CITY OF POWELL Ordinance 2021-20 Exhibit B

# RESPONSE REGARDING PLANNING & ZÓNING COMMISSION'S CONDITIONS ON RECOMMENDATION TO CITY COUNCIL OF APPROVAL OF PRELIMINARY DEVEOPEMENT PLAN FOR PROPERTY LOCATED AT 3041 HOME ROAD SUBMITTED BY REDWOOD USA, LLC (CASE 2021-05Z/PDP)

The motion to recommend approval by City Council of the Preliminary Development Plan for  $70 \pm \text{Acres}$  at 3041 Home Road ( $35 \pm \text{Acres}$  currently zoned PI – Planned Indusial, City of Powell and  $35 \pm \text{currently}$  zoned Industrial District, Liberty Township, which is pending annexation) was made subject to four (4) conditions:

1. That the development text be updated taking into account the comments from Staff, the Architectural Advisor, and the Commission consistent with the City of Powell expectations as it relates to issues such as sign setback, lot coverage, roof pitches, numbering and lettering, prior to Council review.

# Response:

- a) <u>Sign Setback</u> The text has been revised to request a divergence from the normal 25 foot setback from Home Road for a joint identification sign to 10 feet, just behind the requested 10 foot building and parking setback because of the exceptional width of Home Road's right-of-way at this location due to the elevation of the railroad overpass. The proposed sign will be about 100 feet from the existing pavement of Home Road, and below the elevation of Home Road.
- b) Lot Coverage The text has been revised to request a divergence from 25% lot coverage to 36 % lot coverage for the skilled nursing facility, which will be 64,700 square feet in a single story. Lot coverage in Subarea B, the apartments, is significantly less than 20%. As indicated on the Open Space Plan, Exhibit I, the total open space for the mixed use development is 25 ± acres (or 35.7% of the 70 ± acres of the proposed development)
- c) <u>Roof Pitches</u> The text has been revised to request a divergence, for Subarea B, the apartment buildings, from a 7:12 to a minimum pitch of 5:12. The architecture will be finalized during the final development plan stage, but there have been discissions with the Architectural Advisor regarding roof pitch and treatments that could be added to the roof, such as gable style dormer, roof building step down and shed style dormer, each illustrated in Exhibit N-2.
- d) <u>Numbering and Lettering</u> The text has been revised to add references to Exhibits which were added or re-lettered after the prior text was drafted.

2. That the applicant shall work with Staff and the Architectural Advisor prior to a submittal of the Final Development Plan so as to address items identified by Staff, the Architectural Advisor, and the Commission members, such as building architectural variety, garage door orientation, use of proper materials, etc., to ensure effective preparation for the Final Development Plan Submission.

# Response:

This is a Final Development Plan condition, not a Preliminary Development Plan condition, which will be complied with in the Final Development Plan. Such discussions have occurred and will continue.

3. That a stormwater feasibility study demonstrating proper stormwater management shall be provided as a part of the Final Development Plan.

## Response:

This is a Final Development Plan condition, not a Preliminary Development Plan condition, which condition will be complied with in the Final Development Plan.

4. The applicant shall provide adequate data to demonstrate that a one-year predeveloped storm will be detained for the 100-year post-development event.

# Response:

Although not stated, this should be a Final Development Plan condition (as set forth in the proposed Motion 2 in the Staff report), which condition will be complied with in the Final Development Plan. Such data will be part of the stormwater feasibility study to be provided in the Final Development Plan.

#### CHAPTER 1143 - DISTRICT REGULATIONS<sup>[19]</sup>

1143.11 - PROCEDURES FOR APPROVAL OF PLANNED DISTRICT DEVELOPMENT PLANS.

Planned District Development Plans shall be approved in accordance with the procedures established herein in this section.

- (a) \*\*\*
- (b) \*\*\*
- (c) Preliminary Planned District Development Plan Application Requirements. An application for preliminary Planned District Development Plan approval shall be filed with the Zoning Administrator by the owner of the property for which Planned District development is proposed. At a minimum, the application shall contain the following information. Where any of this information is missing or incomplete, the Zoning Administrator shall so notify the applicant and no additional actions need be taken until such missing material is provided.
  - (1) Name, address, and phone number of applicant;

Redwood USA, LLC 7007 East Pleasant Valley Road Independence, OH 44131 216-360-9941

(2) Name, address, and phone number of registered surveyor, registered engineer and/or urban planner assisting in the preparation of the preliminary development plan;

Real Estate Advisor: Jim Frey Real Estate Advisor, LLC James Frey 5311 Gillen Way, Westerville, Ohio 43082 614-206-1123

Land Planning/Landscape Architecture: POD Design Todd Foley 100 Northwoods Boulevard, Suite A, Columbus, Ohio 43235 614-255-3399

Engineer: American StructurePoint Shawn Goodwin 2550 Corporate Exchange Drive, Suite 300, Columbus, Ohio 43231 614-901-2235

Architect: Mann Parsons Gray Architects, Inc. James Keys 3660 Embassy Parkway, Fairlawn, Ohio 44333 330-666-5770

Attorney: Manos, Martin & Pergram Co., LPA Stephen D. Martin 50 North Sandusky Street, Delaware, Ohio 43015 740-363-1313 (3) Legal description of the property;

Exhibits A and A-1 to the Zoning Map Amendment Application in Section 1 and Section 2 of this notebook

(4) A description of present use(s) on and of the land;

The 25.248-acre tract (PIN 319-240-01-068-004) and the 9.556-acre tract (PIN 319-240-01-005-001), which are both currently in the City of Powell, are both wooded, undeveloped and vacant tracts without any roads or other improvements.

The 13.749-acre tract<sup>1</sup> (PIN 319-240-01-005-000) in Liberty Township, is mostly wooded, undeveloped and vacant, but the northern portion, probably of less than 1 acre, has an accessory building and part of an accessory building (both vacant) and a small portion of a paved drive/road. The 21.516-acre tract<sup>1</sup> (PIN 319-240-01-004-000), in Liberty Township, is the only one of the four tracts with road/street frontage and a street address (3041 Home Road). This tract is mostly lawn/grass, with a 7,200± SF light manufacturing and office building built circa 1972, an accessory building (a small portion of which is on the 13.749-acre tract), a septic system, paved parking area and paved drives to the accessory buildings and Home Road. The light manufacturing and office building, the septic system and most paving will be demolished or removed.

(5) A vicinity map at a scale approved by the Zoning Inspector showing all property lines, existing streets and alleys, approved future streets and land uses on adjacent Planned District areas, transportation and land use elements of the Municipality's adopted Comprehensive Plan, current zoning classifications and boundaries, and current land uses on the site of the proposed Planned District development and in the surrounding areas to the physical extent deemed necessary by the Zoning Inspector, but no less than 250 feet beyond the limits of the proposed Planned District Development Plan.

### Exhibit B.

- (6) A preliminary development plan at a scale approved by the Zoning Administrator illustrating:
  - A. The property line definition and dimensions of the perimeter of the site;

Exhibit B, Vicinity Map/Existing Conditions Plan Exhibit C-1 to C-3, Preliminary Development Plan, with site statistics and proposed Phasing, and Exhibit C-4, Lot 3 Conceptual Plans.

B. Rights-of-way and paving widths of all existing, currently platted, and previously approved Planned District streets and alleys adjacent to, on, or abutting the site;

There are currently no public streets or roads on the site. There is an existing curb cut and drive from Home Road at the extreme northeast corner of the site which provides the only access to the site. The existing drive from this curb cut will be removed and relocated as one of the private streets in the proposed development. There will be no public streets in the development. The existing access to Home Road will remain as the only regular vehicular access to the development, but in the second phase of the apartments there will be an emergency only access road, to be constructed by Applicant pursuant to an

<sup>&</sup>lt;sup>1</sup> These acreage figures, which total to 34.905, are from the Auditor's Property Summary, but the Annexation Petition's legal description is 35.336 acres.

Easement Agreement with Olentangy Local School District Board of Education. This emergency only access road will be from the main drive/parking lot of the Middle School to the east property line of the development and then to the main north-south street in the development.

Due to a preserve owned by the City of Powell to the south of the site, railroad tracks on the entire east boundary of the site, the middle school and Liberty Township parkland on the entire east boundary, except for a small lot at the extreme north end of the east boundary, and Home Road being elevated for the railroad overpass, including in the area of the existing access from Home Road (relocated to the extreme northeast corner of the site due to the construction of the overpass about a decade ago), there is and can be, only one regular access point to the entire site.

At some stage of the development of the site Applicant will be required to construct an eastbound deceleration/right turn lane on Home Road. There is currently a center lane/left turn lane on Home Road at the access point to the site.

The Delaware County Engineer's Office has advised, because of the reduced sight lines and the grade of Home Road due to the overpass and the proximity of a traffic light at the Home Road entrance to Liberty Park to the east of the site's access point, that a traffic light will not be permitted at the site's access point (which obviously adversely impacts the amount of traffic which can be generated from the site in any one time interval; i.e., peak A.M. and P.M. M-F hours). Exhibit O, Traffic Impact Study (copy on file with City Engineer), which has been supplemented with a Traffic Impact Study dated April 9, 2021, on file with City Engineer.

C. The area of the site and its subareas in acres;

Exhibit C-1 Site area = 70+ acres Subarea A = 11 acres Subarea B = 59 acres (most of the detention basins, both stream corridors and the passive open space are in Subarea B, which is where the apartments will be located)

D. The topography of the site and abutting areas at no more than five foot contour intervals;

The property is essentially flat. Exhibit E-1 to E-4, which include Preliminary Grading, should suffice for a topography map.

E. Existing surface drainageways and surface sheet flow patterns;

There are two stream corridors which cross the site east-west and several wetlands areas.

Exhibit C-1 to C-3, Preliminary Development Plan with site statistics and proposed phasing, and Exhibit C-4, Lot 3 Conceptual Plans.

F. Flood plain areas, ravine-bottom areas, and areas of ground slope in excess of six percent;

There are no flood plain areas, ravine-bottom areas or areas of ground slope in excess of six percent (6%).

G. Existing vegetation on the site with specific tree spots for all trees six inches in diameter or greater, measured 24 inches from the ground.

Exhibit B, Vicinity Map/Existing Conditions. Note: As part of the final development plan approval there will be a tree survey if required or if needed. As the 70 $\pm$  acres will be developed in phases, and not all areas are treed, any tree survey is likely to be only with respect to only part of the property. There are also undoubtedly parts of the property where it is not necessary to include in a tree survey, such as the wooded, with wetlands, south 5 $\pm$  acres which will not be developed.

H. Existing easements on the site with notations as to their type, extent, and nature;

The existing easements on the site, with notations as to their type, extent and nature, are set forth on the ALTA Survey, Exhibit F.

Except for the pole line providing service to the existing building, which building will be demolished for the development of the project, and the two blanket easements, all easements are along the boundaries of the site. The two blanket easements for electric pole lines are for pole lines physically located along the north and part of the east boundaries of the site. It is quite possible, if not likely, that the pole line along part of the east boundary of the site, essentially a service line to the building to be demolished, will be removed and the easement vacated and a new easement, for underground electric lines, will be granted.

The 20' fiber optic and telephone easement along the west boundary adjacent to the railroad tracks and the 50' sewer and channel easement adjacent to it on the east (a total of 70' of easements) along the site's west boundary (with the railroad tracks) will preclude mounding along the west boundary of the site and in all likelihood will also preclude landscape buffering.

I. The location and dimensions of existing utilities on and adjacent to the site, including the nearest sanitary sewer, with manhole invert elevations;

Exhibit E-1 to E-4, Preliminary Grading/Utility/Storm Water Management Plan

J. Calculation of the maximum residential units permitted on the site under the terms of this Zoning Ordinance, including delineation of the subdistricts of the site upon which these calculations have been made;

Under 1143.13-PR-Planned Residence District, Other Than Single-Family Or Two Family Housing, the maximum density is 9.0 dwelling unit per gross acre. Density for apartments is not addressed in 1143.15-PC-Planned Commercial District.

There is sought a total of 327 apartment units on the 59± acres of Subarea B, which computes to a density of 5.5 dwelling units per acre or only 61% of the maximum permitted density under PR Zoning.

K. A preliminary plan for the first, or next, phase of site development illustrating:

The first phase would consist of Subarea A, Lots 1 and 2 and 87 apartment units at the north end of Subarea B. However, this estimation is based on what is presently known as to site conditions (surface and subsurface), final engineering and governmental requirements and permits, and future market conditions for Subarea A and for apartments.

1. New street centerlines, rights-of-way, and street classification types;

The streets, all to be private, are shown on Exhibit C-1 to C-4, and E-1 to E-4.

2. Names of existing and proposed streets;

There are no existing streets, public or private, within the property/ development site. Street naming of the private streets will occur within the final development plans.

 Generalized lot and block layouts, indicating and illustrating property lines, minimum lot areas, minimum building setbacks and yards, location and extent of major off-street parking areas, etc.;

As set forth or illustrated in Exhibit C-1 to C-4 divergences from the minimums and maximums set forth in 1143.15 are requested as follows:

#### Subarea A:

Minimum Distance Between Buildings: 50 feet to 15 feet

North PL:	10' building and pavement setback
West PL:	40' building setback and 25' pavement setback
South PL:	30' building setback and 10' pavement setback
East PL:	25' sideyard setback

<u>Subarea B:</u>			
North PL:	30' sideyard setback		
West PL:	25' sideyard setback		
South PL:	25' sideyard setback		
East PL:	25' sideyard setback		

Maximum Lot Coverage: 36% (64,700 square feet single story skilled nursing facility on 4.2± acres).

Maximum Building Height: For Lot 3 of Subarea A, not more than 45 feet and three (3) stories.

Maximum Building Dimension: 150 feet to no maximum for Subarea A and 150 feet to 250 feet (long) for Subarea B

4. Subareas of the site to be developed, by land use type, housing types, and housing densities, including subarea statistics;

There will be two subareas, Subarea A, closest to Home Road, and Subarea B, located south of Subarea A and accessible only through Subarea A.

Although the Applicant's choice would be to use the entire 70 acre site for apartments and open space, Subarea A is being set aside, due to the City's desires, for select commercial uses other than apartments. Based upon consulting with commercial developers and medical office building developers and landlords, and William LaFayette, Ph.D. (author of the Fiscal Impact Report, Exhibit C in Section 2 of this notebook, the Zoning Map Amendment Application), it is felt that given the constraints of the site which cannot be eliminated or effectively mitigated [(1) only one point of access, which access point is on the slope of a railroad overpass at the far east side of the site, which railroad overpass's apex is immediately to the west side of the site, which reduces the sightlines eastbound on Home Road so that truck traffic to and from the site is problematic and (2) the County Engineer decree, because of the overpass's location in relation to the site's access point and the traffic light at the entrance to Liberty Park to the east of the access point that a traffic light will not be permitted] that industrial uses, warehouses, office warehouses and other uses which generate tractor trailer and large straight-bed trucks are not viable, nor are uses which generate significant peak hours traffic. The fact that buildings to be constructed on lots fronting on Home Road effectively cannot be constructed facing Home Road, due to the elevation of the home Road overpass, and will, therefore, be constructed fronting on an internal street, adversely impacts the visibility of the area adjacent to Home Road [unless the building(s) at the northwest corner of the site would be several stories high, there would be no view of these building(s) from vehicles westbound on Home road and the view from vehicles eastbound would be of the roof of a building]. There will be no traditional housing in Subarea A.

Also, although there is a committed user for part of Subarea A, Lots 1 and 2, the layout/the site plan for Subarea A must be flexible. As can be seen on Exhibit C-1 to C-4, there is one north-south private street through Subarea A to Subarea B, from the Home Road access point essentially along the site's east boundary and there is, within Subarea A, an east-west private street. However, based upon the needs/desires of currently unknown user(s) for part of Subarea A, this private street may change from that depicted in Exhibit C-1 to C-4. Lots in Subarea A will be determined based upon the needs of users/lot purchasers.

Based upon Applicant's marketing efforts over the past two years, there currently is a skilled nursing facility and a companion assisted living facility for 8± acres of Subarea A, Lots 1 and 2. Although there are no users for the remainder of Subarea A, Lot 3, Exhibit C-4 depicts two alternative concept plans, one retail and one for office buildings.

Subarea B will be developed with 327 single-story, ranch, 2-bedroom, 2-car garage apartments on the balance of the  $70\pm$  acre tract, of  $59\pm$  acres. Within Subarea B there will be  $25\pm$  acres of open space. The apartment density for Subarea B will be 5.5 dwelling units/acre.

5. All proposed structures shall be located showing square footage, tenant or user types, and expected entranceways and service or loading areas;

As set forth in answer to 4 above, the users for Subarea A have only been partially identified and, therefore, Subarea A must remain flexible.

In Subarea B buildings will each contain from 3 to 8 apartment units, each ranging between a minimum of 1,250 square feet and a maximum of 1,750 square feet. All apartments will be single-story, 2-bedroom, 2-bath, 2-car attached garage with direct entry, open floor plan, eat-in kitchen with walk-in pantry, full-size washer and dryer connections, and with outdoor patio and extensive landscaping (see Typical Unit Landscape Plan, Exhibit K).

6. Common open areas, public lands, and natural scenic easements, including the area of each;

There will be common open space throughout Subarea B consisting, primarily, of (a) wooded area on the south end, (b) a "village green" within each of the clusters of units, with walkways either through or along the perimeter of each "village green," (c) four ponds, with fountains, three of them adjacent to the two east-west streams with existing tree buffering which will remain "as is" except for one street crossing of each, (d) the existing tree line on the east boundary of the site (along Liberty Township and Olentangy Local School District lands), and (e) a walkway from the east boundary of the south end of the site through the Middle School property to its parking lot/driveway, which it will cross/connect to the recreational path that runs from the City's preserve to the south of the site to Liberty Park. See Exhibit I, Open Space Plan. The layout of Subarea B, Phase 1, allows for walkway/path connections to the east from the mail center to connect to recreational paths on Liberty Township property, including Liberty Park. This walkway/path connection, on Subarea B, Phase 1, and on Liberty Township property, will be constructed if Liberty Township permits such connection. (Applicant's Real Estate Advisor has communicated with a Liberty Township Trustee and as a result thereof has communicated with Liberty Township Staff regarding two connections from Subarea B to Liberty Township Park's walkway/paths and drafting access easements, temporary construction easements and a joint maintenance agreement.) Total open space is 25± acres. Exhibit I.

7. Proposed landscape treatment of the site;

In Subarea A, the existing trees on the east property line (most of it with Liberty Park) will be maintained. There will be tree buffering along the south of Subarea A, to buffer the apartment units in Subarea B from the commercial uses in Subarea A. Exhibit G, Overall Landscape Plan, and Landscape Plan Enlargements, Exhibits H-1, H-2, H-3, H-4 (enlargement sections respectively for Subarea A and Phases 1, 2 and 3 of Subarea B). There will not be landscaping or tree buffering along the west property line (with the railroad) due to the approximately 1,335 foot long north-south 20 foot wide utility easement adjacent on its west to the railroad property and the 50 foot wide channel (drainage) easement adjacent on its west to the 20 foot utility easement. (Thus,

for approximately 1,335 feet south from the south right-of-way of Home Road/the overpass, there is a 70 foot strip along the west boundary adjacent to the railroad tracks/property which cannot legally be mounded or landscaped). Subarea A landscape plans will be included in the final development plan submittals.

In Subarea B, except for the secondary emergency access through the Middle School and possible connections to existing or future recreational paths on Liberty Township property, the existing boundary tree line will be maintained and supplemented as appropriate. Exhibit G, Landscape Plan and Exhibits H-1, H-2, H-3, and H-4, Landscape Plan Enlargements. Existing woods will be retained on the south end of Subarea B and along the west boundary of Subarea B to the south of the utility and channel easement area (the railroad tracks/property). Exhibit I, Open Space Plan. There will be tree buffering along the north boundary of Subarea B. As noted above with respect to Subarea A, when it is developed, landscaping will be part of the final development plan. Existing trees will be maintained along the two east-west stream corridors. Landscaping/trees along the streets (private) in Subarea B are shown on Exhibit G, Landscape Plan and on Exhibits H-1, H-2, H-3, and H-4, Landscape Plan Enlargements, while the landscaping for the apartment buildings/units is shown on Exhibit K, Typical Unit Landscape Plan. See Exhibit L, Planting Detail.

 Proposed utility patterns and provisions, including sanitary sewer, individual waste disposal systems, storm sewer, trash collection systems, outdoor lighting, and water supply, including relevant easements and engineering feasibility studies or other evidences of reasonableness;

See Exhibit E-1 to E-4, Grading Plans.

9. Provisions for accommodating surface drainage runoff;

To the extent possible, surface drainage runoff from Subarea A will be accommodated with "regional detention" in Subarea B. See Exhibits C-1 to C-3 and E-1 to E-4.

It is anticipated based on current knowledge that in Subarea B there will be four ponds, each with fountains, one to the north and one to the south of the north east-west stream corridor, one to the south of the south east-west stream corridor, and one located in the south end of Subarea B. See Exhibits C-1 to C-4 and E-1 to E-4.

10. Proposed architectural design criteria;

See Exhibit M, for Subarea A and Exhibit N-1 to N-2 for Subarea B. The two eastwest stream corridors with the trees and the ponds effectively subdivide Subarea B into three sub-subareas. Developer may have separate façade architecture for each of the three sub-subareas or villages, which may be separately named or otherwise differentiated. See Exhibit N-1 and N-2. Specific architectural design matters addressed in the Staff Reports and verbally by the Architect Advisor will be addressed in the Final Development Plan. Signage Plan, Exhibit J, has been provided purely as an informational item. Per 1151.09-Sign Zoning Certificates, a zoning certificate is required to erect the three proposed signs, and an application for such a zoning certificate is granted, granted with conditions or denied by the Zoning Administrator. Per 1151.04 – General Requirements for all Signs and Districts (but subject to exceptions which are not applicable) no sign may be placed in Public Rights-of-Way ("ROW"). The Master Project Monument Sign will be located just outside the ten (10) foot building and parking from the ROW of Home Road. At the property the ROW of Home Road is exceptionally wide due to the elevation of the railroad overpass. The Master Project Monument Sign will be 100+ feet from the existing pavement edge of Home Road (see Exhibit J). Please see 12(4) below for divergence.

11. Proposed pedestrian/jogging/bicycle pathways and equestrian paths, including locations, dimensions, landscape and construction, including relationships of such pathways to existing and proposed future pathways on surrounding property;

# See above under 6, Exhibit I, Exhibit C-1 to C-3 and Exhibit P, On-street sidewalks.

12. Overall site development statistics comparing this plan for development with requirements of this Zoning Ordinance and with the comprehensive plan and indicating that all requirements of this Zoning Ordinance and the comprehensive plan have been met in this preliminary plan and will be met in final development.

In comparing this proposed Planned Commercial development with requirements of the Zoning Ordinances:

(1) Divergences from the minimum and maximums set forth in 1143.15 are identified in 3 above.

(2) A divergence from 1143.15(b), Supplemental Regulations for the Planned Commercial District, is requested to permit the apartments to be clustered in Subarea B, separate from the commercial uses in Subarea A. The streets in Subarea A and in Subarea B, all private streets, will be adequate to accommodate the projected traffic generated by such uses. The traffic generation by apartments in Subarea B will be of a different type motor vehicle and significantly less, at AM and PM peak hours, than the existing Planned Industrial uses permitted by the zoning on the 35± acres presently in the City. See Exhibit D, Engineering Feasibility Memo. The uses on Subarea A have been limited to significantly restrict the number of tractor trailers and large straight trucks using the only access point (which the County Engineer will not permit to be signalized) and the AM and PM peak hour generation. See Exhibit O, Traffic Impact Study 2019 (copy on file with City Engineer), which has been supplemented with a Traffic Impact Study, April 9, 2021 on file with the City Engineer.

(3) Divergences from the Official Schedule of Permitted Uses set forth in 1143.15(a), by restricting this proposed development to the following uses in the order in which they appear in 1143.15(a) is requested:

**Office uses** Office type businesses **Office research centers** Services business **Personal services** Multifamily residences (Subarea B only) **Apartment residences (Subarea B only) Elderly housing facilities** Life-care facilities (assisted living) **Congregate housing Convalescent homes** Nursing homes (skilled nursing facility) Medical, dental office facilities and laboratories **Hospitals and clinics** Veterinarian's offices, clinics, hospitals for small animals without kennels **Restaurants** 

None of the Permitted Uses and Conditionally Permitted Uses of 1143.15(a) not listed above will be permitted in this development.

(4) A divergence from 1147.12(b)(1) to permit the use of high quality (currently Norandex Woodsman Select) vinyl lap siding and shake siding of not less than 0.042 thickness.

(5) A divergence from 1147.12 from 1147.12(b)(5) to permit minimum 5:12 primary roof pitch for residential buildings in Subarea B.

(6) A divergence from 1151.07(d), Joint Identification (2) Setbacks to permit the Master Project Monument Sign to be located ten (10) feet from the right-of-way of Home Road. (As the right-of-way at the proposed location of this sign is exceptionally wide due to the elevation of Home Road because of the railroad overpass, the sign will be 100+ feet from the existing pavement edge of Home Road - see Exhibit J.)

The City's Comprehensive Plan shows the 35± acres currently within the City as Planned Industrial District, consistent with the zoning of that area the past 15± years from when that area was rezoned from Planned Residential to Planned Industrial following the conveyance of the south 25 acres from the City to GFS Chemicals. However, since the rezoning 15± years ago to Planned Industrial: (a) the entire 35± acres has remained vacant, (b) the industrial use of part of the 35± acres not in the City by GFS Chemicals has ceased, and (c) the access to and from the 70± acres, a single access point to Home Road at the foot of the overpass's slope/grade, has presented access issues which effectively preclude any of the site being used for a use which would generate tractortrailer and/or large straight-truck traffic (and also any use generating significant AM and PM peak hours traffic). See Fiscal Impact Study, Exhibit C to the Zoning Map Amendment Application in Section 2 of this notebook. L. Projected development schedule by subareas of the entire planned development site, and for the first, or next, phase of development, including land uses, public areas, natural and scenic reserves, streets, buildings, utilities, and other facilities, indicating the relationship of the proposed development to existing and probable uses of surrounding areas during the development timetable;

The development schedule for Subarea A will be that the private north-south street and the extension of all utilities not currently available in Subarea A in sufficient capacity to serve Subarea A and the first phase in Subarea B, and further as may be appropriate, will be extended through Subarea A into Subarea B along the new north-south street. The extension of a street into Subarea A and the extension of utility lines from the utility lines along the new north-south street will occur when users for Subarea A purchase tracts/lots in Subarea A.

Subarea B will be developed in three (3) phases, north to south, with Phase 1 likely having 87 units, Phase 2 having 84 units and Phase 3 having 156 units. The emergency secondary access, through the Middle School site, will likely be developed as part of Phase 2.

M. An overall traffic scheme, illustrating points of access, parking areas, including the number of parking spaces and indicating visitor, employee and service traffic flow, illustrating calculated peak hour traffic use for residents and employees as well as deliveries and other transport and the effect of this traffic on the community traffic ways.

As indicated several times herein and on several exhibits, the only access point for the 70± acre site (other than the emergency access point to be constructed in Subarea B as part of Phase 2 of Subarea B) is the existing access point on Home Road which is on the railroad overpass grade/slope, which access point the County Engineer will not permit to be signalized.

The number of parking spaces in Subarea A, Lot 1 and Lot 2, will be included in the final development plan and for Lot 3 will be determined when user(s) are determined. In Subarea B there will be two spaces in each unit's garage (654 total) and two spaces in each unit's driveway (654 total), and additionally approximately 59 guest parking spaces located throughout the three phases for general use.

With the apartments located only in Subarea B and the commercial only in Subarea A, the traffic flow to Subarea A will be off the north-south road in Subarea A (and there will be no reason for any of the traffic to Subarea A to go into Subarea B) and the traffic generated to and from Subarea B will be only on the north-south road to Home Road and not on the east-west street which will have curb cuts for the parking lots of buildings in Subarea A.

For calculated peak hour traffic please see the Traffic Impact Study 2019, Exhibit O (copy on file with City Engineer), which has been supplemented with a Traffic Impact Study, April 9, 2021, on file with the City Engineer.

N. If to be developed in phases, the entire site development shall be described in outline and diagrammatic plan form, and in a complementing detailed text in a manner calculated to assure City officials that Planned Development requirements and other requirements of this Zoning Ordinance shall be met in the detailed development of the phases to follow, and that the entire Planned Development area will meet all of the requirements of this Zoning Ordinance, such diagrams and descriptive texts being accepted with, and becoming a part of the extended zoning plan for the entire site;

The text above and the various exhibits, in the opinion of Applicant, meets the requirements set forth above.

(7) Evidences, as determined by the Zoning Administrator in his/her sole discretion, of the ability of the applicant to carry forth its plan by control of the land and the engineering feasibility of the plan, and that the applicant has sufficient control over the land and financing to initiate the proposed development plan phase within two years;

The Applicant is in contract to purchase the  $70\pm$  acres, Applicant's engineers have determined that the plan is feasible from an engineering perspective (Exhibit D, Engineering Feasibility Memo, and as is aptly indicated by the various other engineering exhibits attached hereto). Applicant, which has constructed, operates and owns 12,000+ units similar to the 327 units it will construct on this site, has the financial ability to initiate the proposed development within two (2) years. [Applicant has done its marketing studies and has been seeking an appropriate site in Powell for several years and intends to begin site development as soon as possible.]

(8) Evidence of the applicant's ability to post a bond if the plan is approved assuring completion of public service facilities to be constructed within the project area by the developer;

Applicant can present, upon request of the Zoning Administrator, such evidence to the Zoning Administrator.

(9) Verification by the owner of the property that all the information in the application is true and correct to the best of his knowledge.

Please see the Application signed by the owner. The owner has also been in attendance for two sketch plan review presentations to the Planning and Zoning Commission, as well as meetings with Council's Development Committee and staff.

(10) A statement of the character and nature of the development including the cost range or rent levels for housing in residential development and the general types of business or industrial and commercial developments.

As to Subarea A, Applicant is in contract with a skilled nursing facility operator which will construct (1) an approximately 80-bed skilled nursing facility (SNF) similar to its other facilities in Central Ohio and (2) across the east-west street from the SNF, an assisted living facility (AL).

In Subarea B the apartments' rents will be in the range of \$1,775-\$2,200+ per month.

(11) A statement of the general impact the development will have on the infrastructure, municipality and schools including projected demographics, a traffic impact study and a fiscal impact analysis may be required by the Planning and Zoning Commission.

The general impact on the infrastructure of the City will be quite low, as the streets will be private and maintained by Applicant and the only point of access to the site is Home Road, maintained by the County. See Fiscal Impact Report, Exhibit C to the Zoning Map Amendment Application in Section 2 of this notebook. Unless the residents in Subarea B were going to or coming from a business, institution or residence in the City, most of their travel would not be on City maintained streets. Likewise, unless employees in Subarea A lived in the City, most of their travel would not be on City maintained streets. Due to the nature of the apartment units (two-bedroom, single-story units) the number of K-12 students will be quite low, while the positive fiscal impact on the schools will be significant as the estimated market value, for real property tax purposes, of the apartment units will be \$40,900,000. The estimated market value of a skilled nursing facility ("SNF") and assisted living facility ("AL") is \$10,000,000+. See Fiscal Impact Report, Exhibit C to the Zoning Map Amendment Application in Section 2 of this notebook.

Information regarding demographics, including income, of Applicant's apartment projects in similar locales in Central Ohio are set forth in Exhibit V, Redwood Apartments Demographics. The SNF and AL operator that Applicant is in contract with has indicated that the annual payroll for its SNF would be \$4,100,000± and the AL would be \$5,000,000. See Fiscal Impact Report, Exhibit C to the Zoning Map Amendment Application in Section 2 of this notebook.

Presented to City Council in conjunction with the Pre-Annexation Agreement among the City, the property owner and the Developer, was an October 3, 2020 Fiscal Impact Study by William LaFayette, Ph.D./Regionomics which compared the fiscal impact of Developer's proposed development to development of the 70± acres as Planned Industrial, with both developments having 75% 10-year TIF districts. That Study, as set forth in its Tables 2 and 3, showed 20-year cash flows of Developer's proposed development of \$13,392,193 versus Planned Industrial development of \$2,533,399. See Fiscal Impact Report, Exhibit C to the Zoning Map Amendment Application in Section 2 of this notebook.

