: The main entrances have been designed to be prominent, interesting and pedestrian accessible, and include porches or overhangs to provide shelter.

   d. *Generally, single-dwelling porches should be at least eight feet wide and five feet deep and covered by a roof supported by columns or brackets. If the main entrance is to more than one dwelling unit, the covered area provided by the porch should be at least twelve feet wide and five feet deep.*

   e. *If the front porch projects out from the building, it should have a roof pitch which matches the roof pitch of the house. If the porch roof is a deck or balcony, it may be flat.*

   f. *Building elevation changes are encouraged to make a more prominent entrance. The maximum elevation for the entrance should not be more than one-half story in height, or six feet from grade, whichever is less.*

   g. *The front entrance of a multi-dwelling complex should get architectural emphasis, to create both interest and ease for visual identification.*

   Response: Conceptual building elevations included with the Master Plan application package demonstrate consistency with these standards. All of the buildings in are designed to be aesthetically pleasing to those driving or walking by, as well as highly functional to the future residents.

D. Building Facades.

1. General.

a. All building frontages greater than forty feet in length shall break any flat, monolithic facade by including discernible architectural elements such as, but not limited to: bay windows, recessed entrances and windows, display windows, cornices, bases, pilasters, columns or other architectural details or articulation combined with changes in materials, so as to provide visual interest and a sense of division, in addition to creating community character and pedestrian scale. The overall design shall recognize that the simple relief provided by window cutouts or sills on an otherwise flat facade, in and of itself, does not meet the requirements of this subsection.

Response: All buildings proposed for the White Hawk Master Plan area will be designed to be consistent with the standards. Conceptual elevations for the apartments illustrate interesting architectural features on all sides of the buildings in order to create character and pedestrian scale.

b. Building designs that result in a street frontage with a uniform and monotonous design style, roofline or facade treatment should be avoided.

Response: The buildings are designed to be highly functional for the future residents as well as aesthetically pleasing to those walking or driving by.

c. Architectural detailing, such as but not limited to, trellis, long overhangs, deep inset windows, should be incorporated to provide sun-shading from the summer sun.

Response: Architectural detailing and landscaping are proposed to provide sun shading.

d. To balance horizontal features on longer facades, vertical building elements shall be emphasized.

Response: Vertical elements have been incorporated into the major buildings to visually break down longer buildings into smaller proportions that are more appealing to the eye.

e. The dominant feature of any building frontage that is visible from a pedestrian street or public open space shall be the habitable area with its accompanying windows and doors. Parking lots, garages, and solid wall facades (e.g., warehouses) shall not dominate a pedestrian street frontage.

Response: Living spaces front different elements within the Master Plan to provide interest.

f. Developments shall be designed to encourage informal surveillance of streets and other public spaces by maximizing sight lines between the buildings and the street.

Response: Ample windows in the living spaces offer sight lines to the streets and other public spaces.

g. All buildings, of any type, constructed within any TOD district or corridor shall be constructed with exterior building materials and finishes that are of high quality to convey permanence and durability.

Response: All structures in the White Hawk Master Plan area are proposed to be of high quality building materials found in the best residential neighborhoods.

h. The exterior walls of all building facades along pedestrian routes, including side or return facades, shall be of suitable durable building materials including the following: stucco, stone, brick, terra cotta, tile, cedar shakes and shingles, beveled or ship-lap or other narrow-course horizontal boards or siding, vertical board-and-batten siding, articulated architectural concrete or concrete masonry units (CMU), or similar materials which are low maintenance, weather-resistant, abrasion-resistant, and easy to clean. Prohibited building materials include the following: plain concrete, plain concrete block, corrugated metal, unarticulated board siding (e.g., T1-11 siding, plain plywood, sheet pressboard), Exterior Insulated Finish Systems (EIFS), and similar quality, nondurable materials.

Response: All structures in the White Hawk Master Plan area are proposed to be of high quality building materials found in the best residential neighborhoods. The conceptual building elevations demonstrate consistency with these standards. Specific building materials will be detailed at the time of the Site Plan/Architectural Review application.

i. All visible building facades along or off a pedestrian route, including side or return facades, are to be treated as part of the main building elevation and articulated in the same manner. Continuity of use of the selected approved materials must be used on these facades.

Response: All structures in the White Hawk Master Plan area are designed to have the same quality materials on all sides. The conceptual building elevations demonstrate consistency with these standards.

j. Ground-floor openings in parking structures, except at points of access, must be covered with grilles, mesh or lattice that obscures at least thirty percent of the interior view (e.g., at least thirty percent solid material to seventy percent transparency).

Response: No parking structures are proposed.

k. Appropriately scaled architectural detailing, such as but not limited to moldings or cornices, is encouraged at the roofline of commercial building facades and, where such detailing is present, should be a minimum of at least eight inches wide.

Response: No commercial buildings are proposed.

l. Compatible building designs along a street should be provided through similar massing (building facade, height and width as well as the space between buildings) and frontage setbacks.

Response: Attractive, articulated elevations have been designed for each street frontage.

3. Residential.

a. The facades of single-family attached and detached residences (including duplexes, triplexes, fourplexes, townhouses, and row houses) shall comply with the following standards:

i. No more than forty percent of the horizontal length of the ground floor front elevation of a single-family detached or attached dwelling shall be an attached garage.

ii. When parking is provided in a garage attached to the primary structure and garage doors face the street the front of the garage should not take up more than forty percent of the front facade in plan, and the garage should be set back at least ten feet from the front facade. If a porch is provided, the garage may be set back ten feet from the front of the porch. In addition, garage doors that are part of the street-facing facade of a primary structure should not be more than eighty square feet in area, and there should not be more than one garage door for sixteen feet of building frontage.