(12) A fee as established by ordinance.

# Submitted with application.

- (d) Planning and Zoning Commission Public Hearing. The Planning and Zoning Commission shall schedule a public hearing on the application for approval of the preliminary development plan not less than ten or more than 40 days from the date of filing of a completed application and certification by the Zoning Administrator that to the best of his knowledge the preliminary development plan application is complete and that the preliminary development plan, as best he can determine, meets all of the requirements of this Zoning Ordinance and the Comprehensive Plan.
- (e) Notice of Public Hearing.
  - (1) Before holding the public hearing, notice of such Commission hearing shall be given on the Municipality of Powell website at least ten days before the date of said hearing. The notice shall set forth the time and place of the public hearing, a general description of the planned district development, and a statement that, after the public hearing and after submission of a final development plan, the matter will be referred to the Council for further determination.
  - (2) Also before holding the public hearing, written notice of such hearing shall be sent by the Planning and Zoning Commission by first class mail, at least ten days before the hearing, to all owners of property Contiguous to, directly across the street from and within 250 feet of the property in question and to such others as the Commission determines should receive such notice. Notices to individual property owners shall contain the same information as required of notices published on the City website.
- (f) *Public Access to Proposed Planned District Plans.* For a period of at least ten days prior to the public hearing by the Planning and Zoning Commission, all papers relating to the planned district

development plan shall be available for public inspection in the office of the Zoning Administrator or on the Municipality of Powell website.

(g) Approval in Principle of Preliminary Development Plan. Within 30 days after the public hearing, the Planning and Zoning Commission shall review the preliminary development plan to determine if it is consistent with the intent of this Zoning Ordinance and meets or otherwise justifies modification of all of its requirements, as determined by the Planning and Zoning Commission. If it does, the Commission shall approve the preliminary development plan in principle. If it does not, the Commission shall recommend changes and additions needed for approval and await a resubmission.

In approving a preliminary development plan in principle, the Planning and Zoning Commission shall consider:

- (1) If the proposed development is consistent with the intent and requirements of this Zoning Ordinance;
- (2) The appropriateness of the proposed land uses with regard to their type, location, amount, and intensity, where not specifically specified in this Zoning Ordinance;
- (3) The relationships between uses, and between uses and public facilities, streets, and pathways;
- (4) Adequacy of provisions for traffic and circulation, and the geometry and characteristics of street and pathway systems;
- (5) Adequacy of yard spaces and uses at the periphery of the development;
- (6) Adequacy of open spaces and natural preserves and their relationships to land use areas and public accessways;
- (7) The order, or phases, in which the development will occur and the land uses and quantities to be developed at each phase;
- (8) Estimates of the time required to complete the development and its various phases;
- (9) Improvements to be made by the Municipality, if any, and their cost;
- (10) The community cost of providing public services to the development, and
- (11) Impacts of the development on surrounding or adjacent areas.

The Planning and Zoning Commission may require the staging of the planned development to minimize early stage major impacts on the community infrastructure and services systems, and may require the staging of land uses to be generally consistent with the phased development of supporting land uses and public services and facilities.

The Commission's approval in principle of the preliminary development plan shall be necessary before an applicant may submit a final development plan. Approval in principle shall not be construed to endorse a precise location of uses, configuration of parcels, or engineering feasibility.

- (h) Submission of Final Development Plan.
  - (1) After approval in principle of the preliminary development plan, the developer shall submit a final development plan to the Zoning Administrator. The final development plan shall be in general conformance with the preliminary development plan that was approved in principle. For the purposes of this Zoning Ordinance, submission of a final development plan is a formal request for an amendment addition to the zoning of the property in question, and upon final approval by Council becomes the zoning of the property in question in addition to the other requirements of this Zoning Ordinance.
  - (2) Copies of the final development plan as specified by the Zoning Administrator shall be submitted and may be endorsed by a qualified professional team which should include an

urban planner, licensed architect, registered land surveyor, registered civil engineer, and registered landscape architect.

- (i) Final Development Plan Application Contents. An application for approval of the final development plan shall be filed with the Zoning Administrator by the owner of the property for which planned district development is proposed. Each application shall be signed by the owner, attesting to the truth and exactness of all information supplied on the application for the final development plan. Each application shall clearly state that the approval shall expire and may be revoked if construction on the project has not begun within two years from the date of issuance of the approval. At a minimum, the application shall contain:
  - (1) All of the information required for submission of the preliminary planned district development plan application;
  - (2) All plan materials rendered on an engineering survey of the proposed development site, showing the dimensions and bearings of property lines, property areas in acres, topography, existing features of the development site including major wooded areas, structures, easements, utility lines, land uses, and maximum building footprint areas for all nonresidential uses and residential uses other than single-family detached and two-family dwellings;
  - (3) Engineering feasibility studies and plans showing, as necessary, water, sewer, drainage, electricity, telephone, and natural gas installations; waste disposal facilities; street improvements; and the nature and extent of earthwork required for site preparation and development.
  - (4) A detailed landscape plan showing existing and proposed future landscape materials, ground cover, paving patterns and materials.
  - (5) Deed restrictions, protective covenants, and other legal statements or devices to be used to control the use, development and maintenance of the land and the improvements thereon, including those areas which are to be commonly owned and maintained, and
  - (6) A final development plan fee as established by Ordinance.
- (j) Public Hearing by Planning and Zoning Commission. Within 30 days after submission of a completed application for a final development plan and certification by the Zoning Administrator that the plan application is complete and that to the best of his knowledge the plan meets the requirements of this Ordinance and is in compliance with the preliminary development plan that was approved in principle, the Planning and Zoning Commission shall hold a public hearing. Notice and public inspection of the application shall be as specified in subsections (e) and (f).
- (k) Recommendation by the Planning and Zoning Commission. Within 30 days after the Public Hearing on the final development plan the Planning and Zoning Commission shall recommend that the final development plan be approved as presented, approved with supplementary conditions, or disapproved, and shall transmit all papers constituting the record and the recommendations to Council.

Before making its recommendation, the Planning and Zoning Commission shall find that the facts submitted with the application and presented at the public hearing establish that:

- (1) The proposed planned district development phase can be initiated within two years of the date of approval and can be completed within five years;
- (2) The requirements of the Comprehensive Plan relative to the site at issue have been fulfilled;
- (3) The streets proposed are suitable and adequate to carry the anticipated traffic, and increased densities will not generate traffic in such amounts as to overload the street network outside the planned district plan area;
- (4) Proposed non-residential developments can be justified at the location and in the amounts proposed;

- (5) Housing densities are warranted by amenities and conditions incorporated in the final development plan and are in accordance with these planned district development requirements;
- (6) Lands to be dedicated to public use are of acceptable and usable size, shape, and location;
- (7) The area surrounding the development can be planned and zoned in coordination with and in substantial compatibility with the proposed development;
- (8) The existing and proposed utility services are adequate for the population densities and uses proposed, and
- (9) Adequate provision has been made for the detention and channelization of surface drainage runoff.
- (I) *Public Hearing by Council.* After receiving the recommendation from the Planning and Zoning Commission, the Council shall hold a public hearing on the planned district final development plan within a reasonable time.
- (m) Notice of Public Hearing by Council.
  - (1) Before holding its public hearing, notice of such hearing shall be given on the Municipality of Powell website at least ten days before the hearing. The notice shall set forth the time and place of the public hearing, the nature and general description and summary of the planned district development, and a statement that all papers relating to the planned district development are on file with the Clerk and are open for public inspection.
  - (2) Written notice of the hearing on the planned district development shall be mailed by the Clerk by first class mail, at least ten days before the date of the public hearing, to all owners of property contiguous to, directly across the street from and within 250 feet of the proposed planned district development and to such others as Council may determine should receive such notice. Notices to individual property owners should contain the same information as required of notices published on the City website.
- (n) Action by Council. After the public hearing, the Council shall either adopt or deny the recommendation of the Planning and Zoning Commission or adopt some modification thereof. In the event Council makes a substantial change to the recommendation of the Planning and Zoning Commission, it must do so by a vote of not less than three-fourths (six) of all Members of Council or by approval of a majority of all members of Council (four) and subsequent approval by the Planning and Zoning Commission. If approved by a majority of Council with a substantial change but by less than three-fourths, such ordinance with proposed substantial change stated separately shall be submitted to the Planning and Zoning Commission at the next regularly scheduled meeting. If approved by the Commission, then such ordinance with the substantial change shall take effect. If not approved by the Commission, then at the next scheduled Council meeting, Council shall adopt or deny the recommendation of the Planning and Zoning Commission without the substantial changes or adopt the Commission's recommendations with substantial changes with not less than three-fourths (six) of all members of Council. No such Ordinance shall be passed unless it has been fully and distinctly read on two different days and no Ordinance in accordance with the recommendation of the Planning and Zoning Commission shall be deemed to pass or take effect without the concurrence of at least a majority of the full membership of Council. The Council shall be deemed to have rejected the recommendation of the Planning and Zoning Commission when less than a majority of its members (four) vote for its adoption.
- (o) Supplementary Conditions and Safeguards. In approving any planned district development plan application, both the Planning and Zoning Commission and the Council may prescribe appropriate conditions and safeguards in conformity with this Zoning Ordinance. Any violation of such conditions or safeguards, which have been made a part of the terms under which the final development plan has been approved, shall constitute a violation of this Zoning Ordinance and shall be punishable as such.

- (p) Expiration of Approval Period. The approval of a final development plan for a planned district development shall be for a period not to exceed five years to allow for preparation and recording of the required subdivision plat and development of the project. Where a project is completed within five years, the approved final development plan shall remain as the effective zoning control over the area included in the plan, in addition to the requirements of this Zoning Ordinance. If required plats are not properly recorded and/or if no construction has begun on the site within two years of such approval, the approved final development plan shall be void unless an application for a time extension is submitted and approved, which approval may be withheld for good cause.
- (q) Extension of Time Limit. An extension of the time limits set in subsection (p) hereof, as a modification of the approved final development plan, may be approved by Council upon the recommendation of the Planning and Zoning Commission. Such approval shall be granted only upon a finding of a valid purpose and necessity for such extension and evidences of reasonable and diligent efforts toward accomplishment of the original development plan within the originally established time limits, and upon finding that such extension is not in conflict with the general health, welfare and safety of the public or development standards of the district. No extension of time shall be granted except on application filed with the Zoning Administrator not later than 30 days before the expiration of the time limits set in subsection (p) hereof.
- (r) Amendment or Alteration of Approved Planned District Development Plans. Once a final development plan for a planned district has been approved by Council, all subsequent substantial changes to that plan shall only be permitted by resubmission as a new substitute plan and repatriation of the procedures established in these sections. "Substantial change" for the purposes of this section shall mean any modification of an approved planned district development plan, as determined by the Zoning Administrator, that results in:
  - (1) Any increase in the number, or change in the type and/or mix of residences, and/or non-residential building area or land use;
  - (2) Decrease in the approved minimum lot size, number of parking spaces to be provided, and/or trash storage areas;
  - (3) Change in the approved location of land uses, land use subareas or sub-elements, streets, public or private parklands and other public facilities, and/or natural environmental preserves or scenic easements by more than 30 feet;
  - (4) Reduction in area of public and/or private parklands or other public facilities and/or natural environmental preserves or scenic easements;
  - (5) Alteration of the basic geometry and/or operational characteristics of any element of the approved street pattern, parking facilities, service access, trash storage facilities, and/or system of pedestrian and/or equestrian paths that results in a change in operating characteristics or character;
  - (6) Any circumstance below the minimum requirements established in this Zoning Ordinance or as required in the approval of a conditionally permitted use in a planned district.
- (s) Subsequent Zoning Amendments Initiated by Other Than Planned District Processes. No zoning amendment passed during the time period granted for the initiation and completion of an approved final development plan shall in any way affect the terms under which the approval of the planned district development was granted.
- (t) Plat Required.
  - (1) In a Planned District, no use shall be established or changed and no structure shall be constructed or altered until any required subdivision plat has been prepared and recorded in accordance with the Development Regulations.
  - (2) In the event that any public service facilities not to be otherwise guaranteed by a public utility have not been constructed prior to the recording of the plat, the owner of the project shall post a performance bond, or other such alternative form of surety as approved by the City Law Director, in favor of the appropriate public officers in a satisfactory amount assuring the

expeditious completion of said facilities within one year after the recording of said plat. In no event, however, shall any zoning certificate be issued for any building or use until such time as the facilities for the phase in which the building or use is located are completed.

(u) Administrative Review. All plats, construction drawings, restrictive covenants and other necessary documents shall be submitted to the Zoning Administrator, to the Planning and Zoning Commission, and to the Council or to their designated technical advisors upon request for administrative review to assure substantial compliance with the final approved development plan.

(Ord. No. 91-01, 2-5-1991; Ord. No. 91-40; Ord. No. 98-42, 10-6-1998; Ord. No. 2005-11, 3-15-2005; Ord. No. 2017-60, § 1, 12-19-2017)

# Home Rd Planned Commercial District



Zoning Map Amendment & Preliminary Development Plan Submittal

> City of Powell, Ohio February 19, 2021

www.byRedwood.com

# TABLE OF CONTENTS

# Section 1131.04, ZONING MAP AMENDMENT

• SECTION 1131.04, CONTENTS OF APPLICATION FOR ZONING MAP AMENDMENT

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•	1	Application	
•	2	EXHIBIT A	LEGAL DESCRIPTION – Property subject to this Amendment
•	3	EXHIBIT A-1	LEGAL DESCRIPTION – That part of the property to be annexed to the City of Powell
•	4	EXHIBIT B	Pre- Annexation Agreement -Annexation is contingent on zoning set forth in pre-annexation agreement being granted as approved in the agreement
•	5	EXHIBIT C	Fiscal Impact Report- Shows why zoning should change to the proposed zoning
•	6	EXHIBIT D	Property Owners List (34.8± Acres in City of Powell)
•	7	EXHIBIT E	Property Owners List (35± Acres in Liberty Township)
•	-	EXHIBIT F	Preliminary Development Plan (See Tab 5 – Preliminary Development Plan section of this submittal
•	8	EXHIBIT G	Statement of Compatibility



# PLANNING AND ZONING COMMISSION (P&Z) ZONING MAP AMENDMENT APPLICATION

ALL ITEMS ON THIS APPLICATION MUST BE COMPLETED.

Application Fee: \$750.00\* Per Fee Ordinance 2019-49

Applicant: Redwood USA, LLC	plicant: Redwood USA, LLC				
Address/City/State/Zip: 7007 East Plea	sant Valley Road, Independence, OH 44	131			
Email Address: jim@jimfreyadvisor.co	om				
Phone No: 614-206-1123	Cell Phone No: 614-206-1123	Fax No:			
Property Owner: Breagha Plana II, L	LC				
Address/Citv/State/Zip: P. O. Box 245,	Powell, OH 43065				
Email Address: steel@gfschemicals.c	com				
Phone No. 740-881-5440, ext. 118	Cell Phone No: 614-975-0300	Fax No: 740-881-9309			
Architect/Designer for Applicant: Mann F	Parsons Gray Architects, Inc.				
Address/City/State/Zin: 3660 Embassy	Parkway, Fairlawn, OH 44333				
Email Address: james@mpg-architec	sts.com				
Phone No. 330-666-5770	Cell Phone No:	Fax No:			
Property Address: 3041 Home Road	and Home Road, Powell, Ohio 43	8065			
Lot Number/Subdivision. n/a	Existing Lise. vacant/industrial	Planned Commercial (Mixed Use)			
Zoning Map Change Request (attach necessar	y documents): From <u>PI</u> District to <u>PC</u> District in	order to develop:			
1) in 34.8+/- acres in City of Por acres in Liberty Township, apar	well, apartments, regional detention and transformer the transformer transformer transformer transformer to the transformer transformer to the tra	d open space, and 2) in 35+/- d nursing facility, assisted			

living, and general offices.

#### Checklist:

- □ Zoning Map Amendment requirements set forth in Section <u>1131.04</u>
- Attach a list of contiguous property owners as well as directly across the street from and within 250 feet of property
- □ Attach 5 copies of a vicinity map
- □ 1 digital copy (CD, USB, Email) of the complete application packet.
- □ Attach statement of compatibility of proposed zoning and use with adjacent properties and comprehensive plan
- □ Attach the required fee \$750.00\*

\*Does not include transcript cost, which actual cost incurred.

Dest a public notice sign at least (10) days prior to a public hearing or public meeting, pursuant to ordinance 1107.035

Public notice sign details found here.

#### (See Over)

I agree to grant the City Staff, the Commission, Board or Council considering this application access to the property that is the subject of this application for the purposes of reviewing this application and posting public notice for this application.

iture of Applicapt.	Date: 2/17/202/
Office Use	Office Use
	Type/Date:
	Base Fee:\$750.00
	Prepared by:
	Reviewed by:
Received	PAYOR:
	RECIEPT #

City of Powell · 47 Hall Street · Powell, Ohio 43065 · (614) 885-5380 · (614) 885-5339 fax · www.cityofpowell.us

#### LEGAL DESCRIPTION

#### Parcel I

Situated in the Township of Liberty County of Disaveure and State of Orka and bounded and described at follows

Being in Ronge 15 Teurintep 3 Section 2 part of Lot 2 U.S. Matory Landol Beginning at a pix spake at the interaction of this centertine of Dataware County Road. No. 124 and the East lass of Section 2.

Thence S 2\* 19 W along the section line 1335 20 feet to an ean pipe pressing over an iron pipe at 30:09 feet.

Thance HL 67" 40" W 25.00 Fast to an ear price (found)

Thence N. 21 19 E. 1335 20 feet to a R.R. Spite on the certariane of Delawara County Rd. 124 persong and an and pipe (found) at 1505 20 feet

Thance 5.87" 40° E, along the center line of seld County Rd 25.00 feet to the point of beginning, containing 0.768 screes to the serve more or less

Percela

Statellad as the Townsheb of Liberty County of Delaware and State al Otico and bounded and described as follows

Bertg in Range 15, Township 3, Section 2, part of Lot 2, U.S. Mélicary Lands: Beginning all all kost post (found) on the Essandy replicatively line of the Choesepadie and Ohie Refrand and kost post barring 5, 2° DOr W 1335-28 foot four the part of therapester with the containing of Delaware County Rd, 124 and the Easterly right-of-way line of C&O Related.

Thence 3: 67" 40" E. 838.74 least to an wan pipe on the East line of Section 2, passing over an wan pipe at 813.76 feet.

Thence S 2" 19" W along the Easterly line of Section 2 1177 79 feet to a post, passing over a store at 421 64 fact.

Thence N 87" 44" WE 824 37 feet to a steek post on the Easterly right-of-way line of the C&O Hadrood

There along the Eastedy ngb4-of-way line of and railroad with a 5° 30° cours to the light which the ling chold bases N. 0° 50° 30° E. 903 00 feet, an arc distance of 504 11 feet to an ken both to the point of langency

Thence N. 2' 09' E. 677.35 feet to the point of beginning, containing 22.61 acres by the server index or loss

Parcel III

Selected in the State of Oteo, County of Delaware and Yownetsp of Laberty Being in Range 19 Telenstep 3 Section 2, and part of Lot 2, U 3, National London

Beginning at a rainoid spite set on the centering of County Road Mp. 124 known as the GLH, and Catenbus Road, said paths at beginning beam Month 87 degrees 42 Weat 25 00 feet from the post of unit-reaction of the contention of County Road Ms. 124 and the eaction time between sections 2 and 1.

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Thence North 57 degreese, 40 West 613,74 Net to an sort pipe set on the dight of way line of the Chokepania and Ohio Raticaed.

Thence North 2 degrees 69 East along the baid East right-of-way fins. (335:26 feet to a ranks of spike set on the centerline of County Road He. 124, passing over an area pipe at 1305.28 feet.

Thence South 117 degrees 40" East along the contention of County Read No. 124 817.53 feel to the point of beginning, containing 25 00 acres of land, to the same more or less.

Parcel IV

Situated in the State of Dirie County of Delaware, City of Paved, located in Farm Let 1. Section 2. Township 3 North, Range 19 Week, United States Websy Lunds, and being part of a 49.038 scine back conveyed in Mi Annes of Caved Oho LLC, as recorded in Official Record Yolume 432, Page 1382, Delaware County Recorder's Office, and being more particularly detective as fallows

Beginning, for reference, at a manual space found at the intersection of contartance of Rulmenford Read (17 R 122) with the Eastlane of the CSX Transportation, inc. marking the Southwest corner of said 40.036 actic tract.

Thence North 10" 53" 41" West 748 16 feet, slong the Westerly line of said 40.638 acre tract and East line of the CSX Transportation, Inc. to an iron parformed.

Therce North 58\* 35\* 96\* Weet 1154 01 lost stong the Westinfy time of and 40.038 acce tract and East line of the CBX Transportsen. Inc. to an iron pin sel making the PRINCIPAL PLACE OF BECINARING of the bases.

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Thence North 07' 03' 18" East 195 98 feet, along the Westedy Inte of such 40.035 acre stand and East line of the CSA Transportation, Inc. 16 an item pri found marking the Northwest corner of suid 40.035 acre stand and Southerest corner of a 22.31 acre 1955 (Faceal B) conveyed to G Frederics Smith Chestical Company as recorded in Geod Book 420 Page 32.

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LESS AND EXCEPTING FROM PARCELS I AND EI ABOVE

Binuted in the State of Okio, County of Datamera, Township al Udmirty being a part of Form Lot 2 is Section 2 Township 3 North, Rango 19 West, Unded States Mataly Lands and being a part of record 13 520 acre and 24 00 acro percels conveyed to 0, Freideich Smith Chemical Competity an recorded in Book 420, Page 22 is the records of Debayers County being a part of island gang and two part and in scientification of the part of Way and County Lands of DEL-CR124-4 11 (Home Road) and bounded and described as follows

Beginnerg at like intersection of the centrefue of Scorely Road 124 (name Road) and the East Bas of lead Farm Let 2, read part feature 22.03 neet left at station 2401130 of a proposed County Road 124 and being the TRUE FOINT OF BEGINARING for the parter threat described.

1) Thence South 93 degrees 30 minutes 05 seconds Week blong the Evel land of said Farm Lot 2 a delance of 122 74 feet to an ison pin ext. lecated 93 18 leaf right of station 239-99 55 of proposed County Read 124. 2) There's South 65 degrees 10 methins 23 sociands West a distance of 715 67 feet to an kish pan set located 156:00 faet right of station 233-00 00 of proposed County Reed 124

 Thence Hosth 96 degrees 22 menutee 05 seconds West a distance of 134 55 feet to an ean pm set facated 150 00 feet right of station 233-06 00 of proposed County Road 124

4) Thence Meth 03 degrees 28 minutes 47 seconds East along the East line of the CSX Related & Material 278 03 feed to the centrefore of emeting County Road 124 stad port located 77 99 feet left of station 231-84 fee dispropued Caution Road 124.

S) Thence South 86 degrees 21 mmdee 58 excentite East along the contention of animolog Cauchy Robel 124 a distance of 832.39 faot to a point located 23 39 feet left of assbon 240+02 63 of proposed Couchy Robel 124

8) Thetes South 86 degrees 38 menutes 27 seconds East along the contectus of existing County Road 124 a detaines of 10.56 feel to the point of beginning and endeeing an eve of 3 555 secon more or leva.

Of the above described truct, 3 £64 pstee in located in Auditor's Permenent Parcel Namber 315-260-3108-6000 which inductoe 0.563 actes in the present read accupand and 0.071 acres in located in Auditor's Permanent Parcel Number 315-260-01-005-000 which inductes 0.017 acros in the present read occupent

Monuments released to as you pain and are 3/4 inch diameter a 30 inch long you bera with a 1-1/2 inch diameter abaranum cap marked "RNV LS a7819"

Seemage used in this description are based on this Onio Lambert Projection North Zone Plane Coordinate System as eduithalited by the National Goodalic Survey North American Datium of 1963 (1995 adjustment) from GPS observations made by American Consulting Inc.

Stations referred to herein are from the centerities of survey of proposed County Road 124 to found on Belansie County Engineer's Office Right of Way Plan DEL-CR1264 11

The description was prepared and reviewed on July 17 2006 by Charles P. Unterreliner P.S. 7019 from a autrory made by American Comutany, Inc. to 2003



# DESCRIPTION FOR A 35.336 ACRE ANNEXATION FROM LIBERTY TOWNSHIP TO CITY OF POWELL

Situated in the State of Ohio, County of Delaware, Township of Liberty, being in Farm Lot 2, Section 2, Township 3 North, Range 19 West of the United States Military Lands, being,

- All of that 21.587 acre tract as described in deed to Breagha Plana II, LLC, an Ohio limited liability company, recorded in Official Record volume 1084, page 393, (all records referenced herein are to the Delaware County Recorder's Office, unless otherwise stated), being known as Delaware County Auditor's number 319-240-01-004-000.
- All of that 13.749 acre tract as described in a deed to Breagha Plana II, LLC, an Ohio limited liability company, recorded in Official Record volume 1084, page 393, being known as Delaware County Auditor's number 319-240-01-005-000.

and being more particularly described as follows.

**COMMENCING** for reference at the northwest corner of Farm Lot 14, and in the asset line of the said Farm Lot 2, and being the east line of the said Section 2, and being the northeast corner of a 3.484 acre right-of-way taking known as 21-WDV as shown in the plan set DEL-CR124-4.11 on record with the Delaware County Engineer's Office as conveyed to Board of Commissioners of Delaware County, Ohio by the instrument conveyed as Official Record volume 952, page 672, and being the northwest corner of the Clay C. Darnell Subdivision as shown in Plat Book volume 5, page 79;

Thence along the said westerly line of Farm Lot 14, the westerly line of the said Clay C. Darnell Subdivsion, the said easterly line of Farm Lot 2, the said easterly line of Section 2, and the said easterly line of the 21-WDV tract, South 02 degrees 19 minutes 00 seconds West for a distance of 122.74 feet to the southeast corner of the said 21-WDV tract, being the northeast corner of 21.587 acre tract, and being the northwest corner of parcel conveyed to Board of Trustees of Liberty Township by the instrument filed as Deed Book volume 496, page 199, and being on the southerly right-of-way line of Home Road (Varied Width), and being the true **POINT OF BEGINNING** of the parcel herein described;

Thence along the easterly line of the said 21.587 acre tract and said 13.749 acre tract, the westerly line of the said Board of Trustees of Liberty Township tract, the said easterly line of Farm Lot 2, the said easterly line of Section 2, the said westerly line of Farm Lot 14, the westerly line of Section 1, the westerly lines of Farm Lots 15 and 16, South 02 degrees 19 minutes 00 seconds West for a distance of 1,890.25 feet to the southeast corner of the said 13.749 acre tract, the northeast corner of a 9.556 acre tract as conveyed to Breagha Plana II, LLC, an Ohio limited liability company by the instrument filed as Official Record volume 1084, page 393, and being on the existing northerly corporation line of a 9.556 acre tract annexed to City of Powell, Ohio, by Ordinance No. 2005-43 (08-16-2005), Resolution No. 05-773 as filed in Instrument Number 200500041967;



Thence along the said northerly corporation line, the southerly line of the said 13.749 acre tract, and the northerly line of the said 9.556 acre tract, North 87 degrees 29 minutes 09 seconds West for a distance of 842.53 feet to the southwest corner of the said 13.749 acre tract, the northeast corner of the said 9.556 acre tract, the northeast corner of the said existing corporation line, and on the easterly right-of-way line of CSX Transportation Inc.;

Thence along the westerly line of the said 13.749 acre tract, the westerly line of a said 21.587 acre tract, and the said easterly right-of-way line of CSX Transportation Inc., North 02 degrees 19 minutes 00 seconds East for a distance of 1784.53 feet, to the northwest corner of the said 21.587 acre tract, being the southwest corner of the said 21-WDV tract and being on the said southerly right-of-way line of Home Road;

Thence along the northerly line of the said 21.587 acre tract, the southerly line of the said 21-WDV tract, and the said southerly right-of-way line of Home Road; South 87 degrees 31 minutes 03 seconds East for a distance of 134.55 feet to an angle point;

Thence continuing along the last described line, North 84 degrees 01 minutes 25 seconds East for a distance of 715.46 feet to the TRUE POINT OF BEGINNING for this description.

The above description contains a total area of 35.336 acres (0.000 of which are within the present road occupied), of which:

- 21.587 acres is all of PID# 319-240-01-004-000
- 13.749 acres is all of PID# 319-240-01-005-000

Bearing described herein are based on the east line of Farm Lot 2, of Section 2, Range 19, Township 3, Liberty Township, being South 02 degrees 19 minutes 00 seconds West, as referenced in the deed filed as Official Record volume 1084, Page 393 on field in the records of Delaware County, Ohio.

This description was prepared by Andrew T. Jordan, Registered Professional Surveyor Number 8759.

American Structurepoint, Inc.

la



04-22-2019 Date



# PRE-ANNEXATION AGREEMENT

This Pre-Annexation Agreement (the "Agreement") is made and entered into this day of \_\_\_\_\_\_, 2020, by and between Breagha Plana II, LLC (hereinafter the "Landowner"), Redwood USA LLC, an Ohio limited liability company, or its assigns (hereinafter the "Developer"), and the City of Powell, Ohio, an Ohio municipal corporation organized and existing under the Constitution and laws of the State of Ohio and its municipal charter (hereinafter the "City") ("Landowner, Developer and City are together the "Parties"), under the circumstances summarized in the following recitals.

#### BACKGROUND:

A. Landowner is the record owner of approximately 70.069 +/- acres of land south of Home Road, between the CSX railroad tracks to the west and Liberty Road to the east (which land is depicted on Exhibit A and referred to herein as the "Property"); and

B. The Property itself consists of four (4) parcels:

- Two (2) to the south in the City, referred to hereafter as the "Powell Parcels", currently zoned as Planned Industrial District, consisting of:
  - i. 9.556 acres commonly known by Delaware County Auditor's parcel identification number ("PIN") 31924001005001; and
  - ii. 25.248 acres commonly known by PIN 31924001068004; and
- Two (2) to the north in Liberty Township, referred to hereafter as the "Township Parcels", currently zoned as Industrial District, consisting of:
  - i. 21.516 acres commonly known by PIN 31924001004000, and
  - ii. 13.749 acres commonly known by PIN 31924001005000

C. The Property provides the City with a growth corridor to the north that the City would not otherwise have; and

D. Landowner is in a contractual relationship with Developer, which would prefer to purchase, rezone, and develop the entire Property within the City; and

E. The Township Parcels would benefit from certain City services, including in particular police protection; and

F. Landowner and Developer desire formal rezoning of both the Powell Parcels and Township Parcels as part of an overall development plan for the entire Property ("Property Development Plan", defined in greater detail below), and will refile an annexation petition for the Township Parcels concurrently with filing the Property Development Plan with the City; and

G. The City is capable of providing and hereby agrees to offer its municipal services to the Township Parcels if the Landowner annexes the Township Parcels into the City; and

H. The Parties agree that it is in their mutual interest to enter into this Agreement for the annexation, rezoning and development of the Powell Parcels and Township Parcels as part of an overall Property Development Plan, and that the Landowner can seek detachment under Ohio Revised Code ("ORC") Section 709.38 if the City does not grant the requested rezoning.

I. The Olentangy Local School District Board of Education has entered into an access agreement with the Developer, complete with an approved form of easement for recording. Exhibit B.

NOW THEREFORE, in consideration of the covenants and agreements contained herein, including the background recitals from above, the Parties covenant and agree as follows:

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# Section 1. Annexation Petitions and Related Approvals.