Response: The townhouses and duplexes will access the garages from the rear, eliminating the garage and garage doors from the front facade.

iii. Residential building elevations facing a pedestrian route shall not consist of undifferentiated blank walls, but shall be articulated with architectural details such as windows, dormers, porch details, balconies or bays.

Response: Building elevations include interesting architectural elements including windows, dormers and covered porches.

iv. For any exterior wall which is within twenty feet of and facing onto a street or public open space and which has an unobstructed view of that pedestrian street or public open space, at least twenty percent of the ground floor wall area shall be comprised of either display area, windows, or doorways.

Response: All ground floor areas facing the street are proposed to have at least 20% in windows or doorways.

v. Architectural detailing is encouraged to provide variation among attached units. Architectural detailing includes but is not limited to the following: the use of different exterior siding materials or trim, shutters, different window types or sizes, varying roof lines, balconies or porches, and dormers. The overall design shall recognize that color variation, in and of itself, does not meet the requirements of this subsection.

Response: Proposed architectural detailing provides interest and includes several of the specified elements, as demonstrated on the conceptual buildings elevations.

vi. Fences or hedges in a front yard shall not exceed three feet in height. Side yard fencing shall not exceed three feet in height between the front building facade and the street. Fences beyond the front facade of the building in a sideyard or back yard and along a street, alley, property line, or bike/pedestrian pathway shall not exceed four feet in height. Fences over four feet in height are not permitted and hedges or vegetative screens in no case shall exceed six feet in height.

Response: Fences will be consistent with these standards.

b. The facades of multifamily residences shall comply with the following standards:

i. Building elevations, including the upper stories, facing a pedestrian route shall not consist of undifferentiated blank walls, but shall be articulated with architectural detailing such as windows, balconies, and dormers.

Response: The apartment buildings are designed to be interesting and attractive from all sides, as illustrated on the conceptual building elevations.

ii. For any exterior wall which is within twenty feet of and facing onto a pedestrian street or public open space and which has an unobstructed view of that pedestrian street or public open space, at least twenty percent of the ground floor wall area shall be comprised of either display area, windows, or doorways.

Response: All ground floor areas facing the street are proposed to have at least 20% in windows or doorways.

iii. Arcades or awnings should be provided over sidewalks where ground floor retail or commercial exists, to shelter pedestrians from sun and rain.

Response: Retail or commercial uses are not proposed.

E. Roofs.

2. Residential.

a. Flat roofs with a parapet and cornice are allowed for multifamily residences in all TOD, LMR, MMR and HMR districts, in which the minimum for sloped roofs is 5:12.

b. Flat roofs with a parapet and cornice are allowed for single-family attached and detached residences (including duplexes, triplexes, fourplexes, townhouses, and row houses) in all TOD residential districts, except the LMR zone.

Response: No flat roofs are proposed.

c. *For all residences with sloped roofs, the roof slope shall be at least 5:12, and no more than 12:12. Eaves shall overhang building walls at a minimum twelve inches deep on all sides (front, back, sides) of a residential structure.*

Response: For the apartment buildings, the proposed roof pitches are 8:12 at the most visible elevations on the large apartment buildings, filled in with 4:12 'saddles' to emphasize the vertical elements of the buildings and minimize large, unnecessary and energy wasteful roof areas.

d. *Roof shapes, surface materials, colors, mechanical equipment and other penthouse functions should be integrated into the total building design. Roof terraces and gardens are encouraged.*

Response: Roof shapes have been designed to emphasize important building masses and have been integrated into the total building design to present visually interesting articulated masses and elevations.

F. Exterior Building Lighting.

2. Residential.

a. Lighting shall not draw inordinate attention to the building facade.

b. Porch and entry lights are encouraged on all dwellings to create a safe and inviting pedestrian environment at night.

c. No exterior lighting exceeding one hundred watts per fixture is permitted in any residential area.

Response: Only lighting necessary for safety and ADA compliance is proposed for energy efficiency and operations cost effectiveness. Safety lighting will include porch and entry lights at each apartment, no exterior lighting will exceed 100 watts per fixture in any residential area.

G. Service Zones.

1. Buildings and sites shall be organized to group the utilitarian functions away from the public view.

2. Delivery and loading operations, mechanical equipment (HVAC), trash compacting/collection, and other utility and service functions shall be incorporated into the overall design of the building(s) and the landscaping.

3. The visual and acoustic impacts of these functions, along with all wall- or ground-mounted mechanical, electrical and communications equipment, shall be out of view from adjacent properties and public pedestrian streets.

4. Screening materials and landscape screens shall be architecturally compatible with and not inferior to the principal materials of the building.

a. The visual impact of chimneys and equipment shall be minimized by the use of parapets, architectural screening, rooftop landscaping, or by using other aesthetically pleasing methods of screening and reducing the sound of such equipment.

Response: Trash and mail collection is location is dependent on approval of local mail providers and trash haulers. These will be determined as part of the site plan/architectural review approval. No mechanical equipment of required for the apartment units as they will be heated with small electrical units and may be air conditioned with PTAC units or a minisplit system. Wall mounted AC units will be

designed as part of the wall of the unit or screened behind decks. Ground mounted units may be utilized in the rowhouses and duplexes, space exists on the lots for necessary pads. Screening materials and landscape screens will be architectural extensions of the principal materials of the buildings.