Petition(s) for Annexation; Annexation. The Landowner shall re-file its A. annexation petition, map, legal description and other related information, as may be required by the ORC, to annex the Township Parcels, but not including any of the road right-of-way of Home Road (County Road 124) to the City, the legal description of which is attached hereto as Exhibit A-1. The annexation process shall be an "Expedited Type II" annexation as provided in ORC Section 709.023. Landowner agrees that it will execute any necessary annexation petition, as appropriate, and will execute any other documents reasonably necessary to effectuate the annexation as may be required by law at its cost and expense. The annexation petition shall appoint Andrew Wecker, Esq., as the petitioner's agent and may be filed solely with respect to the Township Parcels or may be filed as a joint annexation petition with other parcels so long as all other parcels so joined are supported by one hundred percent (100%) of the owners of each parcel and the joinder of any such additional parcels will in no way affect the agreements of the parties memorialized in this Agreement or the Property Development Plan. The petition will be filed with the Commissioners. Landowner and Developer agree that all costs and expenses in petitioning for the annexation will be borne by Developer. Should the City desire for its own attorney and/or other outside contractors to represent its interests with regard to the annexation petition, those costs will be borne by City. Landowner further agrees that it will continue to support the annexation to the City throughout the process, including any appeal or court action, at no further expense to City, unless the City desires to retain its own attorneys; provided, however, Landowner's continued cooperation in the annexation of the Township Parcels shall be subject to and conditioned upon the City's performance of its duties and obligations as memorialized in this Agreement.

**B.** <u>City Service Resolution</u>. Pursuant to and in accordance with the ORC, the City agrees to enact, prior to twenty (20) days after the date of filing the annexation petition(s) with the Commissioners, the appropriate Service Resolution stating the services that will be provided to the Township Parcels upon annexation. The Service Resolution, once adopted, shall be immediately certified and filed with the Clerk of the Commissioners.

C. <u>Development Considerations</u>. The Powell Parcels are currently zoned under the City zoning ordinance for industrial uses. The intended use of the entire Property (including the Township Parcels) by the Landowner and Developer is that of a Planned Commercial District (PC) under the Powell Zoning Ordinance to include a multifamily rental community and an assisted living facility, skilled nursing facility, memory care facility, medical or medical related offices, professional offices, general offices, and/or similar facility, which may be referred to elsewhere in this document as the Property Development Plan. Landowner and Developer propose the Property Development Plan for the Powell Parcels and Township Parcels attached hereto as Exhibit C, that includes, but is not limited to, three hundred thirty-one (331) multifamily dwelling units and a density of 5.71± dwelling units per acre and incorporated herein by reference, together with an assisted living facility, skilled nursing facility, skilled nursing facility, skilled nursing facility, medical or facility, medical related offices, professional offices, professional offices, general offices, general offices, and/or similar facility on approximately twelve (12) acres.

Upon filing of an application to rezone the Property under the Powell Zoning Code, Council intends to enact legislation formally referring such application to the Powell Planning and Zoning Commission for its review and consideration in accordance with the applicable provisions of the Codified Ordinances. Such review and consideration shall occur during the pendency of the annexation process. The City's planning staff and administration agree that, if the rezoning application and accompanying preliminary development plan is generally consistent with Exhibit C attached hereto, and with three hundred thirty-one (331) multi-family dwelling units and a density of 5.71± dwelling units per acre and incorporated herein by reference, together with an approximately twelve (12) acre assisted living facility, skilled nursing facility, memory care facility, medical or medical related offices, professional offices, general offices, and/or similar facility, as described above, City staff and administration will professionally review and timely process the application to rezone both the Township Parcels and Powell Parcels to a Planned Commercial (PC) Zoning District, with the aforementioned uses as permitted uses.

After the annexation petition has been approved by the Commissioners, a copy of the record is filed with the Clerk of the City and laid before Council, the City understands it has one hundred twenty (120) days to accept the annexation (ORC Section 709.04).

At the request of the Landowner or the Developer, the City agrees to delay acceptance of the annexation until legislative approval of the rezoning of both the Township Parcels and Powell Parcels can be accomplished contemporaneously with the acceptance of the re-filed annexation. If, for some reason, the rezoning ordinance cannot be approved in a form or substance acceptable to Developer and/or the Landowner, the City agrees, at the request of Developer and/or the Landowner, in the sole and absolute discretion of either the Developer or Landowner, to permit the Landowner to withdraw the petition to annex the Township Parcels to the City and/or to forbear from acceptance of the annexation by allowing the 120-day period to expire, thus effectively rejecting the annexation of the Township Parcels.

If the City's acceptance and approval of the annexation (after the City's initial passage of a service ordinance) occurs prior to or other than concurrently with the legislative approval of the rezoning, and the rezoning is subsequently not approved in accordance with Exhibit C, or consistent with three hundred thirty-one (331) multi-family dwelling units and a density of 5.71+ dwelling units per acre and incorporated herein by reference, together with approximately twelve (12) acres of assisted living facility, skilled nursing facility, memory care facility, medical or medical related offices, professional offices, general offices, and/or similar facility, as described above (or as it may be modified acceptably to Developer), or is referred to a vote of the electorate, or a building, utility, or any access moratorium is enacted which would limit Landowner's use of the Township Parcels, or similar action is taken by the City, Delaware County, Liberty Township, or any other property owner that creates a lack of services to the Property, or if all governmental approvals, including but not limited to Federal, State of Ohio, Delaware County, and City government engineering approvals are not finalized within sixty (60) days after Council's acceptance of a Property Development Plan substantially similar to Exhibit C and consistent with the density described above, or Developer is unable to close on the Property with the Landowner, or Developer is unable to receive a construction loan, the City agrees, at the request of the Developer and/or the Landowner, in the sole and absolute discretion of either the Developer or Landowner: (i) to reconsider the ordinance accepting the annexation, and to rescind, repeal and reject the annexation approval within fourteen (14) days of any of the above described events occurring, and receipt of the request of Developer; and/or (ii) to detach the Township Parcels from the City and not oppose any owner's petition to detach its part of the Township Parcels from the City, as permitted under ORC Section 709.38.

D. Approval and Permit Regulation.

(i) <u>Compliance Statement</u>. Nothing in this Agreement shall exempt the parties hereto from the zoning, development plan and subdivision platting processes of

City. The execution and delivery of this Agreement shall not serve as a variance of the zoning, development plan and platting process mandated by the Codified Ordinances and the Subdivision Regulations of City, but will serve as a preliminary understanding and guide for the proposed zoning and development of the Property.

(ii) <u>Council Action</u>. The obligations of and agreements by the City contained herein shall be effective and enforceable upon, and subject to, the approval of all necessary legislation and/or motions by Council. It is acknowledged that the initial legislation approving this Agreement is merely the first in a series of legislative acts implementing this Agreement (a "Council Action"). All subsequent Council Actions implementing this Agreement shall be considered to be in furtherance of this Council Action.

(iii) <u>Permits</u>. Developer will obtain all necessary permits from all levels of government to allow Developer to build and develop the Powell Parcels (and eventually the entire Property) consistent with its intended use.

(iv) <u>Replatting and Other</u>. City will cooperate with Developer to cause the Powell Parcels to be replatted from the currently effective plat, if any, to permit the development of the Powell Parcels generally in accordance with Exhibit C. The City agrees to allow the stormwater management for the Property to be designed to Delaware County Engineer's Office regulations of 100-year post-development peak discharge released at the 2-year predevelopment peak discharge rate. All other stormwater design regulations (excepting that of the stormwater release rate as described above) as set forth in Chapter 1111.05 of the Codified Ordinances for private storm sewers shall govern.

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Stormwater post-construction management BMPs shall be designed in accordance with the current Ohio EPA General Construction Permit.

E. <u>Tax Increment Financing</u>. The Parties agree that City may hereafter determine to:

(i) create one or more tax increment financing areas ("TIF Area" or "TIF Areas"), which areas may include the Property,

(ii) declare that the Improvement (as defined in Ohio Revised Code 5709.40) is a public purpose and that a certain portion of that Improvement be declared exempt from taxation for a certain period of time; and

(iii) provide for owner(s) of the Property, and any successors and assigns, to make service payment in lieu of taxes (the "*TIF Pilots*") with respect to the real property included within a given TIF Area, which area may include the Property.

A list of the TIF Areas, together with their commencement and duration, contemplated by and among the City, Landowner and Developer is attached hereto as Exhibit D.

A list of the Improvements contemplated by and among the City, Landowner and Developer is attached hereto as Exhibit E.

Landowner and Developer each agree that if City determines to create one or more TIF Area on the Property, then each such Party shall consent to and agree to reasonably cooperate with City to create such a TIF Area on the Property. The Parties further agree that if one or more TIF Area is created, then the revenues received by the City from the TIF Pilots (the "*TIF Revenues*") shall be used by the City to pay the costs of public infrastructure improvements which shall hereafter be designated by the City in its sole discretion as benefitting the TIF Area and for any other lawful purpose (which may include payments to the applicable school districts). The Parties agree that unless otherwise agreed to in writing by City, no City monies (other than TIF Revenues as may be used as described above) shall be required to be used to pay the costs of any public infrastructure improvements required to be constructed/installed to serve the Property.

### Section 2. Miscellaneous

A. <u>Intent of Parties</u>. This Agreement shall be binding upon the Parties and their respective successors and/or assigns, and by execution hereof, all Parties represent that they are duly authorized to sign it. By passage of Ordinance No. \_\_\_\_\_ on \_\_\_\_\_, the City authorized the execution of this Agreement.

**B.** <u>Cancellation or Termination</u>. This Agreement may be cancelled or otherwise terminated by mutual written agreement of the Parties or pursuant to the terms of this Agreement as to conflict in law, impracticality and/or acts of God.

C. <u>Remedies</u>. Except as otherwise limited by Chapter 2744 of the Ohio Revised Code as to action for or against the City, the Parties shall be afforded and do possess the right to seek every remedy available at law or in equity provided for under the laws of the State of Ohio as pertains to the terms and conditions, duties, obligations, privileges and rights of this Agreement and the enforcement thereof.

**D.** <u>Enforcement</u>. Unless this Agreement is cancelled or otherwise terminated, this Agreement will be enforceable against any party hereto per the laws, ordinances, resolutions, regulations or policies in effect at the time of the execution of this Agreement.

F. <u>Assignment of Agreement</u>. Developer may assign this Agreement, or any part thereof or any duty, obligation, privilege or right granted under this Agreement to any newly
formed entity of which Developer is a member, Developer's members are members, or to any affiliated entity of which Developer is a member or Developer's members are members.

G. <u>Relative Rights</u>. The rights and obligations of the Parties shall be subject to the terms and conditions hereof, and will inure to the benefit of, and be binding on, the respective successors and assigns.

H. Entire Agreement; Merger Clause; Statement of Incorporation. It is agreed that the Agreement merges all of the oral negotiations, representations, discussions and understandings between the Parties, their legal counsel, agents or representatives. This Agreement contains the entire agreement of the Parties with respect to its subject matter. All documents related to this Agreement and/or attached hereto as exhibits or addendums shall be incorporated into this Agreement by reference as if fully set out at length herein.

I. <u>Severability</u>. If any clause, sentence, paragraph or part of this Agreement shall, for any reason, be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, or invalidate the remainder of this Agreement and the remainder of said Agreement shall continue in full force or effect.

J. <u>Cooperation</u>. The City will cooperate with Landowner to obtain any required and/or necessary permit from any government or governmental agency not a party to this Agreement.

K. <u>Modifications or Amendment of Agreement</u>. No modifications, amendments, alterations or additions shall be made to this Agreement except in a writing signed by all Parties hereto.

L. <u>Recitals</u>. The Parties acknowledge and agree that the facts and circumstances as described in the Background hereto are an integral part of this Agreement and as such are incorporated herein by reference.

M. <u>Executed Counterparts</u>. This Agreement may be executed in several counterparts, each of which shall be regarded as an original and all of which shall constitute but one and the same agreement. It shall not be necessary in proving this Agreement to produce or account for more than one of those counterparts.

N. <u>Captions</u>. The captions and headings in this Agreement are for convenience only and in no way define, limit or describe the scope or intent of any provisions or sections of this Agreement.

**O.** <u>Survival of Representations and Warranties</u>. All representations and warranties of Landowner, Developer, and the City in this Agreement shall survive the execution and delivery of this Agreement.

P. <u>Effective Date</u>. This Agreement shall be effective when signed by all the Parties.

Q. <u>Time</u>. Time shall be of the essence in doing and performing all things to be done under the terms of this Agreement.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives this \_\_\_\_\_ day of \_\_\_\_\_, 2020.

#### **CITY OF POWELL, OHIO**

By: \_\_\_\_\_

Printed: Andrew White

Title: City Manager

LANDOWNER BREAGHA PLANA II, LLC

By:

J. Steel Hutchinson, Member

DEVELOPER REDWOOD USA LLC, AN OHIO LIMITED LIABILITY CORPORATION

By: \_\_\_\_\_\_ David Conwill, Authorized Member

# **INDEX OF EXHIBITS**

- A. Depiction of the Property (70.069 Acres)
- A-1. Description of Township Parcels (to be annexed)
- B. Access Agreement with Olentangy Local School District
- C. Development Plan
- D. TIF Areas
- E. List of Improvements

Exhibit A. Depiction of the Property (70.069 Acres)

Exhibit A-1. Description of Township Parcels (to be annexed)

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# Exhibit B. Access Agreement with Olentangy Local School District

#### AGREEMENT

This AGREEMENT (this "Agreement") is made as of \_\_\_\_\_\_2019, by and between Redwood USA LLC, an Ohio limited liability company, or its assignee ("Redwood") and the Board of Education of the Olentangy Local School District ("Olentangy").

## BACKGROUND

- A. Olentangy owns certain real property commonly known as Olentangy Liberty Middle School ("Middle School") and located in Liberty Township, Delaware County, Ohio, and more particularly described on Exhibit A attached to this Agreement ("Olentangy Property").
- B. Redwood has under contract with the current record owner, Breagha Plana II, LLC ("Breagha"), certain real property adjacent to and west of Olentangy Property and more particularly described on Exhibit B attached to this Agreement ("Breagha Property").
- C. In return for Redwood providing certain public improvements to the Middle School, Olentangy is willing to grant an easement to Redwood from the Breagha Property east to Liberty Road. This easement is in an area not need for school purposes.
- D. Redwood and Olentangy desire to enter into this Agreement to create a perpetual casement over Olentangy Property to benefit Breagha Property.

#### AGREEMENT'

For valuable consideration, the receipt and sufficiency of which is acknowledged, Redwood and Olentangy agree as follows:

- Subject to sections 2, through 5 below, Olentangy shall convey to Redwood an executed casement in recordable form (whether in counterpart or executed jointly on behalf of Redwood, with notary public acknowledgements), the form of which shall be the same or substantially the same as the attached Exhibit C ("Easement"), with the conceptual easement area depicted more or less as shown on attached Exhibit D.
- 2. The parties' obligations hereunder are specifically contingent upon Redwood successfully working with Breagha to annex, rezone and close on its acquisition with the conveyance of record ownership from Breagha to Redwood. Upon written notice by Redwood to Olentangy's Director of Business Management and Facilities (or the equivalent individual at the time of the written notice) that the contingencies have been met to the parties' mutual satisfaction, Olentangy shall then deliver the easement to a mutually selected escrow agent within ten (10) days of the date of Redwood's written notice. The notice itself shall be by U.S. certified mail, return receipt requested or hand delivery by a third-party courier service, FedEx or UPS and providing written confirmation of delivery.

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- 3. After Olentangy's delivery of the easement to a mutually selected escrow agent, Redwood shall build a total of four (4) dugouts at two ball diamonds (whether baseball or softball) designated by Olentangy and at a time mutually agreeable to both Olentangy and Redwood, but in no event shall Redwood be required to commence construction of the dugouts before Redwood has commenced construction of the first phase or phase I of its intended development and vertical construction of the Breagha Property. When it builds the dugouts, Redwood and its agents, employees and contractors will consult with Olentangy to ensure that the dugouts satisfy all applicable legal requirements. Redwood shall use all commercially reasonable efforts to minimize interference with Olentangy's use of its premises during its construction of the dugouts. Redwood shall use its best efforts to protect trees and minimize any damage to Olentangy's premises. As soon as practicable after building the dugouts, Redwood shall at its own cost, remedy any damage occurring on Olentangy's premises. Specifically, Redwood shall, at its sole expense, restore the premises to its prior existing condition. This shall include without limitation returning the premises to its former grade and condition, restoring any trees, landscaping, driveways or pedestrian paths to a condition substantially equal to the condition existing prior to building the dugouts. Redwood also shall maintain an insurance policy covering its work to build the dugouts, and it shall name Olentangy as an additional insured on its policy. In entering this Agreement, Redwood donates the dugouts to Olentangy and the Olentangy accepts this donation without need for further action by the Board of Education.
- 4. Once Redwood has completed the four (4) dugouts at both ball diamonds to Olentangy's reasonable satisfaction and the dugouts have been unconditionally approved for use and occupancy by any and all jurisdictional state and/or local building inspection authorities, within ten (10) days of written notice by either Olentangy or Redwood of said governmental approval, the escrow agent shall either file the easement with the Delaware County Recorder or deliver it to Redwood for recording. Redwood shall pay all recording costs.
- 5. If Redwood does not satisfy the conditions set forth in sections 2 through 4 of this Agreement within twelve (12) months after it receives zoning approval and closes on the Breagha Property, this Agreement (including the escrowed easement referenced herein) shall be null and void in its entirety.

As of the date of this Agreement, the name and contact information of Olentangy's Director of Business Management and Facilities is:

Jeff Gordon Director, Business Management and Facilities Olentangy Local School District 7840 Graphics Way Lewis Center, OH 43035 Phone: (740) 657-4025 Email: (740) 657-4025

 Separately from the dugouts in section 3 above, and subject to Olentangy's written consent, Redwood may complete improvements in the easement area concurrent with its development program for the Breagha Property, which is expected to occur during a later phase in the project after the first phase or phase I area immediately to the south of Home Road is developed and improved.

Redwood USA LLC By

David Casusful The Hacinzed Havenniele L Printed Name and Title

Board of Education of the Olentangy Local School District

By

DALSA ADUS

Printed Name and Title

List of Exhibits:

Exhibit A - Legal Description of Olentangy Property Exhibit B - Legal Description of Breagha Property Exhibit C - Suggested form of EMERGENCY ACCESS EASEMENT AGREEMENT (without exhibits, but see Exhibits A and B above for reference) Exhibit D - Conceptual Easement Area

G-Data Chemisultanness: Entries O. Difedented, Living, Jud-401, 7). Acres 3041, Thoma Road, & ScienteChemiungs - Patergeness: Arcess East ent/From O' SD legal control Clean - Agreement OL SD Redwyed - AW 10-39-7319 does

## EXHIBIT "A" FOR D 99050169 C

Description of a 28.094 acre tract of land, north of Powell, Ohio, west of County Road No. 9, in Liberty Township, County of Delaware, State of Ohio.

Situated in the State of Chio, County of Delaware, and Township of Liberty, being part of Lot 18, Section 1, Township 3, Range 19, United States Military Lands, containing 28.094 acres of land, more or leas, being out of 49.164 acres of land as described to Mary T. Monska et al from the Vella V. Arndr Estate in Delaware County, State of Ohio; said 28.094 acres being more particularly

Beginning at a railroad spike found at the intersection of the southerly line of said Lot 18 with the centerline of County Road No. 9 (Liberty Road), said spike being the northeasterly corner of C.B. & A.M. Marguette's land as recorded in Deed Book 227, Pages 606 and 607, Recorder's Office, Delaware County, Ohio, and being the true point of beginning;

thence N. 88 deg. 50' 05" W. along the southerly line of Lot 18, being the mortherly line of Lot 19 of said C.B. & A.M. Marquette's land, a distance of

thence N. 00 deg. 35' 17" E. along the easterly line of the Chesapeake and Ohio (C& 0) Railroad's 2.00 acre tract as described in Deed Book 167, Page 222, a distance of 190.00 feet to an iron corner post;

150

thence N. 80 deg. 05' 43" W. along the northerly line of said C & O Railroad's 2.00 acre tract, a distance of 460.00 feck to an iron pin;

1.0

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thence S. 89 deg. 00' 00" E. a distance of 2570.40 feet to a railroad spike in the center of County Road No. 9 (Liberty Road);

thence S. 60 deg. 39' 53" W, with the centerline of County Road No. 9 (Liberty Road), a distance of 514.69 feet (passing over a railroad spike at 12.44 feet and 262.44 feet) to the true point of beginning and containing 28.094 acres of land,

Subject to all rights-of-way, easements and restrictions, if any, of previous

Description prepared by Vernon A. Rybski, Registered Surveyor No. 4041.

VOL 0667 PAGE 279







# EXHIBIT "A" FOR D 99050167 C

# NOL 0667 PAGE 664

Situated in the State of Ohio, County of Delaware, and Township of Liberty, being part of Lot 16, Section 1, Township 3, Range 19, United States Military Lands, containing 21.070 acres of land, more or Less, being out of 49.164 acres of land as described to Mary T. Monska et al from the Vella V. Arndt Estate in Delaware County. State of Ohio; said 21.070 acres being more particularly

Beginning at a railroad spike found at the intersection of the northerly line of said Lot 18 with the centerline of County Road No. 9 (Liberty Road), said spike being the southeasterly corner of University Court Incorporated's Lands recorded in Deed Book 382, Page 542, Recorder's Office, Delaware County, Ohio, and being the true point of beginning; thence from said true point of beginning S. 00 deg. 35' 53" W. with the centerline of County Road No. 9 (Liberty Road), a distance of 2570.40 feet to a railroad spike; thence N. 89 deg. 00' 00" W. a distance of of Chesapeake and Ohio (C & O) Railroad's land as recorded in Deed Book 199, Page the southerly line of Lot 17, land owned by University Court incorporated, a distance of 2573.21 feet to the true point of beginning and containing 21.070



HPAPPAOVED FOR TRANSFER CHRIS BAUSERMAN RELASINAE COUNTY ENGINEER 7-13-99

Provisional ocritatined in any deed or other instrument for the conveyance of a dwelling which restrict the sele, reintal or use of the property because of race are oblar are invalid under faceral law and are unorthoreNo.

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#### EXHIBIT A

#### Legal Description

## Parcel 1

Situated in the Township of Liberty, County of Delaware and State of Ohio, and bounded and described as follows:

Being in Range 19, Township 3, Section 2, part of Lot 2, U.S. Military Lands. Beginning at a p.k. spike at the intersection of the centerline of Delaware County Road, No. 124 and the East line of Section 2, thence S. 2° 19' W. along the section line 1335.20 feet to an iron pipe, passing over an iron pipe at 30.00 feet; thence N. 87° 40' W. 25.00 feet to an iron pipe (found); thence N. 2° 19' E. 1335.20 feet to a R.R. Spike on the centerline of Delaware County Rd. No. 124 passing over an iron pipe (found) at 1305.20 feet; thence S. 87° 40' E. along the center line of said County Rd. 25.00 feet to the point of beginning, containing 0.766 acres, be the same more or less, but subject to all legal highways.

#### Parcel II

DESCRIPTION APPROVED FOR TRANSFER Chris Bauserman Delaware County Engineen Situated in the Township of Liberty, County of Delaware and State of Ohio, and bounded and described as follows:

Being in Range 19, Township 3, Section 2, part of Lot 2, U.S. Military Lands. Beginning at an iron pipe (found) on the easterly right-of-way line of the Chesapeake and Ohio Railroad, said iron pipe being S. 2° 09' W. 1335.20 feet from the point of intersection with centerline of Delaware County Rd. No. 124 and the easterly right-of-way line of the C&O Railroad; thence S. 87° 40' E. 838.74 feet to an iron pipe on the East line of Section 2, passing over an iron pipe at 813.74 feet; thence S. 2° 19' W. along the easterly line of Section 2, 1177.79 feet to a post, passing over a stone at 421.64 feet; thence N. 87° 44' W. 824.37 feet to a steel post on the easterly right-of-way line of said railroad with a 0° 30' curve to the right which the long chord bears N. 0° 50' 30" E. 503.08 feet, an arc distance of 504.11 feet to an iron bolt to the point of tangency; thence N. 2° 09' E. 677.35 feet to the point of beginning, containing 22.61 acres, be the same more or less, but subject to all legal highways.

#### Parcel III

Situated in the State of Ohio, County of Delaware and Township of Liberty. Being in Range 19, Township 3, Section 2, and part of Lot 2, U.S. Military Lands:

Beginning at a railroad spike set on the centerline of County Road No. 124, known as the G.I.H. and Columbus Road; said point of beginning bears North 87 degrees, 40' West 25.00 feet from the point of intersection of the centerline of County Road No. 124 and the section line between sections 2 and 1; thence South 2 degrees, 10' West parallel with the section line, 1335.20 feet to an iron pipe, passing over an iron pipe at 30.00 feet; thence North 87 degrees, 40' West 813.74 feet to an iron pipe

set on the right-of-way line of the Chesapeake and Ohio Railroad; thence North 2 degrees 09' East along the said East right-of-way line, 1335.20 feet to a railroad spike set on the centerline of County Road No. 124, passing over an iron pipe at 1305.20 feet; thence South 87 degrees 40' East along the centerline of County Road No. 124, 817.53 feet to the point of beginning, containing 25.00 acres of land, be the same more or less, but subject to all legal highways.

### Parcel IV

Situated in the State of Ohio, County of Delaware, City of Powell, located in Farm Lot 1, Section 2, Township 3 North, Range 19 West, United States Military Lands, and being part of a 40.636 acre tract conveyed to M/I Homes of Central Ohio LLC, as recorded in Official Record Volume 428, Page 1362, Delaware County Recorder's Office, and being more particularly described as follows:

Beginning, for reference, at a railroad spike found at the intersection of centerline of Rutherford Road (T.R. 122) with the east line of the CSX Transportation, Inc., marking the southwest corner of said 40.636 acre tract;

thence North 10° 53' 41" West 748.16 feet, along the westerly line of said 40.636 acre tract and east line of the CSX Transportation, Inc., to an iron pin found;

thence North 08° 35' 08" West 1154.01 feet along the westerly line of said 40.636 acre tract and east line of the CSX Transportation, Inc., to an iron pin set marking the <u>PRINCIPAL PLACE OF</u> <u>BEGINNING</u> of the herein described tract;

thence continuing North 08° 35' 08" West 387.06 feet, along the westerly line of said 40.636 acre tract and east line of the CSX Transportation, Inc., to an iron pin found;

thence North 04° 13' 20" West 782.01 feet, along the westerly line of said 40.636 acre tract and east line of the CSX Transportation, Inc., to an iron pin found;

thence North 35° 19' 13" East 36.89 feet, along the westerly line of said 40.636 acre tract and east line of the CSX Transportation, Inc., to an iron pin found;

thence North 23° 58' 01" East 95.92 feet, along the westerly line of said 40.636 acre tract and east line of the CSX Transportation, Inc., to an iron pin found;

thence North 02° 03' 16" East 195.96 feet, along the westerly line of said 40.636 acre tract and east line of the CSX Transportation, Inc., to an iron pin found marking the northwest corner of said 40.636 acre tract and southwest corner of a 22.61 acre tract (Parcel II) conveyed to G. Frederick Smith Chemical Company, as recorded in Deed Book 420, Page 32;

thence South 86° 24' 15" East 708.91 feet, along the north line of said 40.636 acre tract and south line of said 22.61 acre tract, to an iron pin found in the east line of Farm Lot 1 and west line of a 25.248 acre tract (Parcel III) conveyed to G. Frederick Smith Chemical Company, recorded in Deed Book 420, Page 32, marking the northeast corner of said 40.636 acre tract and southeast corner of said 22.61 acre tract;

thence South 04° 15' 04" West 973.92 feet, along the east line of said 40.636 acre tract and Farm Lot 1 and west line of said 25.248 acre tract and a 51.3172 acre tract conveyed to Board of Trustees

Liberty Township, as recorded in Official Record 32, Page 1888, to an iron pin found marking the southwest corner of said 51.3172 acre tract and the northwest corner of a 21.070 acre tract conveyed to Board of Education of the Olentangy Local School District, as recorded in Deed Book 667, Page 663;

thence South 02° 31' 40" West 780.39 feet, along the east line of said 40.636 acre tract and Farm Lot 1 and west lines of said 21.070 acre tract and a 28.094 acre tract conveyed to Board of Education of the Olentangy Local School District, as recorded in Deed Book 667, Page 278, to an iron pin set (passing an iron pin found at 668.33 feet);

thence along the arc of a curve 638.84 feet turning to the right (delta angle=43° 20' 15", radius=864.43 feet), with a chord bearing and distance of North 60° 00' 16" West 638.36 feet, across said 40.636 acre tract, to the principal place of beginning, containing an area of 25.248 acres.

LESS AND EXCEPTING FROM PARCELS I AND III ABOVE:

Situated in the State of Ohio, County of Delaware, Township of Liberty, being a part of Farm Lot 2 in Section 2, Township 3 North, Range 19 West, United States Military Lands and being a part of record 13.820 acre and 25.00 acre parcels conveyed to G. Frederick Smith Chemical Company as recorded in Book 420, page 32 in the records of Delaware County, being a parcel of land lying on the right and left sides of the centerline of Right of Way and Construction of DEL-CR124-4.11 (Home Road) and bounded and described as follows:

Beginning at the intersection of the centerline of County Road 124 (Home Road) and the east line of said Farm Lot 2, said point located 22.83 feet left of station 240+13.09 of proposed County Road 124 and being the TRUE POINT OF BEGINNING for the parcel herein described;

- thence South 03 degrees 36 minutes 05 -seconds West along the east line of said Farm Lot 2 a distance of 122.74 feet to an iron pin set, located 99.18 feet right of station 239+99.55 of proposed County Road 124;
- 2) thence South 85 degrees 10 minutes 23 seconds West a distance of 715.67 feet to an iron pin set, located 150.00 feet right of station 233+00.00 of proposed County Road 124;
   3) thence North 86 degrees 10 minutes 23 seconds West a distance of 715.67 feet to an iron pin
- 3) thence North 86 degrees 22 minutes 05 seconds West a distance of 134.55 feet to an iron pin set on the east line of the CSX Railroad at a point located 150.00 feet right of station 231+65.45 of proposed County Road 124;
- 4) thence North 03 degrees 28 minutes 47 seconds East along the east line of the CSX Railroad a distance of 228.00 feet to the centerline of existing County Road 124, said point located 77.99 feet left of station 231+64.84 of proposed County Road 124;.
- 5) thence South 86 degrees 21 minutes 56 seconds East along the centerline of existing County Road 124 a distance of 832.39 feet to a point located 23.93 feet left of station 240+02.63 of proposed County Road 124;
- 6) thence South 86 degrees 38 minutes 27 seconds East along the centerline of existing County Road 124 a distance of 10.58 feet to the point of beginning and enclosing an area of 3.555 acres, more or less.
- Of the above described tract, 3.484 acres is located in Auditor's Permanent Parcel Number 319-240-01-004-000 which includes 0.563 acres in the present road occupied and 0.071 acres is

located in Auditor's Permanent Parcel Number 319-240-01-005-000 which includes 0.017 acres in the present road occupied

Monuments referred to as iron pins set are ¼ inch diameter x 30 inch long iron bars with a 1-1/2 inch diameter aluminum cap marked "R/W LS #7819".

Bearings used in this description are based on the Ohio Lambert Projection North Zone Plane Coordinate System as established by the National Geodetic Survey, North American Datum of 1983 (1995 adjustment) from GPS observations made by American Consulting, Inc.

Stations referred to herein are from the centerline of survey of proposed County Road 124 as found on Delaware County Engineer's Office Right of Way Plan DEL-CR124-4.11.

Grantor, for itself and its heirs, executors, administrators, successors and assigns, reserves all existing rights of ingress and egress to and from any residual area.

The description was prepared and reviewed on July 17, 2006 by Charles P. Unterreiner, P.S. 7819 from a survey made by American Consulting, Inc. in 2003.

WHEN RECORDED RETURN TO:

# EMERGENCY ACCESS EASEMENT AGREEMENT

This EMERGENCY ACCESS EASEMENT AGREEMENT (this "Agreement") is made as of \_\_\_\_\_\_\_2019, by and between Redwood USA LI C, an Ohio limited liability company, or its assignee ("Redwood") and the Olentangy Local School District Board of Education ("Olentangy").

#### BACKGROUND

- A. Olentangy owns certain real property commonly known as Olentangy Liberty Middle School ("Middle School") and located in Liberty Township, Delaware County, Ohio, and more particularly described on Exhibit A attached to this Agreement ("Olentangy's Property"). Redwood owns certain real property adjacent to and west of Olentangy's Property and more particularly described on Exhibit B attached to this Agreement ("Redwood's Property").
- B. In return for Redwood providing certain public improvements to the Muldle School, Olentangy is willing to grant an easement to Redwood from the Redwood Property east to Liberty Road. This easement is in an area not need for school purposes.
- C. Redwood and Olentangy desire to enter into this Agreement to create an easement over Olentangy's Property to benefit Redwood's Property.

#### AGREEMENT'

For valuable consideration, the receipt and sufficiency of which is acknowledged, Redwood and Olentangy agree as follows

- 1 -

- Grant of Easements. Olentangy grants and conveys to Redwood a perpetual, nonexclusive easement over, across, along and through that portion of Olentangy 's Property for the sole purpose of ingress and egress of emergency vehicles to and from Redwood's Property ("Easement Area"). The easement granted herein shall not be used for any other purpose.
- Location of Easement Area. The location of the Easement Area over Olentangy's Property is as shown on the drawing on Exhibit C-1 attached to this Agreement and is legally described on Exhibit C-2 attached to this Agreement.
- 3) Use of the Easement Area. As reasonably requested by Olentangy and/or required by local emergency service providers, Redwood shall install at Redwood's sole cost and expense, both on its own property and on Olentangy's Property, gates, bollards and signage ("Easement Area Improvements") to indicate that the driveway in the Easement Area is to be used only by emergency vehicles, and to deter other traffic from using the driveway for access to either property. Signs may read "Not an Exit Emergency Vehicles Only" or similar language.
  - a) Redwood shall use all commercially reasonable efforts to minimize interference with the use and occupancy of Olentangy's Property by Olentangy during Redwood's work to install the Easement Area Improvements. Redwood shall use its best efforts to protect trees and minimize any damage to the Easement Area and/or surrounding areas. As soon as practicable after installing these improvements, Redwood shall at its own cost, remedy any damage occurring on Olentangy's Property. Specifically, Redwood shall, at its sole expense, restore Olentangy's Property to its prior existing condition. This shall include without limitation returning the Easement Area to its former grade and condition, restoring any trees, landscaping, driveways or pedestrian paths to a condition substantially equal to the condition existing prior to Redwood's entry onto or use of the Easement Area or property adjacent to it.
  - b) Olentangy shall maintain, repair and replace (as needed) the paved areas in the Easement Area that exist as of the creation of this Agreement for the operation of the Middle School. Olentangy has no responsibility to maintain, repair or replace any gates, bollards and signage in connection with this Agreement except as it may choose to exercise its rights under section 3.e. below. The area of Olentangy's obligations is as shown on cross-hatched Subarea A on Exhibit C-1.
  - c) Redwood shall maintain, repair and replace (as needed) all other paved areas in the Easement Area, including the gates, bollards and signage located on each party's property, so as to keep such improvements and signage in good, safe condition and repair. The area of Redwood's obligations hereunder is as shown on cross-hatched Subarea B on Exhibit C-1. These obligations shall be subject to the conditions in section 3.a. of this Agreement.
  - d) As to snow plowing and removal, Olentangy shall be primarily responsible for Subarea A and Redwood shall be solely responsible for Subarea B, provided,

however, Redwood shall have the right and obligation to plow and remove snow from Subarea A if school is not in session at the Middle School for any reason.

- e) To the extent one party fails to so maintain, repair and/or replace its improvements and signage, the other party shall provide written notice and thirty (30) days to cure, after which the notifying party will have the right to perform such work, and the party failing to do so will reimburse the performing party within thirty (30) days after receiving an invoice for such work.
- f) Redwood represents and warrants that it has, and shall maintain, a policy of insurance covering its work to construct, and install the Easement Area Improvements. Redwood shall name Olentangy as an additional insured on its policy of insurance.
- 4) Term. The Easement granted under this Agreement will be effective as of the date this Agreement is recorded by Redwood, and it will be perpetual.
- Compliance with Laws. Redwood and Olentangy shall comply at all times with all laws, statutes, ordinances, rules and regulations now or hereafter in effect regarding the Easement Area.
- Liens. Neither party will permit any claim, lien or other encumbrance arising out of this Agreement to accrue against or attach to the other party's property.
- 7) Covenants Running With the Land. The easements and covenants set forth in this Agreement will be covenants and easements running with the land, and will be binding upon and will run with Olentangy's Property and Redwood's Property and will inure to the benefit of and be binding upon Redwood's and Olentangy's respective successors and assigns.
- 8) No Public Right. The easement established under this Agreement will be for the benefit of and be restricted solely to the entities indicated and their successors and assigns. Nothing in this Agreement is intended to create nor shall it be construed as creating any express or implied easement, dedication or any other rights in or for the benefit of the general public.
- Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original, but which when taken together shall constitute one and the same instrument.
- 10) Exhibits. The exhibits attached to this Agreement are incorporated herein by this reference.

List of Exhibits:

Exhibit A - Legal Description of Otentangy's Property Exhibit B - Legal Description of Redwood's Property

- 3 -

Exhibit C-1 – Drawing of Easement Area over Olentangy's Property (Cross-hatched to show Subarea A and Subarea B)

Exhibit C-2 - Legal Description of Easement Area over Olentangy's Property

Redwood USA LLC, an Ohio limited liability

company By

Printed Name and Title

Board of Education of the Olentangy Local

School District By usident KRU [1]

Printed Name and Title

State of Ohio, County of <u>(uyahecc</u>, ss.:

Sworn to before me and subscribed in my presence this 25<sup>th</sup> day of <u>November</u>, 2019, by <u>David</u> <u>Convert</u>, the <u>Author</u>, the <u>Author</u> <u>Menager</u> of Redwood USA LLC, an Ohio limited liability company, who acknowledged that the signing of the foregoing Easement Agreement was his/her and its voluntary act and deed.

In testimony thereof, I have hereunto affixed my hand and official seal on the date

olarial See Justin T. Smith ANNI Notary Public, State of Ohio Greeks My Commission Expires Nøtary Public April 10, 2024 A'E OF OH State of Ohio, County of Relaurance , SS.:

Swom to before me, and subscribed in my presence this 12 th day of <u>December</u>, 2019, by <u>Kerrin O'Brin</u>, the <u>President</u>, of the Olentangy Local School District Board of Education, who acknowledged that the signing of the foregoing Easement Agreement was his/her and its voluntary act and deed.

the testimony thereof. I have bereunto affixed my hand and official seal on the date

KATHLEEN S BOWSER NOTARY PUBLIC OHIO MI COMMISSION EXPINES 04 16 2023

Kathloom & Bouren

The instrument prepared by: Andrew E. Wecker, Esq., Manos, Martin & Pergram Co., LPA, 50 North Sandusky Street, Delaware, Ohio 43015-1926. 740-363-1313

GAData Clients/Business Entities Q-'DRedwood Living Inc -101 70 Acres 3031 Home Road & South Olentangy - Energency Access Easement/DRAFT - OLSD-Redwood Emergency Access Easement -6 10-2019 docs

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Exhibit C. Development Plan

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#### D. TIF Areas

- There will be approximately twelve (12) acres, closest to Home Road except for the private north-south road along the east portion of the Property, for assisted living facility, skilled nursing facility, memory care facility, medical or medical related offices, professional offices, general offices, and/or similar facility (the "Commercial Area").
- 2. The balance of the Property will be multi-family/apartments, which the Developer currently plans to develop over three (3) phases.
- The first TIF Area will include the Commercial Area and Phases 1 and 2 of the multifamily/apartments, a total of 175 apartments ("TIF 1").
- The second TIF Area will be comprised of Phase 3 of the multi-family/apartments, 156 apartments ("TIF 2").
- 5. Each TIF Area shall be exempt from taxation for a period commencing with respect to each TIF Area in the earlier of (i) the first tax year for which Improvements of at least \$5,000,000 in assessed value (e.g., 35% of true value) resulting from the completion of construction of new structure(s) on that TIF Area first appears on the tax list and duplicate of real and public utility property, or (ii) tax year 2022 as to TIF Area 1, and tax year 2027 as to TIF Area 2 (the earlier of (i) or (ii) being the "Commencement Date"), and ending on the earlier of the end of the ninth year after the year of such Commencement Date or the date on which the City can no longer require service payments in lieu of taxes (PILOTS), all in accordance with and as provided in the Ohio Revised Code as to tax increment financing, the Resolution and the TIF Agreement (the "TIF Exemption" and each tax year a Parcel is exempt pursuant to the Resolution an "Exemption Year").

#### E. List of Improvements

- Secondary emergency access and barrier/bollards on property owned by the Board of Education of the Olentangy Local School District ("Olentangy Board of Education") and commonly known as Olentangy Liberty Middle School, 7940 Liberty Road, Powell, OH 43065 ("Middle School"), with an ingress/egress easement to any local first responders. Estimated total cost: \$750,000.00
- Twelve inch (12") sanitary sewer line extension of approximately 1,075 feet from an existing manhole located 44 feet north of Home Road approximately 725 feet east of the northeast corner of the property to be annexed. Estimated total cost: \$200,000.00
- 3. On Home Road, an eastbound right-hand turn lane into the property to be annexed and a center turn lane. Estimated total cost: \$250,000.00
- 4. Total estimated costs for items 1-3: \$1,200,000.00

G: Data Clients Business Entities Q-T/Redwood Living, Inc.-101 70 Acres 3041 Home Road & South Pre-Annexation Agreement Redwood Preannexation Agreement 10-12 2020 doc

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FISCAL IMPACTS OF REDWOOD MIXED USE DEVELOPMENT IN POWELL, OHIO September 30, 2020

> Bill LaFayette, Ph.D. Owner, Regionomics® LLC

egionon From Trends to Insight to Action 1293 S. Fourth St., Columbus, OH 43206

www.regionomicsllc.com

#### Summary of Key Assumptions and Findings

Redwood Apartment Homes is proposing a mixed-use development on a 70-acre parcel on Home Road in Powell, Ohio. The development will be anchored by a 331-unit high-end apartment complex on approximately 58 acres. The acreage fronting Home Road will feature a skilled nursing and assisted living facilities and two office buildings.

The land is currently zoned industrial. A development plan was created in 2005, but it failed to reflect a stream right-of-way and wetlands on the property.

The apartments will be built in three phases: 87 units in 2022, 88 units in 2024, and the remaining 156 units in 2027. Rents will average \$23,190 per unit per year. The conversion of the property to multi-unit use will increase the land value to \$80,000 per acre from its current \$30,000 to \$40,000.

The skilled nursing and assisted living facilities are planned for 2022. Net construction costs will total \$20.25 million. Several alternatives are under consideration for the remaining 3.9 acres. It is suggested that this property be developed with two general-purpose office buildings of 29,000 square feet each and a cost for each of \$5.22 million. It is assumed that the first of these buildings will be built in 2027 and the second building in 2030. These developments will raise the land value of both sites to \$150,000 per acre.

The development will be covered by two 10-year, 75% TIFs. The first TIF, beginning in 2023, would cover the first two phases of the apartment development, the skilled nursing and assisted living facilities, and the office development. The second TIF will begin in 2028, and will cover the third phase of the apartment development. These TIFs will divert 75% of the total property tax revenue, not merely Powell's share, and will reimburse the developers for approximately \$1.2 million of off-site public improvements and will provide Powell approximately \$13 million for other public improvements.

Assumptions are also required for the industrial development. The land will accommodate as much as 943,200 square feet of industrial space. The Auditor's current land values are reasonable for industrial development, so no land value increase is assumed. At a per-square-foot construction cost of \$40, the maximum incremental value is \$37.7 million in 2022 dollars. The development is assumed to begin in 2027 with a 20-year buildout. A 10-year TIF amounting to 75% of the incremental value is assumed for the industrial development.

Powell's income tax rate is 0.75% on wage, salary, and business income earned in the city and 0.5% on income of all Powell residents. The property tax rate is 2.3 mills on the taxable value of all non-exempt property, or 0.0805% on market value. Based on rent, the income of the apartment households will average \$97,392 (total for 331 units of \$32,236,752), with \$61,421 of that total subject to municipal tax.

Currently, 8.1% of residents of southern Delaware County work from home, so their eligible income would be taxed at the full 0.75%. The 8.1% is likely to increase with a higher number of employees working at home, but there are no clear projections yet of the scale of this impact.

Projected payroll income for the assisted living and skilled nursing facilities is \$5 million. Employment will total roughly 120, with 90 to 100 of these full-time positions. Employment of the apartment complex will initially be two, with an increase to eight at full buildout. Wages for these workers will average \$45,636, so total apartment wages at their maximum will be \$365,000 in 2020 dollars.

The office buildings are assumed to house primarily establishments in the professional and technical services sector. The average Delaware County wage in this sector is \$86,094, with employment of 91 in each building. Total wages are \$7.8 million.

The alternative industrial development is assumed to begin in 2027 and occur over 20 years. Industry data indicates 469 square feet per employee. Vacancy is assumed to be 85% in the first year and 90% in each succeeding year. Annual wages average \$45,237. Employment is 1,031 by 2038 with total wages before inflation of \$46.6 million.

Construction workers' wages are also estimated using an economic impact model assuming that their employment will be long enough to create an income tax liability. The model shows construction earnings of \$43.35 per \$100 of construction cost.

Police and administration, building and information technology expenditure categories are also estimated, following from the author's fiscal analysis for the 2015 Powell Comprehensive Plan. The per household net police expenditures are \$400.05, and the administration expenses are \$313.04. Vehicle license and gasoline taxes contributed by the residents of the apartment complex total \$59.95 per household annually.

Roadway maintenance expenditures are a major category, but these are irrelevant for the Redwood plan because interior streets will be private. The industrial development access road will be public, however. Costs are \$4.98 per foot per year, or \$20,930 for the 4,200-foot road.

The net present value to Powell of the Redwood proposal is \$8.2 million, compared to \$1.14 million for the industrial alternative. It must be cautioned that these results are based on all of the assumptions outlined in this document, so each of the impacts could be significantly greater than or less than those estimated.

#### **Characteristics of the Project**

Redwood Apartment Homes is proposing a mixed-use development on a 70-acre parcel on Home Road in Powell, Ohio. The development will be anchored by a 331-unit high-end apartment complex on approximately 58 acres. The acreage fronting Home Road will feature a skilled nursing facility and an assisted living facility to be developed by Foundations Health Solutions and two office buildings. The current plan is that these will be medical office buildings that will draw clientele from the Foundations Health Solutions development. However, as argued below, general offices would be more appropriate for this site.

The acreage is currently zoned industrial, and a plan developed in 2005 divides the acreage into 31 industrial sites. However, the plan failed to reflect stream corridors and wetlands significantly impacting 14 of the 31 sites. Further, the construction of the Home Road railway overpass reduced the acreage and affected the visibility of any development. The property is divided north to south into four parcels as shown in Table 1. The market values assigned to these parcels reflect an industrial use, but if they are used instead for apartment, residential care, and office uses, the market value will be substantially higher. The values do not include \$592,300 in existing improvements on parcel 319-240-01-004-000, and \$23,800 on parcel 319-240-01-005-000. These improvements will be removed before redevelopment, but their value will reduce the increase in property value and tax receipts.

Parcel	Land market value	Acreage	Value per acre
319-240-01-004-000 (northern)	\$ 872,000	21.516	\$ 40,528
319-240-01-005-000	385,700	13.749	28,053
319-240-01-005-001	315,400	9.556	33,005
319-240-01-068-004 (southern)	772,600	25.248	30,600
All four parcels	\$ 2,345,700	70.069	\$ 33,477
Three southern parcels	\$ 1,473,700	48.553	\$ 30,352

	Table 1
Existing Parcels Acreage	and Value (from North to South)

Source: Delaware County Auditor.

The apartments will be constructed in three phases. The first phase, to be built in 2022, will total 87 units. The second phase, planned for 2024, will be 88 units. The final 156 units will be in the third phase, slated for 2027. Initial value per unit will average \$120,000.<sup>1</sup> Rents are expected to average \$1.44 per square foot per month. At an average square footage of 1,342, this implies an average rent of \$23,190 per unit per year.<sup>2</sup> Land accommodating multi-unit projects is generally valued much higher than the averages in Table 1. Regionomics analysis of a large sample of apartment projects yielded an average land value of \$80,000 per acre.

The Foundations Health Solutions project, planned for 2022, will occupy around 6.8 acres adjacent to Home Road. The skilled nursing building will be 64,700 square feet on approximately 4.1 acres. The assisted living facility will consist of 32,500 square feet on 2.7 acres. Construction cost, net of

<sup>&</sup>lt;sup>12</sup> This figure does not include the value of other improvements, such as the about 1%-1½ miles of private streets.

<sup>&</sup>lt;sup>2</sup> All dollar amounts in this study are net of inflation.

excavation, utilities, furnishings, certificates, soft costs, and contingency, will total \$20.25 million. Regionomics analysis suggested a per-acre land value of \$150,000.

The remaining 3.9 acres are under consideration for light industrial or medical office development. Industrial development would be likely to create noise and dirt, and would thus be incompatible with the medical focus of the adjacent development. A medical office development serving the adjacent facilities would initially seem a logical alternative, but the development would face stiff competition from nearby medical facilities, including existing developments on Route 23 and an additional project to be developed at Sawmill Parkway and Home Road by the Ohio State University Wexner Medical Center. An additional problem is the limited visibility of the site because of the railway overpass and the Foundations facilities. This presents a challenge for any operation needing to attract the public. While the skilled nursing and assisted living facilities would definitely provide a patient base, this would likely not be sufficient to justify the scale that this development would require to be feasible.

A better solution might be general offices of support businesses and back-office operations. This would be attractive for businesses wishing to attract the well-educated population of the Powell area. While the timing of such a project is uncertain, one three-story, 29,000-square-foot building is assumed to be built in 2027, and a second identical building in 2030. A developer contact suggested a construction cost of \$180 per square foot for general office space in Central Ohio, implying a total value for each building of \$5.22 million. Land values of commercial property along Liberty Street suggest that \$150,000 per acre for this parcel is reasonable.

The developers of this project make the reasonable assumption that the apartment project's value will increase 10% by the 2028 collection year and another 10% by the 2033 collection. Adjusting this increase by expected inflation (from the Congressional Budget Office's 10-Year Economic Projections issued in July 2020) implies an annual increase in value, net of inflation, of 1.9%. This same value increase is applied to the Foundations project, the office project, and the land.

Finally, the developers are proposing a tax increment financing (TIF) arrangement for the project. There would be two 10-year, 75% TIFs. The first TIF, beginning with the 2023 collection year, would cover the first two phases of the apartment development, the Foundations project, and the office development. The second TIF, beginning with the 2028 collection year, will cover the third phase of the apartment development. It is assumed that the TIF will apply to the improvements but not the increase in land value. The TIFs will collect 75% of all property tax revenues, not merely the revenues normally accruing to Powell.

In general, TIFs provide funding for improvements that make the site developable – improvements that the municipality would likely need to make in any case. Here the TIF revenues would reimburse the developers for three public improvements totaling approximately \$1.2 million:

- An emergency access road to be constructed to Liberty Road through the grounds of Olentangy Liberty Middle School;
- An off-site sewer line linking to the site;
- An eastbound turn lane into the development from Home Road.

Because this analysis includes a comparison of net fiscal impact between the project outlined above and the previously proposed industrial development, assumptions are required for this development as well. Analysis of a large number of industrial projects yields an average of 13,556 square feet of building per acre, and a large range of per-acre land values. The approximately 69.5 developable acres would

accommodate as much as 943,200 square feet. The range of land values seems to be based largely on access and infrastructure; there is no relation between land value and the size of the parcel. Eliminating outlier values, such as those in the Rickenbacker area, produces an average per-acre value of \$32,000, close to the current value. Consequently, no initial land value increase is assumed with the industrial development. The development is assumed to begin in 2027 with a 20-year buildout.

The author's developer contact stated that construction costs for industrial space in Central Ohio range between \$32 and \$43 per square foot; \$40 is assumed. This results in a maximum incremental value of \$37.7 million in 2022 dollars.

As with the Redwood proposal, a TIF arrangement is likely on the industrial development. The projections assume a TIF with terms identical to those of the Redwood project: a 10-year TIF amounting to 75% of the value of the improvements. The TIF is assumed to begin with the initial development of the acreage; this implies a TIF beginning with the 2028 collection and continuing through 2037.

#### **Employment and Wage Assumptions**

Estimation of fiscal impacts requires an estimation of both revenues and costs. This requires in turn estimates of the number of apartment residents, employment, and earnings. Powell's income tax rate is 0.75%, with a credit of 0.25% for earnings taxed elsewhere. Thus, all Powell residents with wage, salary, and business earnings pay at least 0.5% of those earnings to Powell. The total effective property tax rate to all entities (needed for the TIF calculations) is 78.718775 mills on the taxable value of Class II property, or 2.7552% on the market value. The property tax rate is 2.3 mills on all non-exempt property, or 0.0805% on market value.

To estimate the number of households occupying the apartment project, it is assumed that the occupancy rate is 90% during the last half of the year in the first year and 95% in succeeding years. Some of these workers both live and work in Powell, and so pay the full 0.75%. This is irrelevant, though, for those working outside the home at a Powell-based business because the location of their employment is irrelevant to the taxes due at their place of residence.

However, this higher tax rate is relevant for those working from home. On average between 2014 and 2018, 8.1% of workers living in the southernmost census tracts of Delaware County worked at home. That percentage clearly does not reflect those working at home during the pandemic; some of these arrangements may become permanent. Generally, Ohio law specifies that tax is due to any municipality in which a worker is employed for more than 20 days. However, the Ohio General Assembly passed a law this spring that workers will continue to be taxed where they were taxed before they were sent home to work. But that is a temporary provision that expires 30 days after Ohio's health emergency is lifted.

In the long run, a greater shift to working and being taxed at home would benefit primarily residential communities such as Powell to the detriment of cities with a daily net influx of workers such as Columbus. Although many experts believe that a larger number will work from home even after the pandemic than before, no detailed estimates of the long-run impact seem as yet to exist. Consequently, the analysis assumes the historical 8.1%, with the result that the income tax estimate for the apartment complex is likely to be somewhat low.

The average income of the residents of the complex can be estimated from their rent. The average household in southern Delaware County pays 23.8% of their income in rent, according to the American Community Survey. With rent averaging \$1,932.48 per month or \$23,190 per year, household income will average \$97,392. This income includes categories of income that are not taxed, though, such as interest, dividends, and retirement income. The Internal Revenue Service's Statistics of Income suggests that at this income level, wage, salary, and self-employment income averages 63.1% of total income. This implies an average taxable income for the apartment residents of \$61,421. This income is taxed at 0.75% for 8.1% of the residents, and 0.5% for the remainder.

Employment and wages are also required for the commercial projects, including the industrial development proposed under the previous plan. Projected payroll income for the assisted living and skilled nursing facilities is \$5 million as given by Foundations Health Solutions. Employment will total roughly 120, with 90 to 100 of these full-time positions. Employment managing the apartment complex is estimated based on the employment per unit of a sample of complexes in Franklin County. (The Franklin County Auditor's website provides a unit count for all apartment complexes, but the Delaware County Auditor's site does not.) The average is 2.43 employees per 100 units, so it is assumed that employment will be two for the first phase, five when the second phase is added, and eight at full buildout. The average Delaware County wage of workers in the residential property management industry is \$45,636, so total apartment wages at their maximum will be \$365,000 in 2020 dollars.

The office buildings are assumed to house primarily establishments in the professional and technical services sector. The average Delaware County wage in this sector is \$86,094. The Building Owners and Managers Association (BOMA) Benchmarking Report gives an average of 288 square feet per office employee.<sup>3</sup> It is conservatively assumed that this will be reduced 25% as a result of increased social distancing and possibly increased long-term working from home. It is also assumed that occupied square feet will be 85% for half of the first year of occupancy and 90% for succeeding years. (The BOMA report gives an average occupancy rate of 87.61%.) With an assumed occupancy rate, these assumptions imply employment of total wages of \$3.3 million for the workers in each of the two buildings.

Employment in industrial buildings is considerably less concentrated than in office buildings. The BOMA Benchmarking Report indicates 469 square feet per employee versus the 288 square feet per office worker. This suggests potential employment of 2,011 in a fully developed, fully leased park. Annual wages for warehouse employees in Delaware County average \$45,237.

The land has been untouched since being planned for an industrial development in 2005, and egress for large trucks onto Home Road is relatively difficult. Further, acreage is available in the development-ready Wolf Commerce Park and other nearby parks. These facts together suggest that industrial development of the property will occur relatively slowly. Development is assumed to begin in 2027 and occur over 20 years.

Powell will also earn income tax revenue from construction workers' wages, assuming that their employment will continue past the 20-day threshold. These wages must be estimated indirectly through an economic impact model. The author's impact model uses Regional Impact Modeling System (RIMS II)

<sup>&</sup>lt;sup>3</sup> https://www.boma.org/BOMA/Research-Resources/3-BOMA-Spaces/Newsroom/PR91818.aspx. A sample of industrial buildings and their employment in Central Ohio found a similar concentration.

multipliers for the Columbus MSA from the U.S. Bureau of Economic Analysis. The direct earnings estimate from this model is an approximation of construction worker wages. These are \$43.35 per \$100 of construction cost.

#### Impact on Expenditures

The assumptions discussed above provide the background for estimating revenues from each of the two development alternatives. An estimate of expenses is equally important. The approach for these estimates follow from the author's fiscal analysis for the 2015 Comprehensive Plan. This analysis both estimated the fiscal impacts of the development alternatives proposed in the plan and assessed the overall fiscal sustainability of the city's budget.

The analysis recognizes that some expenses are variable; these increase with increasing population and employment, while others do not. The hours spent by police officers patrolling the city and responding to calls – hence the patrol officers' payroll expenses – increase as population increases, as do the vehicle gasoline and oil expenditures. The salary of the chief, however, will not be affected, nor will the number of patrol vehicles. These expenditures are called fixed. Obviously, fixed expenditures will increase with a substantial increase in population and employment, but the increase contemplated in this development is not substantial in the context of the overall city.

The largest expenditures identified in the Comprehensive Plan were police and administration. (Administration was defined as administration and City Council, buildings, and information technology.) Road maintenance was also a substantial expenditure category, but this is not relevant for the apartment project because the streets are private and will not be maintained by the city. The original industrial plan contemplated a public street. Excluding road maintenance expenditures, police and administration expenditures comprised more than three-quarters of the total in 2015, so these are the expenditures included in the analysis.

The variable police expenditures are calculated net of variable revenues that support that activity, including fines, seizures of property, and permits. These are calculated per household and worker, with the total worker count divided by the 3.03 average household size. The number of jobs in Powell is not available, so the total private sector jobs in the 43065 ZIP code from the Census Bureau's ZIP Code Business Patterns are used as an approximation. The ZIP code employment overstates the number of jobs within the city limits, but this is offset somewhat because public sector jobs are not included. The per household net police expenditures are \$400.05, and the administration expenses are \$313.04.

Road maintenance expenses would arise with the public road in the industrial development. It is assumed that the road is constructed and road maintenance begins the year before the development begins. These expenses are measured not per capita but per foot. The total is \$4.98 per foot per year. At a length of 4,200 feet, the variable cost per year is \$20,930. A related factor that must be reflected in the current proposal, however, are the vehicle license and gasoline taxes contributed by the residents of the apartment complex. These revenues average \$59.95 per household.

#### Results

Because of the different timing of the various development elements, the evaluation is based on the net present value of the two alternatives as of 2022 with cash flows measured for 20 years, through 2041. The discount rate is 5%, the current rate on a lower-middle-grade corporate bond. This reflects the risk in the cash flows. As stated above, all dollar amounts are adjusted for inflation.

Table 2 lays out the net present value of the Redwood proposal, which is \$8.2 million. As revealed in the 2015 analysis, residential properties are not generally a net contributor of revenues to the city, primarily because of Powell's low income tax rate. The commercial components of the Redwood project do help to create a positive net present value for the project, as does the TIF and the lack of a need to maintain the interior roads.

The table also provides undiscounted cash flows. Because of the differences in timing of cash flows from this proposal and the industrial development alternative, it is not appropriate to compare the cash flows from these two projects, or use them as a basis for decision-making.

Table 2

Component	Present value	Cash flows
Income tax		
Residential	\$ 933,498	\$ 1,712,714
Skilled nursing, assisted living facilities	435,080	743,019
Offices	785,809	1,581,493
Construction	159,422	196,621
Total	\$ 2,313,810	\$ 4,233,848
Property taxes		
TIF 1	\$ 6,555,439	\$ 9,642,350
TIF 2	2,491,307	4,572,540
Non-TIF	359,661	756,697
Total	\$ 9,406,407	\$ 14,971,586
Road-related household revenues (licenses, fees, etc.)	149,046	256,110
Total revenue	\$ 11,869,263	\$ 19,461,545
Costs		
Reimbursement for public improvements	\$ 1,013,330	\$ 1,200,000
Administration, buildings, IT	1,163,924	2,137,601
Police (net)	1,487,438	2,731,750
Total costs	\$ 3,664,692	\$ 6,069,351
Net revenue	\$ 8,204,571	\$ 13,392,193

Appendix Table A-1 provides the calculated year-by-year cash flows.

Table 3 presents the present values and cash flows of the industrial development. The result is \$1.14 million. This is far less than the Redwood project because of the relatively low average wage, the low

density of employment, and the lack of development until five years after the Redwood development. It must be cautioned that these results are based on all of the assumptions outlined above, so each of the impacts could be greater than or less than those estimated here. The annual cash flows are in Table A-2.

Component	Present value	Cash flows
Income taxes	\$ 1,644,235	\$ 3,578,801
Property taxes		
TIF	\$ 1,428,626	\$ 2,800,219
Non-TIF	54,188	131,895
Total property taxes	\$ 1,482,814	\$ 2,932,114
Total revenue	\$ 3,127,050	\$ 6,510,915
Expenditures		
Reimbursement for public improvements	\$ 686,415	\$ 1,200,000
Administration, buildings, IT	490,833	1,072,294
Police (net)	627,260	1,370,340
Road maintenance	177,732	334,882
Total expenditures	\$ 1,982,239	\$ 3,977,516
Net revenue	\$ 1,144,810	\$ 2,533,399

 Table 3

 Net Present Value and Cash Flows of the Industrial Development

Table A-1 Annual Cash Flows of the Redwood Proposi

Component	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Income tax											
Residential	1,712,714	12,852	27,437	40,091	54,835	54,835	77,609	103,218	103,218	103,218	1,712,714
Skilled nursing, assisted living facilities	743,019	19,410	38,085	38,085	38,085	38,085	38,085	38,085	38,085	38,085	743,019
Offices	1,581,493	0	0	0	0	0	27,717	58,695	86,411	117,389	1,581,493
Construction	196,621	91,288	0	25,748	0	0	62,615	0	16,970	0	196,621
Total	4,233,848	123,551	65,522	103,924	92,920	92,920	206,025	199,997	244,685	258,692	4,233,848
Property taxes											
TIF 1	9,642,350	0	634,171	646,376	867,942	867,942	914,594	1,033,245	1,033,245	1,214,945	9,642,350
TIF 2	4,572,540	0	0	0	0	0	0	425,509	425,509	442,044	4,572,540
Non-TIF	756,697	0	6,772	7,408	10,176	10,176	10,720	17,367	17,367	19,665	756,697
Totai	14,971,586	0	640,944	653,784	878,119	878,119	925,314	1,476,120	1,476,120	1,676,654	14,971,586
Road-related household revenues (incenses, fees, etc.)	256,110	2,347	4,955	7,329	9,967	9,967	14,176	18,852	18,852	18,852	256,110
Total revenue	19,461,545	125,898	711,421	765,037	981,006	981,006	1,145,515	1,694,969	1,739,657	1,954,198	19,461,545
Costs											
Reimbursement for public improvements	1,200,000	0	634,171	565,829	0	0	0	0	0	0	1,200,000
Administration, buildings, IT	2,137,601	24,182	37,908	50,310	64,297	64,302	90,849	120,470	124,946	129,951	2,137,601
Police (net)	2,731,750	30,904	48,445	64,294	82,168	82,175	116,100	153,955	159,674	166,071	2,731,750
Total costs	6,069,351	55,086	720,525	680,433	146,465	146,478	206,949	274,425	284,620	296,021	6,069,351
Net revenue	13,392,193	70,813	-9,104	84,604	834,540	834,528	938,565	1,420,544	1,455,036	1,658,176	13,392,193
Table A-1 (continued) Annual Cash Flows of the Redwood Proposal

Component	2602	2033	2034	2035	2036	2037	2038	2039	2040	2041
Income tax										
Residential	103,218	103,218	103,218	103,218	103,218	103,218	103,218	103,218	103,218	103,218
Skilled nursing, assisted living facilities	38,085	38,085	38,085	38,085	38,085	38,085	38,085	38,085	38,085	38,085
Offices	117,389	117,389	117,389	117,389	117,389	117,389	117,389	117,389	117,389	117,389
Construction	0	0	0	0	0	0	0	0	0	0
Total	258,692	258,692	258,692	258,692	258,692	258,692	258,692	258,692	258,692	258,692
Property taxes										
TIF 1	1,214,945	0	0	0	0	0	0	0	0	0
TIF 2	442,044	468,059	468,059	468,059	495,606	495,606	0	0	0	0
Non-TIF	19,665	58,410	58,410	58,410	61,848	61,848	76,328	80,820	80,820	80,820
Total	1,676,654	S26,469	526,469	526,469	557,454	557,454	76,328	80,820	80,820	80,820
Road-related household revenues (licenses, fees, etc.)	18,852	18,852	18,852	18,852	18,852	18,852	18,852	0	0	0
Total revenue	1,954,198	804,013	804,013	804,013	834,997	834,997	353,872	339,512	339,512	339,512
Costs	-									
Reimbursement for public improvements	0	0	0	0	0	0	0	0	0	0
Administration, buildings, IT	129,979	129,993	130,007	130,021	130,035	130,049	130,063	130,077	130,092	130,106
Police (net)	166,105	166,124	166,142	166,160	166,178	166,196	166,214	166,232	166,251	166,269
Total costs	296,085	296,117	296,149	296,181	296,213	296,245	296,278	296,310	296,342	296,374
Net revenue	1,658,112	507,896	507,864	507,832	538,784	538,752	57,594	43,203	43,170	43,138

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Component	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	TOUZ
Income taxes	3,578,801	0	0	0	0	0	39,182	58,310	97,491	116,620	155,801
Property taxes											
TIF	2,800,219	0	0	0	0	0	0	84,593	84,593	175,761	175,761
Non-TIF	131,895	0	0	0	0	a	0	824	824	1,712	1,712
Total property taxes	2,932,114	0	0	0	0	0	0	85,417	85,417	177,473	177,473
Total revenue	6,510,915	0	0	0	0	0	39,182	143,727	182,909	294,093	333,274
Expenditures						-				-	
Reimbursement for public											
improvements	1,200,000	0	0	0	0	0	0	84,593	84,593	175,761	175,761
Administration, buildings, IT	1,072,294	0	0	0	0	0	8,436	17,871	26,322	35,775	44,241
Police (net)	1,370,340	0	0	0	0	0	10,780	22,839	33,639	45,718	56,538
Road maintenance	334,882	0	0	0	0	20,930	20,930	20,930	20,930	20,930	20,930
Total expenditures	3,977,516	0	0	0	0	20,930	40,146	146,234	165,485	278,184	297,471
Net revenue	2,533,399	0	0	0	0	-20,930	-964	-2,507	17,424	15,908	35,804

Component	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Income taxes	174,929	214,111	233,239	272,421	291,549	330,731	349,859	389,040	408,168	447,350
Property taxes										
TIF	267,057	279,158	374,002	374,002	492,646	492,646	0	0	0	0
Non-TIF	2,601	2,719	3,643	3,643	4,798	4,798	23,180	24,386	28,529	28,529
Total property taxes	269,658	281,877	377,644	377,644	497,444	497,444	23,180	24,386	28,529	28,529
Total revenue	444,587	495,988	610,883	650,065	788,992	828,174	373,038	413,426	436,697	475,879
Expenditures										
Reimbursement for public improvements	267,057	279,158	133,076	0	0	0	0	0	0	0
Administration, buildings, IT	53,710	62,192	71,677	80,175	89,676	98,189	107,707	116,236	125,771	134,316
Police (net)	68,639	79,478	91,600	102,459	114,602	125,481	137,645	148,544	160,729	171,649
Road maintenance	20,930	20,930	20,930	20,930	20,930	20,930	20,930	20,930	20,930	20,930
Total expenditures	410,335	441,758	317,282	203,564	225,208	244,601	266,282	285,711	307,430	326,895
Net revenue	34.252	54.230	293.601	446.501	563.785	583,573	106.756	127,715	129.267	148,984

### **Rezoning Application**

Owner	Parcel No.	Taxpayer/Tax Mailing Address
Craig A. Abbruzzese and Carolyn A. Abbruzzese	319-133-06-033-000	303 Balsamine Drive Powell, OH 43065
Board of Trustees of Liberty Township	319-133-02-001-000 319-132-01-017-000	10104 Brewster Lane Powell, OH 43065-7575
Board of Education of the Olentangy Local School District	319-133-02-002-000 319-133-02-003-000	814 Shanahan Road Lewis Center, OH 43035
City of Powell	319-240-01-068-002	47 Hall Street Powell, OH 43065
Joshua W. Herrman and Rachael N. Herrman	319-240-14-033-000	3229 Winding Woods Drive Powell, OH 43065
Gautham Jayaraman and Ginger Jayaraman	319-133-06-032-000	307 Balsamine Drive Powell, OH 43065
Michael C. Jones and Randi R. Jones	319-240-14-034-000	3239 Winding Woods Drive Powell, OH 43065
Kinsale Golf and Fitness Club, LLC	319-240-01-011-002 319-240-01-011-003	3982 Powell Road Powell, OH 43065-7662
Golf Village Property Owners Association, Inc.	319-240-14-038-000	3735 Attucks Drive Powell, OH 43065



### **Rezoning Application**

Owner	Parcel No.	Taxpayer/Tax Mailing Address
Board of Commissioners of Delaware County, Ohio	319-132-01-007-000	P. O. Box 8006 Delaware OH 43015-8006
Board of Trustees of Liberty Township	319-132-01-009-000 319-132-01-011-000 319-132-01-017-000	10104 Brewster Lane Powell, OH 43065-7575
Del-Co Water Company, Inc.	319-240-01-011-001	6658 Olentangy River Road Delaware, OH 43015-9400
Leonard G. Rodgers and Marilyn C. Rodgers	319-132-01-006-000	9661 Finlarig Drive Dublin, OH 43017
Joseph Indiciani	319-132-01-006-000	45 Ravine Ridge Drive Delaware, OH 43015-2885
Simes Landscape, Inc.	319-240-01-008-000	6326 North Section Line Road Radnor, OH 43066-9736
SS Powell, LLC	319-240-01-011-004	National Tax Search 303 East Wacker Drive, #900 Chicago, IL 60601-5222 And c/o Cogency Global Inc., Statutory Agent 3958-D Brown Park Drive Hilliard, OH 43026-1160
Kinsale Golf and Fitness Club, LLC	319-240-01-011-003 319-240-01-011-002	3982 Powell Road Powell, OH 43065-7662



#### STATEMENT OF COMPATIBILITY

#### The Property

The property, of  $70\pm$  acres, is long and narrow, over 4,000 feet in north-south depth. It is arguably the most isolated tract in (or to be in) the City.

The property is bounded on its entire west boundary, of over 4,000 feet, by the railroad tracks, which are elevated above the level of the property and totally screen it from the uses on the west side of the railroad tracks except for a Del-Co water tank. The property's east boundary, of over 4,000 feet, is bounded, north to south, by a 150-200 foot deep  $\frac{3}{4}$  acre residential lot, Liberty Park, a 25-acre wooded tract owned by Liberty Township, the Liberty/Powell YMCA tract owned by Liberty Township which has no structures within  $700\pm$  feet of the property, an Olentangy Local School District Middle School (the proposed secondary access road to the property, with  $5\pm$  acres of wooded wetlands which will remain as is, has to its immediate south 12 acres of similar wooded wetlands owned by the City. The north boundary, the only road frontage, is the right-of-way line of Home Road, which road is elevated above the level of the property due to the overpass over the railroad tracks, effectively buffering, except for the Del-Co water tank, the uses on the north side of Home Road, which are the Korthals landscaping property, the vacant former Trucco excavating property and the Del-Co water tank.

All of the streets on the property will be private with the only regular access point being from Home Road on the northeast corner of the property, which further isolates the property.

The isolation of the property makes compatibility with adjacent properties essentially a non-factor.

#### The Comprehensive Plan

The Comprehensive Plan is consistent with/based upon the current zoning of the 34+ acres currently in the City, which zoning is Planned Industrial with a development plan of 30+ lots for small office warehouses. The fact that in the 16+ years since the 34+ acres currently in the City was zoned Planned Commercial and the 35+ acres to be annexed from Liberty Township remained zoned Industrial, that there was absolutely no development of the properties establishes that there is simply not a market for the property as it is zoned and has been zoned.

The Comprehensive Plan viewed the property as an employment center, for the purpose of generating income tax. The Fiscal Impact Report establishes that the mixed use proposed in the Pre-Annexation Agreement and the Development Plan has a positive fiscal impact several times greater than if the property could be developed (which it hasn't been able to be in over 15 years) as Planned Industrial.

#### PRELIMINARY DEVELOPMENT PLAN & TEXT TO CITY OF POWELL, OHIO

#### BREAGHA PLANA II, LLC TRACTS CITY OF POWELL AND LIBERTY TOWNSHIP DELAWARE COUNTY, OHIO (3041 Home Road, Powell, Ohio 43065)

Submitted by: Applicant Redwood USA, LLC 7007 East Pleasant Valley Road Independence, OH 44131

Prepared by: Real Estate Advisor: Jim Frey Real Estate Advisor, LLC James Frey 5311 Gillen Way, Westerville, Ohio 43082 614-206-1123 Land Planning/Landscape Architecture: POD Design Todd Foley 100 Northwoods Boulevard, Suite A, Columbus, Ohio 43235 614-255-3399 Engineer: American StructurePoint Shawn Goodwin 2550 Corporate Exchange Drive, Suite 300, Columbus, Ohio 43231 614-901-2235 Architect: Mann Parsons Gray Architects, Inc. James Keys 3660 Embassy Parkway, Fairlawn, Ohio 44333 330-666-5770 Attorney: Manos, Martin & Pergram Co., LPA Stephen D. Martin 50 North Sandusky Street, Delaware, Ohio 43015 740-363-1313

> Submittal Date: February 19, 2021



#### PLANNING AND ZONING COMMISSION (P&Z) PRELIMINARY DEVELOPMENT PLAN APPLICATION

ALL ITEMS ON THIS APPLICATION MUST BE COMPLETED.	Application Fee: \$500.00 + \$100.00 per acre Per Fee Ordinance 2019-49
Applicant: Redwood USA, LLC	
Address/City/State/Zip: 7007 East Pleasant Valley Road, Independence	e, OH 44131
Email Address: jim@jimfreyadvisor.com	
Phone No: 614-206-1123 Cell Phone No: 614-206-1123	Fax No:
Property Owner: Breagha Plana II, LLC	
Address/City/State/Zip: P. O. Box 245, Powell, OH 43065	
Email Address: steel@gfschemicals.com	
Phone No: 740-881-5440, ext. 118 Cell Phone No: 614-975-0300	Fax No: 740-881-9309
Architect/Designer for Applicant: POD Design, Todd Foley	
Address/City/State/Zip: 100 Northwoods Boulevard, Suite A, Columbus	, OH 43235
Email Address: tfoley@poddesign.net	
Phone No: Cell Phone No:	Fax No:
Property Address: 3041 Home Road and Home Road, Powell, OH 43	3065
Lot Number/Subdivision: n/a Existing Use: vacant/industrial	Proposed Use: Planned Commercial (Mixed Use)
Reason for Administrative Review (attach necessary documents):	
see attached Preliminary Plan and Text	

#### Checklist:

- Preliminary Plan requirements set forth in Section <u>1143.11(c)</u>.
- □ Provide any other information that maybe useful to the Planning and Zoning Commission or City Staff in the space
  - below or attach additional pages.
- □ 5 copies of all drawings, text, any other items, and application.
- □ 1 digital copy (CD, USB, Email) of the complete application packet.
- □ Attach the required fee \$500.00 + \$100.00 per acre.
- □ Post a public notice sign at least (10) days prior to a public hearing or public meeting, pursuant to ordinance 1107.035
- Public notice sign details found here.

(SEE OVER)

e of Applicant:	Date:
Office Use	Office Use
	Type/Date:
	Base Fee:\$500.00
	Per Acre:\$100.00X () =
Received	Total:
	Prepared by:
	Reviewed by:
	PAYOR:
	RECIEPT #

I agree to grant the City Staff, the Commission, Board or Council considering this application access to the property that is the subject of this application for the purposes of reviewing this application and posting public notice for this application.

City of Powell · 47 Hall Street · Powell, Ohio 43065 · (614) 885-5380 · (614) 885-5339 fax · www.cityofpowell.us

# Home Rd Planned Commercial District

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## Prelminary Development Plan

City of Powell, Ohio February 19, 2021

www.byRedwood.com







## Project Introduction

Redwood Living would like to bring our beautiful apartment homes to Powell.

Our combination of smart, single-story design, private attached garages, and Redwood's signature features firmly place our apartment homes in a singular category: the maintenance-free convenience of an apartment with a genuine feel of home.

As Redwood's CEO Steve Kimmelman puts it, "We offer a condominium atmosphere with the feel of a single-family home—and without association fees or property taxes to worry about."

Redwood's distinctive approach to apartment home development starts with site selection. We choose communities like Powell because they offer a positive atmosphere, beautiful surroundings, and an appreciation of the qualities that Redwood provides, including energy efficiency.

Being good environmental stewards is a worthwhile goal in itself, but saving money for our residents is also extremely important to us. Our commitment to using specific materials and building processes means there are significant savings for our residents, as documented by our score on the nationally-recognized HERS index. According to this measure, Redwood apartment homes are 40-45% more energy efficient than a home built to current building codes. We're designated "Energy Star" as a result.

Redwood began more than twenty years ago with a simple goal: **give people the kind of apartment that they really wanted to call home.** We listened carefully to what people who lived in apartments had to say about what would simplify and improve the quality of their living experience

We learned that people want a private attached garage, single-story convenience, open floor plans, large kitchens, an extra full bathroom and plenty of closet space. So that's what we provide.

We invite you to learn more about Redwood Living by visiting www.byRedwood. com, and watching our YouTube channel; youtube.com/RedwoodLivingTV.











## Redwood Communities: Peace, Quiet & Comfort

Home Rd Planned Commercial District Preliminary Development Plan



## Who is Redwood?

- Founded in 1991
- Based in Cleveland, Ohio
- 12,000 Units; Owned and Managed
- Single story apartment developer
- 98% Leased Portfolio
- All communities are conventionally financed



## **Redwood Community Exteriors**

- Attractive traditional architectural design
- Stone and shake siding accents
- Individual driveways to garages; no 'ribbon' parking lots
- Upgraded 'carriage-style' garage doors
- Personal outdoor patios





## **Redwood Community Exteriors**

- All communities use extensive landscaping
- Stone accents on buildings
- 2x6 Exterior walls, filled with R-19 batt insulation
- Varied color siding and shake accent panels
- Lifetime dimensional shingles
- Energy Star certified windows
- Individual driveways to garages, no ribbon parking lots
- Carriage style garage doors with windowed panels
- Personal outdoor patio spaces



MPG



## **Redwood Community Interiors**

- No stairs, single-story design
- No one living above or below the apartment home
- Spacious living areas with open floor plan
- Large windows for abundant natural interior light
- 2 bedroom, 2 full bath, with a den space
- Walk-in closets and kitchen pantry



Home Rd Planned Commercial District Preliminary Development Plan



## **Redwood Community Interiors**

- Vaulted ceilings, quality finishes, open floor plans with waterproof LVT (Luxury Vinyl Tile)
- Energy efficiency certified throughout unit including high efficiency furnace
- Granite countertops in kitchen and baths
- LED lighting throughout the home
- Every bedroom has a ceiling fan and walk in closet
- Full size washer and dryer connections
- Smoke-free apartments









## Who are our Residents?

- Residents who want a single-story design
- Residents who want private attached garages
- Those who want a 'peace and quiet' neighborhood
- Maintenance-free lifestyle
- Empty nesters
- Those who can afford \$1,775 \$2,200 rent
- Our design and features generate long-term residents



Home Rd Planned Commercial District Preliminary Development Plan



## Why the Redwood Formula Works so Well?

- 24/7 On-site professional management
- Responsive to resident requests
- A unique neighborhood that sells 'quiet and privacy'
- All single-story homes
- Private driveways to attached garages
- Private streets maintaned by Redwood
- Attached single family rated construction
- State-of-the-art interior amenities and floor plans









## Why Redwood is Good for Powell:

- Appeals to older residents and empty nesters who want to stay in the community but don't want to deal with maintenance issues
- Provides a distinctive condo-like community emphasizing peace and quiet
- Will provide positive tax revenues to community with a minimal impact to community services and public works (i.e. police, fire, maintenance, etc.)
- Additional revenue for local business
- Minimal impact to public schools (5-10% of residents with school age children)
- Low traffic volumes relative to traditional single family home developments



Home Rd Planned Commercial District Preliminary Development Plan



#### LEGAL DESCRIPTION

#### Parcel I

Situated in the Township of Liberty County of Disaveure and State of Orka, and bounded and described at follows

Being in Ronge 15 Teurintep 3 Section 2 part of Lot 2 U.S. Matory Lando Beginning at a pix spike at the interaction of the centertine of Dataware County Road. No. 124 and the East lass of Section 2.

Thence S 2\* 19 W along the section line 1335 20 feet to an ean paper pressing over an iron pape at 30:09 feet.

Thance HL 67" 40" W 25.00 Fast to an son price (found)

Thence N. 21 19 E. 1335 20 feet to a R.R. Spite on the certariane of Delawara County Rd. 124 persong and an and pipe (found) at 1505 20 feet

Thance 5.87" 40° E, along the center line of seld County Rd 25.00 feet to the point of beginning, containing 0.768 screes to the serve more or less

Percela

Statellad as the Townsheb of Liberty County of Delaware and State al Otico and bounded and described as follows

Bertg in Range 15, Township 3, Section 2, part of Lot 2, U.S. Mélicary Lands: Beginning all all kost post (found) on the Essandy replicatively line of the Choesesade and Ohie Refraed and kost post barring 5, 2° DOr W 1335-28 foot four the part of therapester with the containing of Delaware County Rd, 124 and the Easterly right-of-way line of C&O Related.

Thence 3: 67" 40" E. 838.74 least to an wan pipe on the East line of Section 2, passing over an wan pipe at 813.76 feet.

Thence S 2" 19" W along the Easterly line of Section 2 1177 79 feet to a post, passing over a store at 421 64 fact.

Thence N 87" 44" WE 824 37 feet to a steel post on the Easterly right-of-way line of the C&O Hadrood

There along the Eastedy ngb4-of-way line of and railroad with a 5° 30° cours to the light which the ling chold bases N. 0° 50° 30° E. 903 00 feet, an arc distance of 504 11 feet to an ken both to the point of langency

Thence N. 2' 09' E. 677.35 feet to the point of beginning, containing 22.61 acres by the server index or loss

Parcel III

Selected in the State of Oteo, County of Delaware and Yownetsp of Laberty Being in Range 19 Telenstop 3 Section 2, and part of Lot 2, U 3, National London

Beginning at a rainoid spite set on the centering of County Road Mp. 124 known as the GLH, and Catenbus Road, said paths at beginning beam Month 87 degrees 42 Weat 25 00 feet from the post of unit-reaction of the contention of County Road Ms. 124 and the eaction time between sections 2 and 1.

Thence South 2 degrees 10' West parelled with the section line 1335,20 feet to an iton pipe passing ever an iron pipe at 30.00 feet;

Thence North 57 degreese, 40 West 613,74 Net to an sort pipe set on the dight of way line of the Chokepania and Ohio Raticaed.

Thence North 2 degrees 69 East along the baid East right-of-way fins. (335:26 feet to a ranks of spike set on the centerline of County Road He. 124, passing over an area pipe at 1305.28 feet.

Thence South 117 degrees 40" East along the contention of County Read No. 124 817.53 feel to the point of beginning, containing 25 00 acres of land, to the same more or less.

Parcel IV

Situated in the State of Dirie County of Delaware, City of Paved, located in Farm Let 1. Section 2. Township 3 North, Range 19 Week, United States Websy Lunds, and being part of a 49.038 scine back conveyed in MI Nomes of Covered Orbo LLC, as recorded in Official Record Yolume 432, Page 1382, Delaware County Recorder's Office, and being more particularly detective as fallows

Beginning, for reference, at a manual space found at the intersection of contartance of Rulmenford Read (17 R 122) with the Eastlane of the CSX Transportation, inc. marking the Southwest corner of said 40.036 actic tract.

Thence North 10" 53" 41" West 748 16 feet, slong the Westerly line of said 40.638 acre tract and East line of the CSX Transportation, Inc. to an iron parformed.

Therce North 58\* 35\* 96\* Weet 1154 01 lost stong the Westinfy time of and 40.038 acce tract and East line of the CBX Transportsen. Inc. to an iron pin sel making the PRINCIPAL PLACE OF BECINATING of the bases.

Thence contending North D8" 35' 8" Whiti 387.06 feet, along the Westerly brie of seld 40 936 acre tract and East Brie of the CSX Transportation, feet its an iron pin found,

Thence Note: 64" 13" 20" West 762.01 feet, along the Westerly and of sord 40.030 acre tract and East line of the CSX Transportation Inc., to an Iron pur found.

Thence North 35' 19' 15' East 30.89 feet, along the Westerly line of east 40 636 errs tract and East line of the CSX Transportation; Inc. to an iron pin found;

Thence North 23" 55" 61" East 95.92 first, along the Westerly and st and 40 836 sere tract and East line of the CBX Transportation, Inc. to on tags an Journal

Thence North 07' 03' 18" East 195 98 feet, along the Westedy Inte of such 40.035 acre stand and East line of the CSA Transportation, Inc. 16 an item pri found marking the Northwest corner of suid 40.035 acre stand and Southerest corner of a 22.31 acre 1955 (Faceal B) conveyed to G Frederics Smith Chestical Company as recorded in Geod Book 420 Page 32.

Thence South 38" 24" 15" East 706 91 feet, along the Month Sne of such 40.636 sore tixet and Soldh Sne of such 22.81 sore fract to an ktori pin found at the Enal Ene of Farm Liel 1 and Weat fine of a 25.246 sore tract (Parcel TB) conveyed to Q. Fredenck Sninit Changeal Company, recorded for Doed Duok 420. Page 32, mathing the Northweat camer of said 40.835 sore tract and Southwark comer of 22.61 sore tract

Thence South G4\* 15 G4\* Weet \$73.82 feet, along the East this of said 40.838 occe tract and Ferm Lot 1 and Weet has of said 35.238 sera tract and a 51.3172 acre tract conveyed is Baard of Terotoes Loavy Township, an incontend in Official Record 32, Page 1888, to an icon pin Island maring the Southwest cames of said 51.0172 occe and of the Mohamed comer of 21.057 parts excit conveyed to Beard of Education of the Ofersamy Lecal School Classics, as recorded in Deed Beart B7 Page 653.

Therea South 02" 31' 40" West 780,36 (set, along the East bins of aud 40,636 acre text and Ferm Lot 1 and West Breas of sed 28 070 acre text and a 25 094 acre text campined to Board of Education of the Clenianoy Local School Divident, an recorded in Deed Boah 607 Page 278 is an iron pin sel (persang an tran pin found at 008.33 (set)

Thence along the arc of a curve 538.64 feet harning is the nghi (data angle = 43° 20° 15° red us = 864.43 feet) with a cherd bearing and thelance of Nach 60° 50° 16° West 633.38 feet across said 40.836 nore back to the principal place of beginning containing an arcs of 25.248 percs

LESS AND EXCEPTING FROM PARCELS I AND EI ABOVE

Binuted in the State of Okio, County of Datamera, Township al Udmirty being a part of Form Lot 2 is Section 2 Township 3 North, Rango 19 West, Unded States Mataly Lands and being a part of record 13 520 acre and 24 00 acro percels conveyed to 0, Freideich Smith Chemical Competity an recorded in Book 420, Page 22 is the records of Debayers County being a part of island gang and two part and in scientification of the part of Way and County Lands of DEL-CR124-4 11 (Home Road) and bounded and described as follows

Beginnerg at like intersection of the centrefue of Scorely Road 124 (name Road) and the East Bas of lead Farm Let 2, read part feature 22.03 neet left at station 2401130 of a proposed County Road 124 and being the TRUE FOINT OF BEGINARING for the parter threat described.

1) Thence South 93 degrees 30 minutes 05 seconds Week blong the Evel land of said Farm Lot 2 a delance of 122 74 feet to an ison pin ext. lecated 93 18 leaf right of station 239-99 55 of proposed County Read 124. 2) There's South 65 degrees 10 methins 23 sociands West a distance of 715 67 feet to an kish pan set located 156:00 faet right of station 233-00 00 of proposed County Reed 124

 Thence Hosth 96 degrees 22 menutee 05 seconds West a distance of 134 55 feet to an ean pm set facated 150 00 feet right of station 233-06 00 of proposed County Road 124

4) Thence Meth 03 degrees 28 minutes 47 seconds East along the East line of the CSX Related & Material 278 03 feed to the centrefore of emeting County Road 124 stad part located 77 99 feet left of station 231-84 fee dispropued Caution Road 124.

S) Thence South 86 degrees 21 mmdee 58 excentite East along the contention of animolog Cauchy Robel 124 a distance of 832.39 faot to a point located 23 39 feet left of assbon 240+02 63 of proposed Couchy Robel 124

8) Thetes South 86 degrees 38 menutes 27 seconds East along the contectus of existing County Road 124 a detaines of 10.56 feel to the point of beginning and endeeing an eve of 3 555 secon more or leva.

Of the above described truct, 3 £64 pstee in located in Auditor's Permenent Parcel Namber 315-260-3108-6000 which inductoe 0.563 actes in the present read accupated and 0.071 acres in located in Auditor's Permanent Parcel Number 315-260-01-005-000 which inductes 0.017 acros in the present read occupent

Monuments released to as you pain and are 3/4 inch diameter a 30 inch long you bera with a 1-1/2 inch diameter abaranum cap marked "RWVLS a7819"

Seemage used in this description are based on this Onio Lambert Projection North Zone Plane Coordinate System as eduithalited by the National Goodalic Survey North American Datium of 1963 (1995 adjustment) from GPS observations made by American Consulting Inc.

Stations referred to herein are from the centerities of survey of proposed County Road 124 to found on Belansie County Engineer's Office Right of Way Plan DEL-CR1264 11

The description was prepared and reviewed on July 17 2006 by Charles P. Unterreliner P.S. 7019 from a autrory made by American Comutany, Inc. to 2003



#### DESCRIPTION FOR A 35.336 ACRE ANNEXATION FROM LIBERTY TOWNSHIP TO CITY OF POWELL

Situated in the State of Ohio, County of Delaware, Township of Liberty, being in Farm Lot 2, Section 2, Township 3 North, Range 19 West of the United States Military Lands, being,

- All of that 21.587 acre tract as described in deed to Breagha Plana II, LLC, an Ohio limited liability company, recorded in Official Record volume 1084, page 393, (all records referenced herein are to the Delaware County Recorder's Office, unless otherwise stated), being known as Delaware County Auditor's number 319-240-01-004-000.
- All of that 13.749 acre tract as described in a deed to Breagha Plana II, LLC, an Ohio limited liability company, recorded in Official Record volume 1084, page 393, being known as Delaware County Auditor's number 319-240-01-005-000.

and being more particularly described as follows.

**COMMENCING** for reference at the northwest corner of Farm Lot 14, and in the asset line of the said Farm Lot 2, and being the east line of the said Section 2, and being the northeast corner of a 3.484 acre right-of-way taking known as 21-WDV as shown in the plan set DEL-CR124-4.11 on record with the Delaware County Engineer's Office as conveyed to Board of Commissioners of Delaware County, Ohio by the instrument conveyed as Official Record volume 952, page 672, and being the northwest corner of the Clay C. Darnell Subdivision as shown in Plat Book volume 5, page 79;

Thence along the said westerly line of Farm Lot 14, the westerly line of the said Clay C. Darnell Subdivsion, the said easterly line of Farm Lot 2, the said easterly line of Section 2, and the said easterly line of the 21-WDV tract, South 02 degrees 19 minutes 00 seconds West for a distance of 122.74 feet to the southeast corner of the said 21-WDV tract, being the northeast corner of 21.587 acre tract, and being the northwest corner of parcel conveyed to Board of Trustees of Liberty Township by the instrument filed as Deed Book volume 496, page 199, and being on the southerly right-of-way line of Home Road (Varied Width), and being the true **POINT OF BEGINNING** of the parcel herein described;

Thence along the easterly line of the said 21.587 acre tract and said 13.749 acre tract, the westerly line of the said Board of Trustees of Liberty Township tract, the said easterly line of Farm Lot 2, the said easterly line of Section 2, the said westerly line of Farm Lot 14, the westerly line of Section 1, the westerly lines of Farm Lots 15 and 16, South 02 degrees 19 minutes 00 seconds West for a distance of 1,890.25 feet to the southeast corner of the said 13.749 acre tract, the northeast corner of a 9.556 acre tract as conveyed to Breagha Plana II, LLC, an Ohio limited liability company by the instrument filed as Official Record volume 1084, page 393, and being on the existing northerly corporation line of a 9.556 acre tract annexed to City of Powell, Ohio, by Ordinance No. 2005-43 (08-16-2005), Resolution No. 05-773 as filed in Instrument Number 200500041967;



Thence along the said northerly corporation line, the southerly line of the said 13.749 acre tract, and the northerly line of the said 9.556 acre tract, North 87 degrees 29 minutes 09 seconds West for a distance of 842.53 feet to the southwest corner of the said 13.749 acre tract, the northeast corner of the said 9.556 acre tract, the northeast corner of the said existing corporation line, and on the easterly right-of-way line of CSX Transportation Inc.;

Thence along the westerly line of the said 13.749 acre tract, the westerly line of a said 21.587 acre tract, and the said easterly right-of-way line of CSX Transportation Inc., North 02 degrees 19 minutes 00 seconds East for a distance of 1784.53 feet, to the northwest corner of the said 21.587 acre tract, being the southwest corner of the said 21-WDV tract and being on the said southerly right-of-way line of Home Road;

Thence along the northerly line of the said 21.587 acre tract, the southerly line of the said 21-WDV tract, and the said southerly right-of-way line of Home Road; South 87 degrees 31 minutes 03 seconds East for a distance of 134.55 feet to an angle point;

Thence continuing along the last described line, North 84 degrees 01 minutes 25 seconds East for a distance of 715.46 feet to the TRUE POINT OF BEGINNING for this description.

The above description contains a total area of 35.336 acres (0.000 of which are within the present road occupied), of which:

- 21.587 acres is all of PID# 319-240-01-004-000
- 13.749 acres is all of PID# 319-240-01-005-000

Bearing described herein are based on the east line of Farm Lot 2, of Section 2, Range 19, Township 3, Liberty Township, being South 02 degrees 19 minutes 00 seconds West, as referenced in the deed filed as Official Record volume 1084, Page 393 on field in the records of Delaware County, Ohio.

This description was prepared by Andrew T. Jordan, Registered Professional Surveyor Number 8759.

American Structurepoint, Inc.

la



04-22-2019 Date





Home Rd Planned Commercial District Existing Conditions | 02.19.2021





EX. C-2

Home Rd Planned Commercial District PDP Phase 1 & 2 | 02.19.2021



EX. C-3

Home Rd Planned Commercial District PDP Phase 3 | 02.19.2021



www.structurepoint.com

### MEMORANDUM

DATE:	February 17, 2021
TO:	City of Powell
FROM:	Brian Johnson, El
RE:	Home Road Planned Commercial District – Engineering Feasibility Memorandum
CC:	Shawn Goodwin, PE; Ollie Damschroder

In addition to the Preliminary Development Plan (PDP) package submitted for the above referenced project, this memorandum provides further clarification on utility service, access and traffic for the project.

#### Sanitary Sewer

Gravity sanitary sewer service for the subject property is available from the existing 12" sanitary sewer and manhole in the northwest corner of the Home Road/Shasta Trail intersection. A proposed 12" sanitary sewer extension along the north side of Home Road, then south into the property will be provided with this project for sewer service. Per correspondence with the Delaware County Regional Sewer District (DCRSD), the existing 12" sanitary sewer has the capacity to service the project and proposed densities. See "Attachment A" for a sewer capacity letter dated February 2, 2021 from DCRSD.

#### <u>Water</u>

Water service for the subject property will be provided by the existing 12" Del-Co watermain on the north side of Home Road. A public watermain extension will be provided into the property, then split into private systems to service the property. See "Attachment B" for a water capacity letter dated February 15, 2021 from Del-Co Water.

#### Home Road Access

A memorandum of understanding (MOU) to establish the scope of a Traffic Impact Study (TIS) was approved by the Delaware County Engineer's Office (DCEO) on April 22, 2019. After approved of the MOU, the TIS was completed on July 12, 2019 and provided to the DCEO for review. At the time of the initial TIS in 2019, the DCEO was beginning a Home Road Capital Improvement Project (CIP) to widen Home Road. We coordinated our efforts with this project to potentially incorporate our improvements within the Home Road CIP. At this time our project was put on hold. We are currently in the process of revising our MOU to re-establish a TIS scope with the DCEO and make it current. We will be resubmitting the MOU and coordinating on a revised TIS in the next few weeks and will keep City staff engaged in our discussion with the DCEO.

In addition to the TIS, we evaluated the proposed curb cut for Intersection Sight Distance (ISD) for both passenger cars and semi-trucks. Per ODOT ISD requirements, sight distance is compromised when looking west towards the Home Road overpass for semi-truck traffic. The proposed use has minimal semi-truck traffic and can accommodate the required ISD for the curb cut.

## **Attachment A**



## **Delaware County**

**Regional Sewer District** 

**Executive Director** Michael A. Frommer, P.E. **Director/Sanitary Engineer** Tiffany M. Maag, P.E.

February 2, 2021

Shawn Goodwin, P.E. American Structurepoint Inc. 2550 Corporate Exchange Drive Suite 300 Columbus, OH 43231 sent via email: <a href="mailto:sgoodwin@structurepoint.com">sgoodwin@structurepoint.com</a>

Re: **Request for Sewer Capacity** 3041 Home Road Parcel: 31924001004000, 31924001005001, 31924001068004

Dear Mr. Goodwin:

The Delaware County Regional Sewer District (the "County") has considered your request for approval to discharge sanitary sewage into the Delaware County Sanitary Sewer System from the above referenced location, representing 283 Equivalent Residential Unit(s) (ERU).

Capacity is available to serve the proposed development. Extensions from the existing sanitary sewer on the north side of Home Road will be necessary to provide service to the proposed buildings.

The current assessment of capacity availability is subject to periodic reevaluation by the County and shall not be valid after 18 months from the date of this letter.

If you have any questions, please feel free to contact me.

Sincerely,

Kelly Thiel

Kelly Thiel Staff Engineer III Delaware County Regional Sewer District

cc: Correspondence File

## **Attachment B**

Officers TIMOTHY D. McNAMARA President DAVID A. BENDER Vice President ROBERT W. JENKINS Secretary G. MICHAEL DICKEY Treasurer GLENN MARZLUF General Manager/CEO SHANE CLARK Chief Operating Officer



6658 OLENTANGY RIVER ROAD DELAWARE, OHIO 43015 www.delcowater.org Phone (740) 548-7746 + Fax (740) 548-6203 Directors BRUCE A. BLACKSTON BRIAN P. COGHLAN WILLIAM E. COLE DOUGLAS D. DAWSON J. MICHAEL SHEETS PERRY K. TUDOR

February 15, 2021

Shawn Goodwin American Structurepoint, Inc. 2550 Corporate Exchange Drive Suite 300 Columbus, Ohio 43231 Via Email: sgoodwin@structurepoint.com

RE: Water Availability – Redwood Home Road

Dear Mr. Goodwin:

As requested, this is to inform you that Del-Co Water can provide water service to the site described below upon plan approval and payment of the required fees:

Development: Redwood Home Road Proposed Land Use: ±331 multi-family units, 134 room skilled care/assisted living facility, and commercial outlot(s) Location: Southeast corner of Home Road and railroad tracks across from Old Liberty Rd. Land Size: ±70 acres

This site can be served from an existing 12-inch waterline located on Home Road

This letter of water availability is valid for a period of one year from the date of this letter. Del-Co makes no guarantee of water availability beyond this period. Contact our Engineering Department if you have any questions on the plan review process, or our Customer Service Department for information on tap fees.

Sincerely, DEL-CO WATER COMPANY, INC.

7 00

Shane F. Clark, P.E. Deputy General Manager



## **Attachment C**


CALE: 1:1 EDIT DATE: 2/17/21 - 8:11 AM EDITED BY: BJOHNSON DRAWING FILE: \\COLUFS2\PROJECTS\2018\01836\D. DRAWINGS\CIVIL\EXHIBITS\\SD EXHIBIT\2021-02-17 INTERSECTION SITE DISTANCE.













AC	Air Conditioner		
Ø	Concrete Moument Found		
D	Drain		
Ø	Drainage Inlet Square		
E	Electric Box		
Ø	Electric Meter		
€	Guy Wire		
ĴI.P.F.	Iron Pin & Cap Found		

P.F.	Iron Pin Found
P.S.	Iron Pin Set
.F.	Iron Pipe Found
	Post
	Power Pole
	Sanitary Manhole
	Sign
	Storm Manhole



**BASIS OF BEARINGS** 

SCALE: 1"=60'

Bearings described hereon are based on South 86 degrees 21 minutes 27 seconds East for the centerline of right-of-way for Home Road, measured from Grid North, referenced to the Ohio State Plane Coordinate System (North Zone) and the North American Datum of 1983 (2011 Adjustment), as established utilizing a GPS survey and an NGS OPUS solution.

To the best of my knowledge and belief there are no gaps or cores between Parcels I, II, III, and IV.

# ALTA/NSPS LAND TITLE SURVEY STATE OF OHIO, COUNTY OF DELAWARE, TOWNSHIP OF LIBERTY QUARTER SECTION 2 TOWNSHIP 3 NORTH, RANGE 19 WEST, FARM LOTS 1 & 2, UNITED STATES MILITARY LANDS

AC	Air Conditioner	<b>○</b> Ⅰ.₽.F.
0	Concrete Moument Found	●1.P.S.
D	Drain	⊚P.F.
Ø	Drainage Inlet Square	٠
E	Electric Box	ф
Ø	Electric Meter	0
€	Guy Wire	4
()I.P.F.	Iron Pin & Cap Found	0





#### BASIS OF BEARINGS

Bearings described hereon are based on South 86 degrees 21 minutes 27 seconds East for the centerline of right-of-way for Home Road, measured from Grid North, referenced to the Ohio State Plane Coordinate System (North Zone) and the North American Datum of 1983 (2011 Adjustment), as established utilizing a GPS survey and an NGS OPUS solution.



T SCALE: 1:1 EDIT DATE: 6/7/19 - 8:08 AM EDITED BY: AJORDAN DRAWING FILE: O:\2018\01836\D. DRAWINGS\SURVEY\201801836.SV.2019-04-01.LTS.DWG

×	Redwood	44.4		distinctive living
	STRUCTUREPOINT		2550 Corporate Exchange Drive   Suite 300 Columbus, Ohio 43231 TFI 614 901 2235   FAX 614 901 2236	www.structurepoint.com
	ALTA/NSPS LAND TITLE SURVEY	REDWOOD - HOME ROAD	POWELL, DELAWARE COUNTY, OHIO	
APPROVED DATE				
DESCRIPTION				
REVISIONS DATE SHEET NO.				
DATE	<u>:</u> WN BY	06/07	7/2019	
CHE	CKED BY: NUMBER:	BPB 2018	.01836 -2	



	Redwood			distinctive living
			2550 Corporate Exchange Drive   Suite 300 Columbus, Ohio 43231 TEL 644 004 3325   EAV 644 004 3326	recontructurepoint.com
	ALTA/NSPS LAND TITLE SURVEY	<b>REDWOOD - HOME ROAD</b>	POWELL, DELAWARE COUNTY, OHIO	
PROVED DATE				
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DATE		06/0	7/2019	
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C II INE S S I. N

SURVEYOR'S NOTES	LEGAL DESCRIPTION
1. This plat of an ALTA/NSPS LAND TITLE SURVEY is based upon the First American Title Insurance	Parcel I
Company commitment for title insurance having Commitment No. 451-010069 and the effective date of May 17, 2019 at 8:00 am issued by America Land Title Affiliates, LLC	Situated in the Township of Liberty follows:
<ol> <li>No comment is made regarding the following Exceptions in Schedule BII of the commitment for title insurance: 1 - 11, 22 - 26.</li> </ol>	Being in Range 19, Township 3, Se
3. The following notes are keyed the Exceptions in Schedule B - Section II of the above reference commitment for title insurance and pertain only to the location of the item in relation to the subject premises. The undersigned makes no assumptions or assertions as to what rights exist or do not exist as described in the	Thence S. 2° 19' W. along the section
below documents.	Thence N. 87° 40' W. 25.00 feet to a
Item 12: Easement granted to The Marion-Reserve Power Company, recorded May 31, 1946, in Volume 215, Page 83. (as to Parcels I, II, III, and IV).	Thence N. 2° 19' E. 1335.20 feet to a iron pipe (found) at 1305.20 feet;
<b>Surveyor's Notes:</b> Easement affects subject property and is blanket in nature, affects parcels I, II & III covering the lands within Farm Lot 2, see plat.	Thence S. 87° 40' E. along the cen 0.766 acres, be the same more or le
Item 13: Easement for Pole Line Along granted to Columbus and Southern Ohio Electric Company, recorded June 23, 1959, in Volume 283, Page 130. (as to Parcels I, II, III, and IV).	Parcel II
<b>Surveyor's Notes:</b> Easement affects subject property and is blanket in nature, affects parcels I, II & III, exact location is unclear, nothing to plat.	Situated in the Township of Liberty follows <sup>.</sup>
Item 14: Right of Way and Easement granted to Columbus and Southern Ohio Electric Company, recorded November 13, 1964, in Volume 314, Page 633. (as to Parcel III). <i>Surveyor's Notes:</i> Easement affects parcel III of subject property, 20' easement, see plat.	Being in Range 19, Township 3, Se on the Easterly right-of-way line of
Item 15: Easement granted to Columbus and Southern Ohio Electric Company, recorded December 15, 1964, in Deed Volume 315, Page 383. (as to Parcels I, II, III, and IV).	right-of-way line of C&O Railroad;
Surveyor's Notes: Easement affects parcel III of subject property, 10' easement, see plat.	Thence S. 87° 40' E. 838.74 feet to 813.74 feet;
Item 17: Easement and Reservation recorded February 11, 2010, in Official Record Book 952, Page 672. (as to Parcels I, II, and III) <b>Surveyor's Notes:</b> Affects subject parcel, 21-WDV was a warranty deed take by eminent domain, 21-CHV	Thence S. 2° 19' W. along the Easter feet;
affects parcel III of subject property, see plat, 21-SV affects parcels II & III of subject property, see plat, 21-TV has expired and is no longer affecting subject property.	Thence N 87° 44' W. 824.37 feet to a
Item 18: Deed Recital recorded November 30, 2011, in Book 1084, Page 398. (as to Parcels I, II, III, and IV). <b>Surveyor's Notes:</b> Affects all buildings on parcels II & III with reservation subject to the terms and	Thence along the Easterly right-of-w bears N. 0° 50' 30" E. 503.08 feet, a
conditions of a Ground Lease, see plat.	Thence N. 2° 09' E. 677.35 feet to th
August 06, 2013, in Book 1239, Page 252. (as to Parcels I, II, III, and IV). Survevor's Notes: Easement affects parcel III of subject property. 20' easement, see plat.	Parcel III
Item 20: Reservation, Lease and the terms, covenants and conditions thereof between Breagha Plana II,	Situated in the State of Ohio, Coun Section 2, and part of Lot 2, U.S. Mil
November 30, 2011, in Book 1084, Page 404. (as to Parcel II & III). Surveyor's Notes: Easement affects parcel III of subject property, building lease area and ingress/egress over drive, see plat.	Beginning at a railroad spike set on Road; said point of beginning bears centerline of County Road No. 124 a
Easement not listed in title report to Columbus and Southern Ohio Electric Company recorded May 19, 1964, in Deed Volume 311, Page 190. (as to Parcel IV). Electric Lines Easement blanket in nature as called out for an average valuation man page V 2 HV/15 for The Heaking Volley BV CO for dead of accompant from	Thence South 2 degrees, 10' West iron pipe at 30.00 feet;
Chesapeake and Ohio Railway Company with reference to the lands in Deed Volume 199, Page 38, with references to the lands in Deed Volume 175, Page 29.	Thence North 87 degrees, 40' West and Ohio Railroad;
<ol> <li>The purpose of this survey was to prepare an ALTA/NSPS Land Title Survey for the site.</li> </ol>	Thence North 2 degrees 09' East al the centerline of County Road No. 12
5. This plat of an <b>ALTA/NSPS LAND TITLE SURVEY</b> represents the conditions of the site on: March 17, 2019 (date of latest field activity).	Thence South 87 degrees 40' East beginning, containing 25.00 acres of
6. The accuracy of any flood hazard data shown on this survey is subject to map scale uncertainty and to any	Parcel IV
other uncertainty in location or elevation on the referenced Flood Insurance Rate Map. Flood Insurance Rate Map having Community-Panel Number 39041C0229K (effective date April 15, 2009) of the National	Situated in the State of Ohio, Count

- Flood Insurance Program indicates this site to be within zones "AE" (areas determined to be within the regulatory floodway), "AE" (areas determined to be within the 100 year flood plain), "X" (areas within the 500 year flood plain), and "X" (areas determined to be outside 500-year floodplain)
- 7. Encroachments:

There are no known encroachments to show.

8. The subject property is adjacent to the rights-of-way for Home Road (CR-124) (a public street) on the north with vehicular access.

9. Discussion of Certain ALTA Table A Items:

Item 6: No zoning information provided by client.

Item 9: There are currently 36 delineated parking spaces on the subject property.

Item 11: The locations of any underground utilities shown on this plat are based upon above ground evidence (including, but not limited to, manholes, inlets, and marks made on the ground by others) or plan information provided by the utility owners and are speculative in nature. There may be underground utilities for which there is no above ground evidence, for which the above ground evidence was not observed (i.e. buried or paved over), or for which no plans were provided.

> Observed evidence of Electric and Telecommunications (which may or may not include telephone, cable TV and fiber optic lines), Sanitary Sewer and Storm Drainage exist on or adjacent to the subject property.

Item 16: No observed evidence of building construction or earth moving work currently exists on site.

Item 17: The undersigned has not been made aware of any proposed changes to the public right-of-way width or location. There is no evidence of recent sidewalk construction.

Item 18: No wetlands areas were delineated by appropriate authorities. This survey only certifies that the undersigned was not made aware of any wetlands.

Item 19: The undesigned is not aware of any offsite easements or servitudes.

10. American Structurepoint, Inc. makes no warranty, either expressed or implied, as to our staking, findings, recommendations, plans, specifications, or professional advice except that the work was performed pursuant to generally accepted standards of practice and degree of care exercised by members of the same profession on projects of comparable size and complexity. As used in this survey, the word certify (certified, certification, and/or certificate) shall be interpreted as meaning a professional opinion regarding the conditions of those facts and/or findings which are the subject of the certification and does not constitute a warranty or guarantee, either express or implied.

11. This Plat of an ALTA/NSPS LAND TITLE SURVEY represents a survey made under my supervision and in compliance with the Minimum Standards for Boundary Surveys as established by Chapter 4733-37 of the Ohio Administrative Code with corners established as shown and is true and correct to the best of my knowledge.

r, County of Delaware and State of Ohio, and bounded and described as

ection 2, part of Lot 2, U.S. Military Lands. Beginning at a p.k. spike at the ware County Road, No. 124 and the East line of Section 2,

ion line 1335.20 feet to an iron pipe, passing over an iron pipe at 30.00 feet; an iron pipe (found);

a R.R. Spike on the centerline of Delaware County Rd. 124 passing over an

ess.

ection 2, part of Lot 2, U.S. Military Lands. Beginning at an iron pipe (found) f the Chesapeake and Ohio Railroad, said iron pipe being S. 2° 09' W. rsection with the centerline of Delaware County Rd. 124 and the Easterly

to an iron pipe on the East line of Section 2, passing over an iron pipe at

nty of Delaware and Township of Liberty. Being in Range 19, Township 3, ilitary Lands:

the centerline of County Road No. 124, known as the G.I.H. and Columbus North 87 degrees, 40' West 25.00 feet from the point of intersection of the and the section line between sections 2 and 1;

parallel with the section line, 1335.20 feet to an iron pipe, passing over an

t 813.74 feet to an iron pipe set on the right-of-way line of the Chesapeake

along the said East right-of-way line, 1335.20 feet to a railroad spike set on 24, passing over an iron pipe at 1305.20 feet;

ty of Delaware, City of Powell, located in Farm Lot 1, Section 2, Township 3 North, Range 19 West, United States Military Lands, and being part of a 40.636 acre tract conveyed to M/I Homes of Central Ohio LLC, as recorded in Official Record Volume 428, Page 1362, Delaware County Recorder's Office, and being more particularly described as follows:

Beginning, for reference, at a railroad spike found at the intersection of centerline of Rutherford Road (T.R. 122) with the East line of the CSX Transportation, Inc., marking the Southwest corner of said 40.636 acre tract;

Thence North 10° 53' 41" West 748.16 feet, along the Westerly line of said 40.636 acre tract and East line of the CSX Transportation, Inc., to an iron pin found;

Thence North 08° 35' 08" West 1154.01 feet along the Westerly line of said 40.636 acre tract and East line of the CSX Transportation, Inc., to an iron pin set marking the PRINCIPAL PLACE OF BEGINNING of the herein described tract;

Thence continuing North 08° 35' 8" West 387.06 feet, along the Westerly line of said 40.636 acre tract and East line of the CSX Transportation, Inc., to an iron pin found;

Thence North 04° 13' 20" West 782.01 feet, along the Westerly line of said 40.636 acre tract and East line of the CSX Transportation, Inc., to an iron pin found;

Thence North 35° 19' 13" East 36.89 feet, along the Westerly line of said 40.636 acre tract and East line of the CSX Transportation, Inc., to an iron pin found;

Thence North 23° 58' 01" East 95.92 feet, along the Westerly line of said 40.636 acre tract and East line of the CSX Transportation, Inc., to an iron pin found;

Thence North 02° 03' 16" East 195.96 feet, along the Westerly line of said 40.636 acre tract and East line of the CSX Transportation, Inc., to an iron pin found marking the Northwest corner of said 40.636 acre tract and Southwest corner of a 22.61 acre tract (Parcel II) conveyed to G. Frederick Smith Chemical Company, as recorded in Deed Book 420, Page 32;

Thence South 86° 24' 15" East 708.91 feet, along the North line of said 40.636 acre tract and South line of said 22.61 acre tract, to an iron pin found in the East line of Farm Lot 1 and West line of a 25.248 acre tract (Parcel III) conveyed to G. Frederick Smith Chemical Company, recorded in Deed Book 420, Page 32, marking the Northeast corner of said 40.636 acre tract and Southeast corner of 22.61 acre tract;

Thence South 04° 15' 04" West 973.92 feet, along the East line of said 40.636 acre tract and Farm Lot 1 and West line of said 25.248 acre tract and a 51.3172 acre tract conveyed to Board of Trustees Liberty Township, as recorded in Official Record 32, Page 1888, to an iron pin found marking the Southwest corner of said 51.3172 acre tract and the Northwest corner of a 21.070 acre tract conveyed to Board of Education of the Olentangy Local School District, as recorded in Deed Book 667, Page 663;

Thence South 02° 31' 40" West 780.39 feet, along the East line of said 40.636 acre tract and Farm Lot 1 and West lines of said 21.070 acre tract and a 28.094 acre tract conveyed to Board of Education of the Olentangy Local School District, as recorded in Deed Book 667, Page 278, to an iron pin set (passing an iron pin found at 668.33 feet);

Thence along the arc of a curve 638.84 feet turning to the right (delta angle = 43° 20' 15", radius = 864.43 feet), with a chord bearing and distance of North 60° 00' 16" West 638.36 feet, across said 40.636 acre tract, to the principal place of beginning, containing an area of 25.248 acres.

LESS AND EXCEPTING FROM PARCELS I AND III ABOVE:

Situated in the State of Ohio, County of Delaware, Township of Liberty, being a part of Farm Lot 2 in Section 2, Township 3 North, Range 19 West, United States Military Lands and being a part of record 13.820 acre and 25.00 acre parcels conveyed to G. Frederick Smith Chemical Company as recorded in Book 420, Page 32 in the records of Delaware County, being a parcel of land lying on the right and left sides of the centerline of Right of Way and Construction of DEL-CR124-4.11 (Home Road) and bounded and described as follows:

Beginning at the intersection of the centerline of County Road 124 (home Road) and the East line of said Farm Lot 2, said point located 22.83 feet left of station 240+13.09 of a proposed County Road 124 and being the TRUE POINT OF BEGINNING for the parcel herein described;

1) Thence South 03 degrees 36 minutes 05 seconds West along the East line of said Farm Lot 2 a distance of 122.74 feet to an iron pin set, located 99.18 feet right of station 239+99.55 of proposed County Road 124;

nter line of said County Rd. 25.00 feet to the point of beginning, containing

v, County of Delaware and State of Ohio, and bounded and described as

erly line of Section 2,1177.79 feet to a post, passing over a stone at 421.64

a steel post on the Easterly right-of-way line of the C&O Railroad;

way line of said railroad with a 0° 30' curve to the right which the long chord an arc distance of 504.11 feet to an iron bolt to the point of tangency;

he point of beginning, containing 22.61 acres, be the same more or less.

t along the centerline of County Road No. 124, 817.53 feet to the point of f land, be the same more or less.

2) Thence South 85 degrees 10 minutes 23 seconds West a distance of 715.67 feet to an iron pin set, located 150.00 feet right of station 233+00.00 of proposed County Road 124;

3) Thence North 86 degrees 22 minutes 05 seconds West a distance of 134.55 feet to an iron pin set, located 150.00 feet right of station 233+00.00 of proposed County Road 124;

4) Thence North 03 degrees 28 minutes 47 seconds East along the East line of the CSX Railroad, a distance of 228.00 feet to the centerline of existing County Road 124, said point located 77.99 feet left of station 231+64.84 of proposed County Road 124;

5) Thence South 86 degrees 21 minutes 56 seconds East along the centerline of existing County Road 124 a distance of 832.39 feet to a point located 23.93 feet left of station 240+02.63 of proposed County Road 124;

6) Thence South 86 degrees 38 minutes 27 seconds East along the centerline of existing County Road 124 a distance of 10.58 feet to the point of beginning and enclosing an area of 3.555 acres, more or less.

Of the above described tract, 3.484 acres is located in Auditor's Permanent Parcel Number 319-240-01004-000 which includes 0.563 acres in the present road occupied and 0.071 acres is located in Auditor's Permanent Parcel Number 319-240-01-005-000 which includes 0.017 acres in the present road occupied.

Monuments referred to as iron pins set are 3/4 inch diameter x 30 inch long iron bars with a 1-1/2 inch diameter aluminum cap marked "R/W LS #7819".

Bearings used in this description are based on the Ohio Lambert Projection North Zone Plane Coordinate System as established by the National Geodetic Survey, North American Datum of 1983 (1995 adjustment) from GPS observations made by American Consulting, Inc.

Stations referred to herein are from the centerline of survey of proposed County Road 124 as found on Delaware County Engineer's Office Right of Way Plan DEL-CR124-4.11.

The description was prepared and reviewed on July 17, 2006 by Charles P. Unterreiner, P.S. 7819 from a survey made by American Consulting, Inc. in 2003.

-	Kedwood			distinctive living
	STRUCTUREPOINT		2550 Corporate Exchange Drive   Suite 300 Columbus, Ohio 43231	I EL 614.901.2230   FAX 614.901.2236 www.structurepoint.com
	ALTA/NSPS LAND TITLE SURVEY	REDWOOD - HOME ROAD	POWELL, DELAWAKE COUNTY, OHIO	
APPROVED DATE				
DESCRIPTION				
REVISIONS DATE SHEET NO.				
DATE:		06/0	7/2019	
	N BY: (ED BY: JMBER:	ATJ BPB 2018	01836 <b>- 4</b>	<u>∂</u>



CONCEPTUAL PLANT PALETTE			
SYMBOL	BOTANICAL NAME	COMMON NAME	
DECIDUOUS	S TREES		
AM GR	Amelanchier x grandiflora 'Autumn Brilliance"	Autumn Brilliance Serviceberry	
AC FR	Acer x. freemanii 'Autumn Blaze'	Autumn Blaze Maple	
GL TR	Gleditsia triacanthos f. i. 'Skyline'	Skyline Honeylocust	
LI TU	Liriodendron tulipifera	Tulip Tree	
MA VI	Magnolia virginiana	Sweetbay Magnolia	
QU CO	Quercus coccinea	Scarlet Oak	
QU MU	Quercus muehlenbergii	Chinkapin Oak	
UL PA	Ulmus x 'Patriot'	Patriot Elm	
EVERGREEN TREES			
PI AB	Picea abies	Norway Spruce	
PI GL	Picea glauca	White Spruce	
PI OM	Picea omorika	Serbian Spruce	
SHRUBS, ORNAMENTAL GRASSES			
СН СО	Chamaecyparis p. compacta variegata	Dwarf Variegated False Cypress	
HY PA	Hydrangea paniculata 'Limelight'	Limelight Hydrangea	
PE HA	Pennisetum a. 'Hameln'	Dwarf Fountain Grass	
PE LB	Pennisetum a. 'Little Bunny'	Little Bunny Fountain Grass	
** Plant palette meant for conceptual use only, not limited to list above.			

EXISTING TREES TO REMAIN

## ZONING REQUIREMENTS - RESIDENTIAL AREA

1145.30(A)(1) MINIMUM REQUIRED TREES - ALL RESIDENCES AND RESIDENTIAL LAND USES, PER DWELLING UNIT: 1/2" IN TRUNK DIAMETER FOR EVERY 150 SQUARE FEET OR FRACTION THEREOF OF BUILDING GROUND COVERAGE, WITH A MINIMUM OF 11/2" OF TOTAL TRUNK DIAMETER:

REDWOOD UNITS: 1700 - 1800 SF EACH = 6" OF TREE CAL. PER UNIT REQUIRED PROPOSED UNITS: 331 = (6X331)/2 = 993

REQUIRED: (933) 2" CAL. TREES

PROPOSED: 861 TREES (MIX OF DECIDUOUS AND EVERGREEN, MIN 2" CAL. AND 6' HT) IN ADDITION TO  $\pm$ 13 AC PRESERVED WOODLANDS + WETLANDS

## ZONING REQUIREMENTS - COMMERCIAL AREA

**1145.30(A)(3) MINIMUM REQUIRED TREES** - ALL OFFICE USES, INSTITUTIONAL USES, CONVALESCENT AND NURSING HOMES AND CHILD DAY-CARE FACILITIES, INCLUDING RELATED PARKING, LOADING AND TRASH STORAGE AREAS OVER 19,501 SQUARE FEET: A TOTAL TRUNK DIAMETER BEGINNING AT 28", PLUS 1" OF TRUNK DIAMETER FOR EVERY 2,000 SQUARE FEET OVER 19,500 SQUARE FEET OR FRACTION THEREOF

LOT #1 & LOT #2 BUILDINGS: TOTAL 97,200 SF (97,200 SF - 19,500)/2000 = (39 + 28)/2 = 34

7,200 SF - 19,500)/2000 = (39 + REQUIRED: (34) 2" CAL. TREES

PROPOSED: 70 TREES (MIX OF DECIDUOUS AND EVERGREEN, MIN 2" CAL. AND 6' HT)

**1145.31 - REQUIRED LANDSCAPING OF PARKING AREAS** - PARKING AREAS WITH MORE THAN TEN PARKING SPACES REQUIRE NO LESS THAN ONE DECIDUOUS TREE OF ONE AND ONE-HALF INCH TRUNK DIAMETER OR MORE, MEASURED 24 INCHES FROM THE GROUND, FOR EVERY EIGHT PARKING SPACES. NO MORE THAN EIGHT PARKING SPACES SHALL BE PROVIDED SIDE-BY-SIDE IN ANY AISLE WITHOUT INTERJECTION OF SUCH A "PLANTING BAY".

LOT #1: 69 PARKING SPACES: REQUIRED (69/8): 9 TREES PROPOSED: 20 TREES

LOT #2: 85 PARKING SPACES: REQUIRED (85/8): 11 TREES PROPOSED: 22 TREES

**1145.32 - REQUIRED LANDSCAPING AROUND BUILDING FOUNDATIONS** -ALL NONRESIDENTIAL BUILDINGS IN RESIDENTIAL ZONING DISTRICTS SHALL BE PLANTED: AT A MINIMUM, AT LEAST 70 PERCENT OF THE LINEAL FOOTAGE AROUND THE PERIMETER OF A STRUCTURE SHALL BE LANDSCAPED IN THIS MANNER. A MINIMUM OF FIVE SHRUBS SHALL BE PLANTED IN EVERY 40 FEET OF LINEAL BUILDING PERIMETER. A MINIMUM OF TEN PERENNIAL OR ANNUAL PLANTS AND/OR FLOWERS SHALL BE PLANTED IN EVERY 40 FEET OF LINEAL BUILDING PERIMETER. LOT #1: 770 LF

REQUIRED: 770 LF / 40 = 19x5 = 96 SHRUBS 770 LF / 40 = 19x10 = 190 PLANTS PROPOSED:  $\pm 3,130$  SF MIXTURE OF SHRUBS, PERENNIALS, AND ORNAMENTAL GRASSES

LOT #1: 1440 LF

REQUIRED: 1440 / 40 = 36x5 = 180 Shrubs 1440 / 40 = 36x10 = 360 Plants PROPOSED:  $\pm 4,660$  SF MIXTURE OF SHRUBS, PERENNIALS, AND ORNAMENTAL GRASSES



### Columbus

100 Northwoods Blvd, Ste A Columbus, Ohio 43235 p 614.255.3399

#### Cincinnati

20 Village Square Floor 3 Cincinnati, Ohio 45246 p 614.360.3066

**POD**design.net

# Project Name Home Road Planned Commercial District

Home Road Powell, Ohio 43065

### Prepared For



Redwood Living 7007 Pleasant Valley Rd. Independence, OH 44131

#### Project Info

Project # Date By Scale 18067 02/19/21 ZM, SO, TF As Noted

Revisions

Sheet Title

# OVERALL LANDSCAPE PLAN

NOTE: THE PLAN AS SHOWN IS CONCEPTUAL IN NATURE AND IS PROVIDED TO ILLUSTRATE DESIRED LAYOUT AND QUALITY OF THE PROJECT. FINAL LAYOUT AND LANDSCAPING ARE SUBJECT TO CHANGE BASED UPON FINAL ZONING APPROVAL AND ENGINEERING.







PROPOSED DECIDUOUS TREE

PROPOSED ORNAMENTAL TREE





. . . . . . . . . . . . .

PROPOSED FOUNDATION PLANTING (SHRUBS AND PERENNIALS)

EXISTING TREES TO REMAIN



Columbus 100 Northwoods Blvd, Ste A Columbus, Ohio 43235 р 614.255.3399

Cincinnati 20 Village Square Floor 3 Cincinnati, Ohio 45246 p 614.360.3066

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# Project Name Home Road Planned Commercial District

Home Road Powell, Ohio 43065

### **Prepared For**



Redwood Living 7007 Pleasant Valley Rd. Independence, OH 44131

### Project Info

Project # Date By Scale

18067 02/19/21 ZM, SO, TF As Noted

Revisions

### Sheet Title

COMMERCIAL SUBAREA A LANDSCAPE PLAN

EX. H-1

Sheet #





PROPOSED DECIDUOUS TREE

PROPOSED ORNAMENTAL TREE



. . . . . .

. . . . .

PROPOSED EVERGREEN TREE

EXISTING TREES TO REMAIN

# MAPLE GLEN NEIGHBORHOOD

\*Not exclusive to these specific Maple species, for design intent only.



Acer rubrum Red Maple



Acer rubrum Red Maple



Acer saccharum Sugar Maple



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**Cincinnati** 20 Village Square Floor 3 Cincinnati, Ohio 45246 p 614.360.3066

**POD**design.net

# Project Name Home Road Planned Commercial District

Home Road Powell, Ohio 43065

Prepared For				

Redwood Living 7007 Pleasant Valley Rd. Independence, OH 44131

# Project InfoProject #18067Date02/19/21ByZM, SO, TFScaleAs Noted

Revisions

Sheet Title
LANDSCAPE
PLAN
ENLARGEMENT
- NORTH







PROPOSED DECIDUOUS TREE

PROPOSED ORNAMENTAL TREE



. . . . .

PROPOSED EVERGREEN TREE

EXISTING TREES TO REMAIN

#### OAK GROVE NEIGHBORHOOD \*Not exclusive to these specific Oak species, for design intent only.



Red Oak



Quercus rubrum Red Oak



White Oak



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**Cincinnati** 20 Village Square Floor 3 Cincinnati, Ohio 45246 p 614.360.3066

**POD**design.net

# Project Name Home Road Planned Commercial District

Home Road Powell, Ohio 43065

Pre	pared	For



Redwood Living 7007 Pleasant Valley Rd. Independence, OH 44131

Project Info	
Proiect #	18067
Date	02/19/21
Ву	ZM, SO, TF
Scale	As Noted

Revisions

Sheet Title
LANDSCAPE
PLAN
ENLARGEMENT
- CENTRAL







PROPOSED DECIDUOUS TREE

PROPOSED ORNAMENTAL TREE



. . . . .

PROPOSED EVERGREEN TREE

EXISTING TREES TO REMAIN

# ELMWOOD NEIGHBORHOOD

\*Not exclusive to these specific Elm species, for



Ulmus americana 'Princeton' Princeton Elm



Princeton Elm



Ulmus parvitolia Lacebark Elm



**Columbus** 100 Northwoods Blvd, Ste A Columbus, Ohio 43235 p 614.255.3399

**Cincinnati** 20 Village Square Floor 3 Cincinnati, Ohio 45246 p 614.360.3066

**POD**design.net

# Project Name Home Road Planned Commercial District

Home Road Powell, Ohio 43065

Pre	pai	red	For



Redwood Living 7007 Pleasant Valley Rd. Independence, OH 44131

Project Info	
Project #	18
Date	02
Ву	Z١
Scale	As

••

18067 02/19/21 ZM, SO, TF As Noted

Revisions

Sheet Title
LANDSCAPE
PLAN
ENLARGEMENT
- SOUTH









Columbus 100 Northwoods Blvd, Ste A Columbus, Ohio 43235 p 614.255.3399

Cincinnati 20 Village Square Floor 3 Cincinnati, Ohio 45246 p 614.360.3066

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# Project Name Home Road Planned Commercial District

Home Road Powell, Ohio 43065

**Prepared For** 

Redwood Living

7007 Pleasant Valley Rd. Independence, OH 44131

Redwood

Project # 18067 Date 02/19/21	Project Info	
By ZM, SO, TF Scale As Noted	Project # Date By Scale	18067 02/19/21 ZM, SO, TF As Noted

Revisions

# Sheet Title SIGNAGE PLAN







**Columbus** 100 Northwoods Blvd, Ste A Columbus, Ohio 43235 p 614.255.3399

**Cincinnati** 20 Village Square Floor 3 Cincinnati, Ohio 45246 p 614.360.3066

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# Project Name Home Road Planned Commercial District

Home Road Powell, Ohio 43065

#### **Prepared For**



Redwood Living 7007 Pleasant Valley Rd. Independence, OH 44131

#### Project Info

Project # Date By Scale 18067 02/19/21 ZM, SO, TF As Noted

Revisions

# Sheet Title TYPICAL UNIT LANDSCAPE PLAN

## PLANTING LEGEND



 $\bigcirc \textcircled{}$ 

PROPOSED ORNAMENTAL TREE

PROPOSED DECIDUOUS TREE

DECIDUOUS SHRUBS EVERGREEN SHRUBS





THE AMOUNT OF PRUNING SHALL BE LIMITED TO 1/3 OF THE BRANCHES TO COMPENSATE FOR LOSS OF ROOTS FROM TRANSPLANTING. REMOVE DEAD AND INJURED LIMBS. REMOVE BURLAP AND WIRE OR TWINE FROM TOP AND SIDES OF BALL. CENTER SHRUB IN HOLE. SET TOP OF BALL 1-3" ABOVE FINISH GRADE.



#### Columbus 100 Northwoods Blvd, Ste A Columbus, Ohio 43235 p 614.255.3399

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Home Road Powell, Ohio 43065

District

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Redwood Living 7007 Pleasant Valley Rd. Independence, OH 44131

Project Info

Project # Date By Scale

18067 02/19/21 ZM, SO, TF As Noted

Revisions

Sheet Title PLANTING DETAILS

Sheet #	
EX.	



# STREET PERSPECTIVE

# POWELL

Healthcare Center Powell, Ohio

25000 Country Club Blvd Suite 255 N. Olmstead, Ohio 44070



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# POWELL

Healthcare Center Powell, Ohio

25000 Country Club Blvd Suite 255 N. Olmstead, Ohio 44070



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# DRIVE PERSPECTIVE







# POWELL

Healthcare Center Powell, Ohio

25000 Country Club Blvd Suite 255 N. Olmstead, Ohio 44070



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# BUILDING 1







# POWELL

Healthcare Center Powell, Ohio

25000 Country Club Blvd Suite 255 N. Olmstead, Ohio 44070



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# BUILDING 2







Redwood







Home Rd Planned Commercial District Architectural Design Criteria Subarea B | 02.19.2021

EX. N-1









Redwood



EXTERIOR FINISH MATERIAL SELECTIONS				
	ITEM	MATERIAL/STYLE	COLOR	
1	DECORATIVE LOUVER	VINYL	WHITE	
2	ASPHALT SHINGLES	DIMENSIONAL 30 YEAR LAMINATED	WEATHERED WOOD	
3	GUTTERS AND DOWNSPOUTS	PREFINISHED ALUMINUM	WHITE	
4	horizontal Siding	VINYL	VARIES	
5	Shake siding	VINYL	VARIES	
6	CORNER TRIM	COMPOSITE	WHITE	
7	STONE VENEER	PRESTIGE	OHIO WHITE VEIN	
8	OVERHEAD GARAGE DOOR	RAISED PANEL PAN STEEL	WHITE	
9	SINGLE HUNG WINDOW	VINYL	STANDARD WHITE	
10	SLIDING PATIO DOOR	VINYL	WHITE	
11	SUNROOM PORCH COACH LIGHT	METAL & GLASS	BLACK	
12	WALL PACK LIGHT	METAL & GLASS	BLACK	
13	COLUMN	VINYL	WHITE	
14	LOUVER	ALUMINUM	BROWN	
15	PRIVACY FENCE	VINYI	WHITE	

# Architectural Materials























# <u>SIDING COLORS - BY NORANDEX</u>







FRONT: <u>RUSSET</u>

SIDES AND REAR: <u>SIERRA</u>

FRONT: <u>OLIVE</u> NOTES:

FRONT: <u>MOCHA</u>

BUILDING FRONT SIDING COLORS WILL VARY BETWEEN THE ABOVE 5 OPTIONS
 SHAKES BY FOUNDRY SPECIALTY SIDING - TO MATCH SIDING COLORS



# **Traffic Impact Study**

Redwood Home Road Development Redwood Acquisition LLC

July 12, 2019



2550 CORPORATE EXCHANGE DRIVE, SUITE 300 COLUMBUS, OHIO 43231 614.901.2235

www.structurepoint.com



## Traffic Impact Study Redwood Home Road Development

Prepared for

# **Redwood Acquisition, LLC**



American Structurepoint, Inc. 2550 Corporate Exchange Drive, Suite 300 Columbus, OH 43231 Tel 614.901.2235 Fax 614.901.2236

I certify that this Traffic Impact Study has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.

Jeremy Chapman, PhD, PTOE, PE Ohio Registration #84147



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- Appendix A Memorandum of Understanding and Site Plan
- Appendix B Raw Traffic Data
- Appendix C Trip Generation
- Appendix D Capacity Analysis Results
- Appendix E Turn Lane Warrant Analysis Results
- Appendix F Queue Analysis Results



### **Executive Summary**

#### **Study Purpose and Scope**

The purpose of this traffic study is to determine the operational impacts of the proposed Redwood residential development located in Delaware County, Ohio on the surrounding roadway network. This study identifies the effects of the proposed development and provides necessary recommendations for roadway improvements.

#### **Background Information**

The proposed 70-acre Redwood site is expected to have 334 dwelling units and would be located south of Home Road in Delaware County, OH. This facility will have 8 acres dedicated to a senior assisted-living facility while the remaining 62 acres is proposed as multi-family housing. The proposed development will occur in three phases with expected groundbreaking in late 2019 or early 2020.

#### **Traffic Forecast**

Intersection turning movement counts for this study were utilized from the recently completed OSU Southern Delaware County Ambulatory TIS report dated January 16, 2019. As agreed upon with Delaware County Engineer's Office, a linear annual growth rate of 3.0% was applied to each roadway to determine the opening year (2020) and horizon year (2040) background volumes. Additional site trips generated from proposed developments in the OSU study were added to the projected background traffic to arrive at no-build scenario volumes for opening and horizon year scenarios. New site trips generated by the proposed Redwood development were added in to the no-build scenarios to determine the total traffic volumes for build scenarios.

#### **Capacity Analysis**

A capacity analysis was performed for all signalized and unsignalized study intersections in each scenario using Highway Capacity Software (HCS - Version 7). All analyses were reported using the methodology outlined in the Highway Capacity Manual (HCM 6).

Under the Delaware County Engineer's Office standards, development impacts that increase the average delay by more than 5 seconds (where LOS is D or worse) require mitigation. Capacity improvements have been identified for the locations not meeting this criteria.

#### **Findings and Recommendations**

Based on a review of the capacity analysis, queuing analysis, and turn lane warrants, the following improvements have been identified for the study intersections. These improvements are solely based on AM and PM peak hour operations of a typical weekday which is assumed to represent the worst-case.

#### Home Rd & Sawmill Pkwy

• This intersection operates at an acceptable LOS and delay in the opening year no-build scenarios (1A and 1B) in AM and PM peak hours.



- With the added Redwood development volumes (scenarios 2A and 2B), the AM peak operates at an acceptable LOS whereas the PM peak hour has certain failing movements which could not be mitigated with optimizing signal timings. An eastbound right turn lane was thus added to enable the intersection to operate at an acceptable LOS in the PM peak hour. With these improvements, the AM peak operates at a lower delay than before. The length of this added eastbound right turn lane for 2020 build scenarios was found to be 325' based on ODOT's Location and Design Manual and observed 95<sup>th</sup> percentile queues.
- The intersection starts failing in both the AM and PM peak hours for scenario 3 (2040 no-build). To mitigate this, the following improvements were needed:
  - Northbound Approach
    - Add an additional left turn lane (Turn lane length same as existing 600')
    - Convert existing shared thru-right lane to a thru lane,
    - Add a dedicated right turn lane (Turn lane length determined to be 415' for no-build and 455' for build)
  - Westbound Approach: Convert existing right turn lane to a shared thru-right turn lane.
  - Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario but turn lane length would be increased to 375')
  - Right-turn overlap phases would also be needed on all approaches.
- With these improvements, both no-build and build scenario in the horizon year would operate at LOS D with difference in delays not exceeding 5 seconds and thus not requiring any additional mitigation.

#### Home Rd & Liberty Rd N

- This intersection operates at an acceptable LOS and delay in the opening year no-build scenarios (1A and 1B) in AM and PM peak hours.
- With the added Redwood development volumes (scenarios 2A and 2B), the AM peak operates at an acceptable LOS whereas the PM peak hour has certain failing movements which could not be mitigated with optimizing signal timings. An eastbound right turn lane was thus added to enable the intersection to operate at an acceptable LOS in the PM peak hour. With these improvements, the AM peak operates at a lower delay than before. The length of this added eastbound right turn lane for 2020 build scenarios was found to be 430' based on ODOT's Location and Design Manual and observed 95<sup>th</sup> percentile queues.
- The intersection starts failing in the PM peak hours for scenario 3 (2040 no-build) with northbound approach failing in AM peak hour. To mitigate this, the following improvements were needed:
  - Westbound Approach: Convert existing shared thru-right lane to a thru lane, and add another shared thru-right lane.
  - Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario but with turn lane length increased to 480')

#### Home Rd & Liberty Rd N

• This intersection operates at an acceptable LOS and delay in the opening year build scenarios (2A and 2B) in AM and PM peak hours.



- Turn lane warrants performed showed that eastbound right and westbound left turn lanes are warranted for the horizon year build scenario. These turn lanes were taken in to consideration while analyzing the intersection and was found to be operating at an acceptable LOS in both peak hours.
- It is also assumed that Home Road would be converted to a 4 lane roadway between Sawmill Pkwy and Liberty Road.
- Turn lane lengths for eastbound right and westbound left turn lanes were estimated to be 225' and 180' respectively.



### **1.0 Study Purpose and Scope**

#### 1.1 Purpose

The purpose of this traffic study is to determine the operational impacts of the proposed Redwood development located in Delaware County, Ohio on the surrounding roadway network. This study identifies the effects of the proposed development and provides necessary recommendations for roadway improvements. The study area and existing lane configurations at the study intersections are shown on **Figure 1.1**.

#### 1.2 Scope

The study focuses on three intersections adjacent to the study area that are expected to carry the most traffic from this proposed development. The study intersections are listed in **Table 1.1**.

#### Table 1.1 – Study Intersections

No.	Intersection Name
1	Home Road & Sawmill Parkway
2	Home Road & Liberty Road N
3	Home Road & Access Road

Capacity analysis was performed for the scenarios listed in **Table 1.2**. The study scenarios focus on the opening year (2020), and the horizon year (2040) no-build and build traffic conditions. All scenarios account for the expected background traffic growth in the area including added trips from the OSU study.

#### Table 1.2 – Study Scenarios

			Traffic Volumes			
Scenario	Scenario Description	Year	Background Growth	Added Site Trips from OSU Study	Existing Single Family and Proposed Multi-Family Housing from OSU Study	Added Site Trips from Redwood
1A	Opening Year No-Build	2020	Х	Х	Х	-
1B	Opening Year No-Build	2020	х	х	-	-
2A	Opening Year Build	2020	х	х	Х	х
2B	Opening Year Build	2020	х	х	-	х
3	Horizon Year No-Build	2040	х	х	Х	-
4	Horizon Year Build	2040	Х	х	х	х



The study procedures followed the Delaware County Engineer's Office standards and the Memorandum of Understanding between the developer, and Delaware County, OH. All analysis results and recommendations have been summarized and are documented in this TIS.







O Defining the built environment.


## **2.0 Background Information**

## 2.1 Surrounding Roadway Network

The following sections document the current roadway conditions of the streets within the vicinity of the study area. The existing roadway network and intersection lane configuration is shown in **Figure 1.1**. The Delaware County Thoroughfare Plan (December 2001) was utilized to determine the functional classifications of the study roadways listed below.

#### 2.1.1 Home Road

Home Road is an undivided 2-lane east/west roadway that forms the northern boundary of the proposed development and provided direct access to the proposed Redwood development. It is classified as a Major Arterial around the study area with the posted speed limit being 50 mph.

#### 2.1.2 Sawmill Parkway

Sawmill Parkway is a divided 4-lane north/south roadway. The intersection of Sawmill Pkwy & Home Rd would serve as one of the two signalized intersections through which the new Redwood development patrons would enter or exit. It is classified as a Major Arterial around the study area. There are dedicated left turn lanes at all approaches and dedicated right turn lanes at westbound and southbound approaches. The posted speed limit on Sawmill Pkwy north and south of Home Rd is 45 mph.

#### 2.1.3 Liberty Road N

Liberty Road N is a north/south 2-lane local roadway that is classified as a minor arterial. There are dedicated left turn lanes at all approaches and the posted speed limit north and south of Home Road is 50 mph.

## 2.2 Proposed Development

The proposed residential development by Redwood is to be located on a parcel just south of Home Road, and west of Olentangy Liberty Middle School in Delaware County, Ohio. A conceptual site plan/layout of the proposed development is shown in **Figure 1.1** and is included in **Appendix A**.

The proposed development will consist primarily of 334 dwelling units (DU's) of low-rise multi-family houses. The proposed development is expected to break ground in late 2019 or early 2020 and expected to be completed in three phases with about 100 DU's complete by the opening year of 2020, 134 DU's by 2021, and the remaining 100 DU's by 2022.

## **2.3 Off-Site Developments**

At the northeast quadrant of Home Rd & Sawmill Pkwy, an ambulatory care facility is proposed along with neighboring out-lots being occupied by retail businesses. Additionally, a 215-unit apartment development is also proposed along Old Home Rd and east of the proposed ambulatory care facility site. The conceptual site layout of these proposed developments are shown in **Figure 1.1**.



# **3.0 Traffic Forecast**

Based on discussions with the Delaware County Engineer's Office, raw traffic volumes for the two study intersections were utilized from the OSU South Delaware County Ambulatory Facility TIS (dated January 16, 2019). These raw volumes were projected to obtain the opening year (2020) and horizon year (2040) baseline traffic volumes by applying an annual linear background traffic growth rate of 3% for all roadway segments as agreed upon in the MoU. Generated trips for the off-site developments, and proposed apartments were then added to these baseline volumes to be evaluated in no-build scenarios for Redwood's TIS. Finally, the proposed Redwood residential development generated trips in the opening build and horizon build phases were then added to estimate the opening year (2020) and horizon year (2040) build total traffic volumes. The following sections of the report provide greater detail of these steps.

## **3.1** Existing Traffic Data

Intersection turning movement counts for the two study intersections were utilized from OSU South Delaware County Ambulatory Facility TIS dated January 16, 2019. The raw data from the traffic counts is provided in **Appendix B**.

## **3.2 Background Traffic Growth**

Based on discussions with the Delaware County Engineer's Office, a linear annual growth rate of 3% was assumed for all roadway segments at the two study intersection. These two signalized intersections were used to estimate counts at the intersection of Home Rd & Access Road. The linear annual growth rates were applied to the existing counts to forecast the opening year (2020) and horizon year (2040) background traffic volumes.

## **3.3 Added Trips for Off-Site Developments**

As agreed upon in the MoU, trips generated from the off-site developments (ambulatory care facility and retail businesses) were directly added to the projected background traffic to arrive at no-build scenario volumes for Redwood Home Road TIS. For the opening year scenarios, the proposed apartment development along Old Home Road was treated separately and referred to as A (with apartments) and B (without apartments).

## 3.4 Trip Generation

The Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10<sup>th</sup> Edition* was used to calculate the generated trips for the proposed Redwood development. AM and PM peak hour trips were forecasted based on ITE land use codes #220 (Multi-family Housing – Low-Rise). **Table 3.1** shows the comparison of total number of AM peak hour and PM peak hour trips for the build scenarios that are generated by the development.



ITE Land				AM	Peak Tr	ips	PM Peak Trips			
Use Code	Phase	Description	Size	Total Trips	Enter	Exit	Total Trips	Enter	Exit	
220	Initial Build (Phase 1)	Multi-Family Housing (Low-Rise)	100 DU	48	11	37	59	37	22	
220	Full Build (Phase 1, 2, 3)	Multi-Family Housing (Low-Rise)	334 DU	150	35	115	173	109	64	
****										

## Table 3.1 – Base Trip Generation Comparison

\*DU – Dwelling Units

The trip generation estimate used in this study is based on the latest site plan available. All calculations documented in this study are based on the land use types and sizes provided in **Table 3.1**. Any significant changes to land use size or roadway connectivity may require additional analysis. The following sections describe the methodology used to calculate internal trips and mode reduction trips, which were removed from the total trips identified in Table 3.1.

#### 3.4.1 Internal Trips

Internal trips are trips which have origins and destinations within a development, but never actually travel outside of the development on public roadways. These trips are usually removed from the total trip ends generated by a development. Most internal trips happen when there are mixed use developments like retail and residential uses within the study area. For the Redwood Home Road development, no internal trips were assumed to be generated and hence no reductions were done.

#### 3.4.2 Mode Choice Reduction Trips

Mode choice reduction trips consist of those trips made on a transportation mode other than a passenger car. The reduction of total trips due to mode choice is common in urban areas where census data shows that workers over the age of 16 choose to walk, bike or take public transportation to work, rather than drive. Based on a review of census data and routes operated by Delaware County Transit Agency (DATA) for communities near the proposed Redwood development, no mode choice reduction for the Redwood Home Road development was done.

#### 3.4.3 Pass-By Trips

Pass-by trips consist of those that are an intermediate stop enroute from a trip origin to a trip destination. Pass-by trips begin and end outside the study area and are trips that are currently on the roadway. These trips are typically associated with retail land use types. The proposed development does not intend to have any retail land use types and hence no pass-by trips were computed. The resulting new trips after internal, mode choice and pass-by trip reductions are summarized in Table 3.2.



		I	nitial Bu	ild Trips	;		Full Build Trips								
	AM Peak			PM Peak			ļ	AM Peal	٢	PM Peak					
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total			
Total	11	37	48	37	22	59	35	115	150	109	64	173			
Internal	0	0	0	0	0	0	0	0	0	0	0	0			
Mode Reduction	0	0	0	0	0	0	0	0	0	0	0	0			
Pass-By	0	0	0	0	0	0	0	0	0	0	0	0			
New Site Trips	11	37	48	37	22	59	35	115	150	109	64	173			

## Table 3.2 – Trip Generation with Reductions

## 3.5 Trip Distribution and Assignment

Trip distribution percentages from the OSU study were used to distribute trip ends generated from the proposed Redwood development. The trip assignment percentages were adjusted for each movement at certain intersections based on the distribution percentages observed. **Figure 3.1** shows the trip distribution and assignment percentages along the roadway segments.







### 3.6 Total Traffic Volumes

After applying the background growth rates for each roadway segment to the raw traffic volumes and adding trips generated by the proposed off-site and Redwood Home Road development, the 2020 and 2040 total traffic volumes were obtained for each scenario at the study intersections. These volumes are shown graphically in **Figures 3.2 to 3.6**.

Figure No.	Figure Description	Formula
3.2	2020 Background Traffic Volumes	А
3.3	Added Off-Site Trips (Proposed Ambulatory Facility and Retail)	В
3.4	Added Off-Site Trips (Existing Single-Family and Proposed Low-Rise Multi-Family Apartment)	С
3.5	Added Redwood Development Site Trips for Opening Year	D
3.6	2020 No-Build Volumes (With Apartments) – Scenario 1A	E=A+B+C
3.7	2020 No-Build Volumes (Without Apartments) – Scenario 1B	F = A + B
3.8	2020 Build Volumes (With Apartments) – Scenario 2A	G = A + B + C + D
3.9	2020 Build Volumes (Without Apartments) – Scenario 2B	H=A+B+D
3.10	2040 Background Traffic Volumes	I
3.11	Added Redwood Development Site Trips for Horizon Year	J
3.12	2040 No-Build Volumes (With Apartments) – Scenario 3	K=I+B+C
3.13	2040 Build Volumes (With Apartments) – Scenario 4	L = I + B + C + J

## Table 3.3 – Total Traffic Volume Computations







































# 4.0 Capacity Analysis

A capacity analysis has been performed for the two signalized study intersections for all scenarios while the unsignalized intersection has only been evaluated for opening year (2020) and horizon year (2040) build scenarios. The capacity analysis of signalized and stop controlled intersections was performed using HCS7 based on the methodology outlined in the *Highway Capacity Manual* (HCM 6).

The standard parameter used to evaluate traffic operating conditions is referred to as the level-of-service (LOS). There are six LOS (A through F) which relate to driving conditions from best to worst, respectively. LOS for signalized and unsignalized intersections is defined in terms of control delay per vehicle, which is a direct correlation to driver discomfort, frustration, fuel consumption, and lost travel time. **Table 4.1** provides the LOS criteria as defined in the *Highway Capacity Manual*.

LOS	Signalized / Roundabout Intersection Control Delay per Vehicle (seconds)	Unsignalized Intersection Control Delay per Vehicle (seconds)
Α	≤ <b>10</b>	≤ <b>10</b>
В	> 10 and ≤ 20	> 10 and ≤ 15
С	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
Ε	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

## Table 4.1 – LOS Thresholds

As agreed upon in the MoU, development impacts that increase average delay by more than 5 seconds (where LOS is D or worse) for the intersection require mitigation that restores the average no-build delay. Improvements were identified for the locations not meeting the criteria.

The performance measures evaluated in this study include: LOS, average vehicle delay, and 95<sup>th</sup> percentile queue length. Poor operating conditions are indicated in red font in the Capacity Analysis summary tables. Capacity analysis reports from HCS are provided in **Appendix D**.

## 4.1 Capacity Analysis Summary for AM Peak Hours

**Table 4.2** shows the capacity analysis summary for AM peak hours for all scenarios evaluated. The following section summarizes the results by each intersection.



1	Intersection			EB		W	В	N	В	SB		Overall	
Int. ID		Scenario	Control Type	Delay (sec)	LOS	Delay (secs)	LOS	Delay (secs)	LOS	Delay (secs)	LOS	Delay (secs)	LOS
		1A		43.8	D	35.8	D	42.1	D	35.6	D	39.5	D
		2A		44.1	D	36.3	D	42.6	D	35.7	D	39.9	D
		2A**		29.4	С	33.4	С	42.6	D	35.7	D	36.4	D
	Home Rd &	1B		39.6	D	25.5	С	43.1	D	35.1	D	36.6	D
1	Sawmill	2B	Signal	39.8	D	26.0	С	43.5	D	35.2	D	36.9	D
	Pkwy	2B**		27.7	С	23.8	С	43.5	D	35.2	D	34.1	С
		3		166.8	F	67.5	Ε	135.7	F	56.4	Ε	109.0	F
		3**		45.0	D	65.1	Ε	39.3	D	33.3	С	45.0	D
		4		45.3	D	66.2	Ε	39.2	D	33.6	С	45.4	D
		1A		38.2	D	28.2	С	36.6	D	38.7	D	34.7	С
		2A	-	38.7	D	28.3	С	36.7	D	38.7	D	35.0	С
		2A**		21.3	С	27.8	С	36.7	D	38.7	D	28.9	С
		1B		46.3	D	39.3	D	29.7	С	35.3	D	39.0	D
2	Home Rd &	2B	Signal	48.8	D	39.5	D	29.7	С	35.3	D	40.0	D
		2B**		31.0	С	39.0	D	29.7	С	35.3	D	33.9	С
		3		48.4	D	55.3	Ε	130.5	F	68.9	Ε	72.1	Ε
		3**		28.7	С	35.1	D	31.0	С	37.4	D	32.4	С
		4		29.1	С	35.4	D	31.4	С	37.5	D	32.7	С
		2A		-	-	8.8	Α	16.7	С	-	-	-	-
3	Home Ka &	2B	OWSC	-	-	8.7	Α	16.3	С	-	-	-	-
	ALCESS KU	4		-	-	10.1	В	25.7	D	-	-	-	-
*refe	ers to LOS for leg	ft turn move	ment; **re	efers to v	vith im	provem	ents re	sults for	the sar	ne scenc	ario,		

## Table 4.2 – Capacity Analysis Results Summary (AM)

#### 4.1.1 Home Road & Sawmill Pkwy

For scenario 1A (2020 no-build with apartments), the intersection operates at LOS D and control delay of 39.5 seconds. With added volumes from the Redwood Development, scenario 2A (2020 build scenario) would operate at LOS D and control delay of 39.9 seconds. While there are no improvements needed based on the AM peak results, PM peak results do require mitigation. Thus, the AM scenarios were also evaluated with these improvements and the intersection is expected to operate at LOS D and control delay of 36.4 seconds.

For scenario 1B (2020 no-build without apartments), the intersection operates at LOS D and control delay of 36.6 seconds. With added volumes from the Redwood Development, scenario 2B (2020 build without apartments) would operate at LOS D and control delay of 36.9 seconds. While there are no improvements needed based on the AM peak results, PM peak results do require mitigation. Thus, the AM scenarios were also evaluated with these improvements and the intersection is expected to operate at LOS C and control delay of 34.1 seconds.



For scenario 3 (2040 no-build), the intersection would operate at a failing intersection LOS with eastbound and northbound approaches failing. To mitigate this, the following improvements were identified:

- Northbound Approach: Add an additional left turn lane, convert existing shared thru-right lane to a thru lane, and add a dedicated right turn lane.
- Westbound Approach: Convert existing right turn lane to a shared thru-right turn lane.
- Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario)
- Right-turn overlap phases would be needed on all approaches.

With this mitigation, the intersection would operate at LOS D and a control delay of 45.0 seconds.

For scenario 4 (2040 build), the intersection would operate at LOS D and a control delay of 45.4 seconds. Improvements identified in scenario 3 were included while evaluating scenario 4. No further improvements were identified as the delay for build scenario did not increase by more than 5 seconds in comparison to delay for no-build scenario.

#### 4.1.2 Home Road & Liberty Rd N

For scenario 1A (2020 no-build with apartments), the intersection operates at LOS C and control delay of 34.7 seconds. With added volumes from the Redwood Development, scenario 2A (2020 build with apartments) would operate at LOS C and intersection delay of 35.0 seconds. While there are no improvements needed based on the AM peak results, PM peak results do require mitigation. Thus, the AM scenarios were also evaluated with these improvements and the intersection is expected to operate at LOS C and control delay of 28.9 seconds.

For scenario 1B (2020 no-build without apartments), the intersection operates at LOS D and control delay of 39.0 seconds. With added volumes from the Redwood Development, scenario 2B (2020 build without apartments) would operate at LOS D and control delay of 40.0 seconds. While there are no improvements needed based on the AM peak results, PM peak results do require mitigation. Thus, the AM scenarios were also evaluated with these improvements and the intersection is expected to operate at a LOS of C and delay of 33.9 seconds.

For scenario 3 (2040 no-build), the intersection would operate at LOS E with the northbound approach failing. To mitigate this, the following improvements were identified:

- Westbound Approach: Convert existing shared thru-right lane to a thru lane, and add another shared thru-right lane.
- Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario)

With this mitigation, the intersection would operate at LOS C and a control delay of 32.4 seconds.

For scenario 4 (2040 build), the intersection would operate at LOS C and a control delay of 32.7 seconds. Improvements identified in scenario 3 were included while evaluating scenario 4. No further improvements were identified as the delay for build scenario did not exceed by more than 5 seconds in comparison to delays for no-build scenario.



#### 4.1.3 Home Road & Access Road

The northbound approach and westbound left movements are expected to operate at an acceptable LOS and delay in the 2020 build scenarios 2A and 2B. For the 2040 build scenario, the northbound approach is expected to operate at LOS D and a delay of 25.7 seconds.

## 4.2 Capacity Analysis Summary for PM Peak Hours

**Table 4.3** shows the capacity analysis summary for PM peak hours for all scenarios evaluated. The following section summarizes the results by each intersection.

1	Intersection		Control Type	EB	3	W	B	NB		SB		Overall	
INT.		Scenario		Delay (sec)	LOS	Delay (secs)	LOS	Delay (secs)	LOS	Delay (secs)	LOS	Delay (secs)	LOS
		1A		59.8	Ε	36.4	Ε	58.5	Ε	58.4	Ε	53.4	D
		2A		62.0	Ε	41.1	Ε	60.2	Ε	59.5	Ε	55.8	Ε
		2A**		28.4	С	23.8	С	60.2	Ε	59.5	Ε	44.5	D
	Home Rd &	1B	Signal	46.0	D	38.7	D	53.9	D	58.1	Ε	49.5	D
1	Sawmill	2B		47.1	D	43.2	D	55.0	D	58.9	Ε	51.3	D
	Pkwy	2B**		25.5	С	26.6	С	55.0	D	58.9	Ε	42.8	D
		3		241.2	F	73.1	Ε	213.8	F	150	F	175.2	F
		3**		45.8	D	57.1	Ε	47.0	D	47.2	D	49.2	D
		4		47.3	D	61.6	Ε	47.0	D	47.4	D	50.7	D
		1A		25.2	С	25.4	С	67.1	Ε	65.4	Ε	37.7	D
		2A		28.2	С	26.3	С	69.1	Ε	66.0	Ε	39.5	D
		2A**		21.6	С	27.6	С	50.2	D	50.0	D	32.0	С
	Home Rd &	1B		27.2	С	27.2	С	56.2	Ε	56.3	Ε	36.2	D
2	Liberty Rd N	2B	Signal	28.7	С	27.9	С	57.2	Ε	56.6	Ε	37.1	D
		2B**		21.0	С	26.1	С	57.2	Ε	56.6	Ε	33.7	С
		3		35.0	С	65.0	Ε	236.4	F	181.9	F	107.6	F
		3**		45.2	D	43.7	D	45.2	D	34.0	С	43.5	D
		4		48.3	D	45.1	D	47.9	D	34.1	С	45.7	D
	Home Rd &	2A		-	-	10.1	B*	19.7	С	-	-	-	-
3	Access Rd	2B	OWSC	-	-	10.0	B*	19.3	С	-	-	-	-
	ALLESS NU	4		-	-	13.2	B*	33.3	D	-	-	-	-
*refe	ers to LOS for lej	ft turn move	ment; **re	efers to "	With I	mprover	nents'	' results j	for the s	same scend	ario		

## Table 4.3 – Capacity Analysis Results Summary (PM)

#### 4.2.1 Home Road & Sawmill Pkwy

For scenario 1A (2020 no-build with apartments), the intersection operates at LOS D and control delay of 53.4 seconds. With added volumes from the Redwood Development, scenario 2A (2020 build with apartments) would operate at LOS E and control delay of 55.8 seconds. There are some movements which operate at failing LOS and these could be mitigated by adding an eastbound right turn lane and an overlap



phase for the same to relieve these heavy right turn volumes. Post mitigation, the intersection would operate at LOS D and control delay of 44.5 seconds.

For scenario 1B (2020 no-build without apartments), the intersection operates at LOS D and intersection delay of 49.5 seconds. With added volumes from the Redwood Development, scenario 2B (2020 build without apartments) would operate at LOS D and control delay of 51.3 seconds. There are some movements which operate at failing LOS and these could be mitigated by adding an eastbound right turn lane and an overlap phase for the same to relieve these heavy right turn volumes. Post mitigation, the intersection would operate at LOS D and control delay of 42.8 seconds.

For scenario 3 (2040 no-build), the intersection would operate at a failing intersection LOS with all approaches except the westbound one failing as well. To mitigate this, the following improvements were needed:

- Northbound Approach: Add an additional left turn lane, convert existing shared thru-right lane to a thru lane, and add a dedicated right turn lane.
- Westbound Approach: Convert existing right turn lane to a shared thru-right turn lane.
- Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario)
- Right-turn overlap phases would be needed on all approaches.

With this mitigation, the intersection would operate at LOS D and a control delay of 49.2 seconds.

For scenario 4 (2040 build), the intersection would operate at LOS D and a control delay of 50.7 seconds. Improvements identified in scenario 3 were included while evaluating scenario 4. No further improvements were identified as the delays for build scenario did not exceed by more than 5 seconds in comparison to delays for no-build scenario.

#### 4.2.2 Home Road & Liberty Rd N

For scenario 1A (2020 no-build with apartments), the intersection operates at LOS D and control delay of 37.7 seconds. With added volumes from the Redwood Development, scenario 2A (2020 build with apartments) would operate at LOS D and control delay of 39.5 seconds. There are some movements which operate at failing LOS and these could be mitigated by installing an eastbound right turn lane and an overlap phase for the same to relieve these heavy right turn volumes. Post mitigation, the intersection would operate at LOS C and control delay of 32.0 seconds.

For scenario 1B (2020 no-build without apartments), the intersection operates at LOS D and control delay of 36.2 seconds. With added volumes from the Redwood Development, scenario 2B (2020 build without apartments) would operate at LOS D and control delay of 37.1 seconds. There are some movements which operate at failing LOS and these could be mitigated by installing an eastbound right turn lane and an overlap phase for the same to relieve the heavy right turn volumes. Post mitigation, the intersection would operate at LOS C and control delay of 33.7 seconds.

For scenario 3 (2040 no-build), the intersection would operate at a failing intersection LOS with northbound and southbound approaches failing. To mitigate this, the following improvements were needed:



- Westbound Approach: Convert existing shared thru-right lane to a thru lane, and add another shared thru-right lane.
- Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario)

With this mitigation, the intersection would operate at LOS D and a control delay of 43.5 seconds.

For scenario 4 (2040 build), the intersection would operate at LOS D and a control delay of 45.7 seconds. Improvements identified in scenario 3 were included while evaluating scenario 4. No further improvements were identified as the delays for build scenario did not exceed by more than 5 seconds in comparison to delays for no-build scenario.

#### 4.2.3 Home Road & Access Road

The northbound approach and westbound left movements are expected to operate at an acceptable LOS and delay in the 2020 build scenarios 2A and 2B. For the 2040 build scenario, the northbound approach is expected to operate at LOS D and a delay of 33.3 seconds.

### 4.3 Turn Lane Warrant Analysis

Left turn and right turn lane warrants were evaluated at Home Road & Access Road for the 2040 build condition based on Delaware County Engineer's Office standards. Ohio DOT's *Location and Design Manual (January 2019)* was used to evaluate the turn lane warrants. Based on the warrant analysis, it was observed that both left turn and right turn lanes are warranted for the 2040 build scenarios. For the westbound approach, a two-way left turn lane (TWLTL) exists as of today on Home Road and would work without restriping it to a dedicated left turn lane. Detailed analysis results are attached in **Appendix E**.

### 4.4 Queuing Analysis

**Table 4.4** and **Table 4.5** shows the queuing analysis summary for all study intersections in all scenarios evaluated. Wherever 95<sup>th</sup> percentile queues have exceeded existing storage lengths, they have been highlighted in red. Additionally, queues observed at newly added capacity analysis driven turn lanes are also highlighted. The required turn lane lengths for these newly added turn lanes are computed using procedures outlined in Ohio DOT's Location and Design Manual and the averaged with the observed 95<sup>th</sup> percentile queues. These have been discussed in **Table 4.6**.



	Intersection	Scenario	95th Percentile Queues (Existing Storage Length) in ft.   AM Peak Hour											
Int. ID				EB			WB			NB			SB	
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		1A	100 (375)	45	51	158 (500)	350	176 (300)	175 (600)	456		106 (500)	236	61
		2A	100 (375)	455		166 (500)	345	176 (300)	174 (600)	461		107 (500)	236	61
		2A**	100 (375)	302	69	147 (500)	345	345 176 1 (300) (60		461		107 (500)	236	61
		1B	97 (375)	426		135 (500)	229	100 (300)	178 (600)	78 00) 455		103 (500)	235	59
1	Home Rd & Sawmill Pkwy	2B	97 (375)	43	30	143 (500)	224	100 (300)	178 (600)	46	50	104 (500)	235	59
		2B**	97 (375)	290	68	128 (500)	224	100 (300)	178 (600)	46	50	104 (500)	235	59
		3	209 (375)	13	43	334 (500)	397	182 (300)	459 (600)	11	25	247 (500)	400	94
		3**	220 (375)	270	147	259 (500)	46	51	214 (600)	496	134	169 (500)	318	79
		4	220 (375)	275	147	177 (500)	441 <sup>2</sup> (6		214 (600)	496	145	177 (500)	318	79
		1A	25 (550)	25 (550) 476		48 (325)	384		198 (325)	169		19 (325)	21	17
		2A	25 (550)	484		48 (325)	386		199 (325)	16	59	19 (325)	23	L7
		2A**	26 (550)	289	40	47 (325)	386		199 (325)	169		19 (325)	217	
		1B	27 (550)	44	18	57 (325)	448		157 (325)	163		17 (325)	208	
2	Home Rd & Liberty Rd N	2B	27 (550)	46	56	57 (325)	452		158 (325)	163		17 (325)	208	
		2B**	27 (550)	348	85	55 (325)	45	52	158 (325)	16	63	17 (325)	20	)8
		3	47 (550)	55	59	165 (325)	75	52	609 (325)	28	87	29 (325)	41	L4
		3**	41 (550)	249	136	96 (325)	32	29	247 (325)	22	22	26 (325)	30	)7
		4	42 (550)	256	145	97 (325)	33	33	251 (325)	22	22	26 (325)	30	)7
		2A	-	-	-	0	-	-		10		-	-	-
3	Home Rd & Access Rd	2B	-	-	-	0	-	-		10		-	-	-
		4	-	-	-	5	-	-		11		-	-	-
**Refers to	results for the"With Imp	orovements"	scenari	0	хх	Refers t	to newly	v added	capacit	y-drive	n turn lo	ine quei	ues	

## Table 4.4 – Queuing Analysis Summary (AM)



				05th [	Dorcont			cting St	orago I	ongth)	inft I	M Doal	Hour	
Int. ID	Intersection	Scenario		FR	ercent			sting st	UTage L	NR		IVIPEar	SB	
		Jeenano	Left	Thru	Right	Left	Thru	Right	left	Thru	Right	left	Thru	Right
		1A	81 (375)	75	56	239 (500)	317	85 (300)	399 (600)	5:	15	210 (500)	334	79
		2A	81 (375)	77	77	269 (500)	317	87 (300)	399 (600)	535		223 (500)	334	79
		2A**	81 (375)	406	127	159 (500)	315	89 (300)	399 (600)	535		223 (500)	334	79
		18	77 (375)	651		331 (500)	352	78 (300)	400 (600)	468		196 (500)	335	78
1	Home Rd & Sawmill Pkwy	2B	77 (375)	66	56	362 (500)	352	80 (300)	400 (600)	48	35	207 (500)	335	78
		2B**	77 (375)	371	118	153 (500)	352	80 (300)	400 (600)	48	35	207 (500)	335	78
		3	152 (375)	23	03	436 (500)	445	87 (300)	1297 (600)	12	58	305 (500)	701	99
		3**	174 (375)	384	276	305 (500)	53	38	357 (600)	443	329	209 (500)	424	84
		4	176 (375)	402	276	360 (500)	544 357 (600		357 (600)	443	378	224 (500)	424	84
		1A	25 (550)	25 453 550)		77 (325)	460		103 (325)	285		17 (325)	30	)7
		2A	26 (550)	49	95	175 (325) 467		114 (325)	28	35	17 (325)	31	LO	
		2A**	29 (550)	329	269	76 (325)	506		111 (325)	259		16 (325)	271	
		1B	24 (550)	51	15	75 (325)	47	73	106 (325)	27	79	17 (325)	28	34
2	Home Rd & Liberty Rd N	2B	27 (550)	46	56	57 (325)	452		158 (325)	163		17 (325)	208	
		2B**	26 (550)	337	280	72 (325)	48	30	117 (325)	27	79	17 (325)	28	35
		3	52 (550)	54	16	389 (325)	9!	52	676 (325)	64	14	34 (325)	71	18
		3**	65 (550)	387	422	213 (325)	4	79	247 (325)	34	11	19 (325)	32	23
		4	69 (550)	423	448	256 (325)	49	96	278 (325)	34	11	19 (325)	32	26
		2A	-	-	-	3	-	-		8		-	-	-
3	Home Rd & Access Rd	2B	-	-	-	3	-	-		8		-	-	-
		4	-	-	-	5	-	-		38		-	-	-
**Refers to	results for the"With In	nprovement	s" scena	ario	хх	Refers t	to newly	/ added	capacit	y-driver	n turn la	ine quei	ies	

## Table 4.5 – Queuing Analysis Summary (PM)



**Table 4.6** below shows the final computed turn lane lengths for capacity-driven or warrant analysis driventurn lanes. Spreadsheets showing computations are attached in **Appendix F**.

				Turn Lane Length	Computation	
Int. ID	Intersection	Scenario	Movement	L&D Manual Computation	95th	
				Includes Taper	Percentile Queues	Average
		2A		550	98	325
1	Home Rd & Sawmill Pkwy	2B	EDD	525	93	310
		3	EDR	540	212	375
L		4		450	212	330
		3		595	232	415
		4	INDK	645	262	455
		2A		700	155	425
2	Lleves Del Q. Liberty Del N	2B		675	183	430
Z	Home Ka & Liberty Ka N	3	EBK	640	279	460
		4		665	297	480
2	Llomo Dd 8 Accoss Dd	4	EBR	450	0	225
3	HOME RU & ACCESS RU	4	WBL	350	5	180

## Table 4.6 – Turn Lane Length Computation

## **5.0 Findings and Recommendations**

Based on a review of the capacity analysis, queue analysis, and turn lane warrant analysis, following improvements have been identified for the study intersections. These improvements are solely based on AM and PM peak hour operations of a typical weekday which is assumed to represent the worst-case. The proposed lane configuration for study intersections in opening year build and horizon year no-build are graphically depicted in **Figure 5.1** and **Figure 5.2**.

## 5.1 Home Rd & Sawmill Pkwy

- This intersection operates at an acceptable LOS and delay in the opening year no-build scenarios (1A and 1B) in AM and PM peak hours.
- With the added Redwood development volumes (scenarios 2A and 2B), the AM peak operates at an acceptable LOS whereas the PM peak hour has certain failing movements which could not be mitigated with optimizing signal timings. An eastbound right turn lane was thus added to enable the intersection to operate at an acceptable LOS in the PM peak hour. With these improvements, the AM peak operates at a lower delay than before. The length of this added eastbound right turn lane for 2020 build scenarios was found to be 325' based on ODOT's Location and Design Manual and observed 95<sup>th</sup> percentile queues.
- The intersection starts failing in both the AM and PM peak hours for scenario 3 (2040 no-build). To mitigate this, the following improvements were needed:
  - Northbound Approach



- Add an additional left turn lane (Turn lane length same as existing 600')
- Convert existing shared thru-right lane to a thru lane,
- Add a dedicated right turn lane (Turn lane length determined to be 415' for no-build and 455' for build)
- Westbound Approach: Convert existing right turn lane to a shared thru-right turn lane.
- Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario but turn lane length would be increased to 375')
- Right-turn overlap phases would also be needed on all approaches.
- With these improvements, both no-build and build scenario in the horizon year would operate at LOS D with difference in delays not exceeding 5 seconds and thus not requiring any additional mitigation.

## 5.2 Home Rd & Liberty Rd N

- This intersection operates at an acceptable LOS and delay in the opening year no-build scenarios (1A and 1B) in AM and PM peak hours.
- With the added Redwood development volumes (scenarios 2A and 2B), the AM peak operates at an acceptable LOS whereas the PM peak hour has certain failing movements which could not be mitigated with optimizing signal timings. An eastbound right turn lane was thus added to enable the intersection to operate at an acceptable LOS in the PM peak hour. With these improvements, the AM peak operates at a lower delay than before. The length of this added eastbound right turn lane for 2020 build scenarios was found to be 430' based on ODOT's Location and Design Manual and observed 95<sup>th</sup> percentile queues.
- The intersection starts failing in the PM peak hours for scenario 3 (2040 no-build) with northbound approach failing in AM peak hour. To mitigate this, the following improvements were needed:
  - Westbound Approach: Convert existing shared thru-right lane to a thru lane, and add another shared thru-right lane.
  - Eastbound Approach: Add an additional thru lane (a dedicated right turn lane was already added for 2020 build scenario but with turn lane length increased to 480')
- With these improvements, both no-build and build scenario in the horizon year would operate at LOS D with difference in delays not exceeding 5 seconds and thus not requiring any additional mitigation.

## 5.3 Home Rd & Access Rd

- This intersection operates at an acceptable LOS and delay in the opening year build scenarios (2A and 2B) in AM and PM peak hours.
- Turn lane warrants performed showed that eastbound right and westbound left turn lanes are warranted for the horizon year build scenario. These turn lanes were taken in to consideration while analyzing the intersection and was found to be operating at an acceptable LOS in both peak hours.
- It is also assumed that Home Road would be converted to a 4 lane roadway between Sawmill Pkwy and Liberty Road.
- Turn lane lengths for eastbound right and westbound left turn lanes were estimated to be 225' and 180' respectively.







# Appendix A – Site Plan





**APPROVED** By mlove at 1:24 pm, Apr 22, 2019

March 28, 2019

Mr. John Piccin, PE, PS Deputy Development Engineer Delaware County Engineer's Office 50 Channing Street Delaware, Ohio 43015

Subject: Redwood – Home Road Traffic Impact Study Memorandum of Understanding

Dear Mr. Piccin:

This Memorandum of Understanding is submitted to document the scope of the above captioned Traffic Impact Study (TIS) for a proposed site on Home Road in Delaware County, Ohio. Following your concurrence, American Structurepoint, Inc. ("we") will prepare a traffic impact study in accordance with the methodologies and assumptions described below.

#### Proposed Development & Access Plan

Redwood is planning to develop a nearly 70 acre parcel along Home Road with up to 343 multi-family dwelling units on the south side of Home Road. The facility will have approximately 8 acres dedicated to a senior assisted living facility with the remaining 62 acres proposed as multi-family housing. This mixed-use development is proposed to occur in 3 phases, with a planned groundbreaking in late 2019 or early 2020.

#### Intersections to Analyze

Access to the public street serving the site will be examined, consisting of a single access point to Home Road. In addition to the site access point, the following intersections comprise the study area for this TIS:

- 1. Home Road/Sawmill Parkway
- 2. Home Road/Liberty Road N.

#### **Data Collection**

We will utilize turning-movement traffic counts from the recently completed OSU Southern Delaware County Ambulatory TIS (dated January 16, 2019) for the study area intersections listed above. We do not anticipate performing any additional traffic counts given the available data.

Mr. John Piccin, PE, PS March 28, 2019 Page 2

#### **Trip Generation**

Site-generated trip ends will be forecast using data and methodology contained in the <u>ITE Trip Generation</u> <u>Manual, 10th Edition</u>. Weekday afternoon peak hour traffic volumes will be estimated using trip generation rates published for ITE land use code #220 (Multifamily Housing – Low Rise). The land will be rezoned for a planneduse development (PUD) with the proposed use specific to this land use code.

This study will not consider the effects of pass-by and internal trip reduction percentages for this site, as the only proposed use is residential.

#### **Trip Distribution**

Site generated traffic volumes will be assigned to the existing street system based on trip generation volumes from the OSU study. Traffic will be assigned to the site access point and study area intersection for analysis. Trip distribution will follow the same patterns as in the OSU Study.

#### **Traffic Projections**

Based on input received from Delaware County, opening day (2020) and design year (2040) traffic projections will be used in traffic analyses. Site-generated traffic volumes and other projected traffic will be combined with existing traffic at study area intersections to provide design volumes for analysis. Background traffic volumes (from the OSU Study) will be forecast to horizon year conditions by applying a linear growth rate of 3.0% per year (from MORPC approved growth rates for the immediate area) and evaluated for growth (non-development) related impacts.

#### **Traffic Analyses**

#### Intersection Capacity Analyses

Highway Capacity Software (HCS) will be used to evaluate operational characteristics of study area intersections and the roadway segments surrounding the proposed development site. Development impacts that increase average delay by more than 5 seconds (where Level of Service is D or worse) for the entire intersection require mitigation under Delaware County standards. Mitigation will be identified that restores the no-build average delay.

#### Traffic Signal Warrant Analysis

At the direction of the Delaware County Engineer's Office, a traffic signal warrant analysis shall not be performed for the proposed driveway entrance on Home Road. This intersection will remain unsignalized.

#### Queue Analyses

Turn lanes at the study intersections will be analyzed to determine if adequate storage is available based on traffic volume projections. Storage requirements will be calculated using tables provided in the Location and Design Manual § 401 (Ohio Department of Transportation, 2010). Results will be averaged with anticipated 95th percentile queues obtained from HCS reports.

#### Turn Lane Warrants

Left and right turn lane warrants will be evaluated at the planned access point (where public street access onto Home Road is desired) for 2040 Build conditions, based on Delaware County Engineer's Office standards.

#### Turn Lane Length Calculations

Lengths of all capacity driven or warranted turn lanes will be determined using storage calculations provided in the <u>Location and Design Manual</u> § 401 (Ohio Department of Transportation, 2010). The lengths will be based on the maximum volume for the 2040 Build condition for either AM or PM peak conditions.

Mr. John Piccin, PE, PS March 28, 2019 Page 3

#### **Report Preparation**

A detailed report including applicable figures and tables will be prepared to summarize study methodologies, analysis, findings and recommendations. The report will be submitted to Delaware County for review. Please signify your concurrence with the scope of work outlined herein by signing below and returning this Memorandum of Understanding to me.

Should you have questions or comments during your review or if I may be of further assistance in this matter, please contact me at (317) 547-5580 at your convenience.

Sincerely,

Jeremy R. Chapman, PE, PhD, PTOE Senior Traffic Engineer

Enclosures: Proposed Concept Site Plan

#### ACCEPTANCE AND APPROVAL OF MEMORANDUM OF UNDERSTANDING

BY:

Delaware County Engineer's Office

DATE: \_\_\_\_\_





# Appendix B – Raw Traffic Data


Wed Apr 25, 2018 Full Length (4PM-6PM, 7AM-9AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements ID: 516868, Location: 40.195862, -83.096305

Leg	Home Rd	l				Home Ro	1				Sawmill	Pkwy				Sawmill	Pkwy				
Direction	Eastboun	ıd				Westbou	nd				Northbo	und				Southbo	und				
Time	L	Т	R	U	Арр	L	Т	R	U	Арр	L	Т	R	U	Арр	L	Т	R	U	Арр	Int
2018-04-25 7:00AM	9	56	26	0	91	24	109	35	0	168	87	185	15	0	287	32	83	6	0	121	667
7:15AM	27	63	23	0	113	35	68	23	0	126	49	138	19	0	206	35	113	11	0	159	604
7:30AM	19	81	24	0	124	33	51	12	0	96	28	73	32	0	133	20	101	26	0	14 7	500
7:45AM	9	81	27	0	117	38	50	32	0	120	44	141	38	0	223	12	96	13	0	121	581
Hourly Total	64	281	100	0	445	130	278	102	0	510	208	537	104	0	849	99	393	56	0	548	2352
8:00AM	3	84	36	0	123	34	72	27	0	133	41	71	18	0	130	18	77	11	0	106	492
8:15AM	10	60	26	0	96	26	40	13	0	79	22	42	26	0	90	7	68	9	0	84	349
8:30AM	5	79	17	0	101	37	55	6	0	98	34	45	28	0	107	4	56	8	0	68	374
8:45AM	10	79	32	0	121	37	52	14	0	103	24	108	26	0	158	17	66	2	0	85	467
Hourly Total	28	302	111	0	441	134	219	60	0	4 13	121	266	98	0	485	46	267	30	0	343	1682
4:00PM	8	64	35	0	107	27	72	12	0	111	55	86	37	0	178	35	112	8	0	155	551
4:15PM	16	73	38	0	127	38	72	23	0	133	66	94	30	0	190	22	58	5	0	85	535
4:30PM	13	67	44	0	124	26	62	31	0	119	76	113	42	0	231	29	81	1	0	111	585
6 4:45PM	16	90	52	0	158	30	87	20	0	137	76	103	38	0	217	36	108	9	0	153	665
Hourly Total	53	294	169	0	516	121	293	86	0	500	273	396	147	0	816	122	359	23	0	504	2336
9 5:00PM	21	77	35	0	133	20	80	21	0	121	77	93	55	0	225	29	77	5	0	111	590
α 5:15PM	14	86	49	0	14 9	37	81	16	0	134	73	120	45	0	238	13	75	4	0	92	613
5:30PM	13	98	39	0	150	36	66	17	0	119	83	103	54	0	240	10	79	7	0	96	605
5:45PM	21	81	45	0	14 7	29	71	17	0	117	94	97	57	0	248	15	58	4	0	77	589
Hourly Total	69	342	168	0	579	122	298	71	0	491	327	413	211	0	951	67	289	20	0	376	2397
Total	214	1219	548	0	1981	507	1088	319	0	1914	929	1612	560	0	3101	334	1308	129	0	1771	8767
% Approach	10.8%	61.5%	27.7%	0%	-	26.5%	56.8%	16.7%	0%	-	30.0%	52.0%	18.1%	0%	-	18.9%	73.9%	7.3%	0%	-	-
% Total	2.4%	13.9%	6.3%	0%	22.6%	5.8%	12.4%	3.6%	0%	21.8%	10.6%	18.4%	6.4%	0%	35.4%	3.8%	14.9%	1.5%	0%	20.2%	-
Lights	202	1176	538	0	1916	488	1034	275	0	1797	916	1564	542	0	3022	299	1262	125	0	1686	8421
% Lights	94.4%	96.5%	98.2%	0%	96.7%	96.3%	95.0%	86.2%	0%	93.9%	98.6%	97.0%	96.8%	0%	97.5%	89.5%	96.5%	96.9%	0%	95.2%	96.1%
Articulated Trucks	0	3	2	0	5	5	8	0	0	13	0	1	4	0	5	0	0	0	0	0	23
% Articulated Trucks	0%	0.2%	0.4%	0%	0.3%	1.0%	0.7%	0%	0%	0.7%	0%	0.1%	0.7%	0%	0.2%	0%	0%	0%	0%	0%	0.3%
Buses and Single-Unit Trucks	12	40	8	0	60	14	46	44	0	104	13	47	14	0	74	35	46	4	0	85	323
% Buses and Single-Unit Trucks	5.6%	3.3%	1.5%	0%	3.0%	2.8%	4.2%	13.8%	0%	5.4%	1.4%	2.9%	2.5%	0%	2.4 %	10.5%	3.5%	3.1%	0%	4.8%	3.7%

<sup>\*</sup>L: Left, R: Right, T: Thru, U: U-Turn

Wed Apr 25, 2018 Full Length (4PM-6PM, 7AM-9AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements ID: 516868, Location: 40.195862, -83.096305



Wed Apr 25, 2018 AM Peak (7AM - 8AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements ID: 516868, Location: 40.195862, -83.096305

L	eg	Home R	d				Home R	d				Sawmill	Pkwy			Sawmill	Pkwy				
D	ire ction	Eastbou	nd				Westbou	ınd				Northbo	und			Southbo	und				
Т	ime	L	Т	R	U	Арр	L	Т	R	U	Арр	L	Т	RU	J App	L	Т	R	U	Арр	Int
	2018-04-25 7:00AM	9	56	26	0	91	24	109	35	0	168	87	185	15 (	) 287	32	83	6	0	121	667
	7:15AM	27	63	23	0	113	35	68	23	0	126	49	138	19 (	206	35	113	11	0	159	604
	7:30AM	19	81	24	0	124	33	51	12	0	96	28	73	32 (	) 133	20	101	26	0	14 7	500
	7:45AM	9	81	27	0	117	38	50	32	0	120	44	141	38 (	) 223	12	96	13	0	121	581
	Total	64	281	100	0	445	130	278	102	0	510	208	537	104 (	849	99	393	56	0	548	2352
	% Approach	14.4%	63.1%	22.5%	0%	-	25.5%	54.5%	20.0%	0%	-	24.5%	63.3%	12.2% 0%		18.1%	71.7%	10.2%	0%	-	-
	% Total	2.7%	11.9%	4.3%	0%	18.9%	5.5%	11.8%	4.3%	0%	21.7%	8.8%	22.8%	4.4% 0%	36.1%	4.2%	16.7%	2.4%	0%	23.3%	-
	PHF	0.593	0.867	0.926	-	0.897	0.855	0.638	0.729	-	0.759	0.598	0.726	0.684	- 0.740	0.707	0.869	0.538	-	0.862	0.882
	Lights	59	272	98	0	429	125	262	99	0	486	205	527	98 (	830	88	369	54	0	511	2256
	% Lights	92.2%	96.8%	98.0%	0%	96.4%	96.2%	94.2%	97.1%	0%	95.3%	98.6%	98.1%	94.2% 0%	97.8%	88.9%	93.9%	96.4%	0%	93.2%	95.9%
	Articulated Trucks	0	0	0	0	0	1	5	0	0	6	0	1	2 (	) 3	0	0	0	0	0	9
	% Articulated Trucks	0%	0%	0%	0%	0%	0.8%	1.8%	0%	0%	1.2 %	0%	0.2%	1.9% 0%	0.4 %	0%	0%	0%	0%	0%	0.4%
Pa	Buses and Single-Unit Trucks	5	9	2	0	16	4	11	3	0	18	3	9	4 (	) 16	11	24	2	0	37	87
6	% Buses and Single-Unit Trucks	7.8%	3.2%	2.0%	0%	3.6%	3.1%	4.0%	2.9%	0%	3.5%	1.4%	1.7%	3.8% 0%	1.9%	11.1%	6.1%	3.6%	0%	6.8%	3.7%
34 of 58	L: Left, R: Right, T: Thru, U: U-T	Γurn																			

Wed Apr 25, 2018 AM Peak (7AM - 8AM) All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements ID: 516868, Location: 40.195862, -83.096305



#### Wed Apr 25, 2018 PM Peak (4:45PM - 5:45PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements ID: 516868, Location: 40.195862, -83.096305

Leg		Home R	d				Home R	d				Sawmill	Pkwy				Sawmill	Pkwy				
Dire	ction	Eastbou	nd				Westbou	ınd				Northbo	und				Southbo	und				
Tim	e	L	Т	R	U	Арр	L	Т	R	U	Арр	L	Т	R	U	Арр	L	Т	R	U	Арр	Int
	2018-04-25 4:45PM	16	90	52	0	158	30	87	20	0	137	76	103	38	0	217	36	108	9	0	153	665
	5:00PM	21	77	35	0	133	20	80	21	0	121	77	93	55	0	225	29	77	5	0	111	590
	5:15PM	14	86	49	0	149	37	81	16	0	134	73	120	45	0	238	13	75	4	0	92	613
	5:30PM	13	98	39	0	150	36	66	17	0	119	83	103	54	0	240	10	79	7	0	96	605
	Total	64	351	175	0	590	123	314	74	0	511	309	419	192	0	920	88	339	25	0	452	2473
	% Approach	10.8%	59.5%	29.7%	0%	-	24.1%	61.4%	14.5%	0%	-	33.6%	45.5%	20.9%	0%	-	19.5%	75.0%	5.5%	0%	-	-
	% Total	2.6%	14.2%	7.1%	0% 2	23.9%	5.0%	12.7%	3.0%	0%	20.7%	12.5%	16.9%	7.8%	0%	37.2%	3.6%	13.7%	1.0%	0%	18.3%	-
	PHF	0.762	0.895	0.841	-	0.934	0.831	0.902	0.881	-	0.932	0.931	0.873	0.873	-	0.958	0.611	0.785	0.694	-	0.739	0.930
	Lights	62	343	175	0	580	123	309	66	0	498	309	416	189	0	914	80	338	25	0	443	2435
	% Lights	96.9%	97.7%	100%	0% 9	98.3%	100%	98.4%	89.2%	0%	97.5%	100%	99.3%	98.4%	0%	99.3%	90.9%	99.7%	100%	0%	98.0%	98.5%
	Artic ulate d Truc ks	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
	% Articulated Trucks	0%	0.6%	0%	0%	0.3%	0%	0.3%	0%	0%	0.2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0 %	0.1%
Pa	Buses and Single-Unit Trucks	2	6	0	0	8	0	4	8	0	12	0	3	3	0	6	8	1	0	0	9	35
e	% Buses and Single-Unit Trucks	3.1%	1.7%	0%	0%	1.4 %	0%	1.3%	10.8%	0%	2.3%	0%	0.7%	1.6%	0%	0.7%	9.1%	0.3%	0%	0%	2.0%	1.4%
36 of 58	Left, R: Right, T: Thru, U: U-T	lurn																				

Wed Apr 25, 2018 PM Peak (4:45PM - 5:45PM) - Overall Peak Hour All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks) All Movements ID: 516868, Location: 40.195862, -83.096305





Count data is 1 hour off; we used miovision but the time zone was not set to eastern...so add 1 hour to everything...for instance, the count time started at 1:00 AM, not 12:00 AM...so we have count data from 1:00 AM - 1:00 AM (24 hours).

#### DLZ 8430 West Bryn Mawr Avenue, Suite 100

Chicago, Illinois, United States 60631 (773) 283-2600 sslezakdlz@gmail.com

Count Name: Home Road Signal Timing Study Site Code: 10121702 Start Date: 10/12/2017 Page No: 1

### **Turning Movement Data**

										arrining.	WIOVCII		ala									
				Liberty Road	i				Home Roa	d				Liberty Road	i				Home Roa	d		
				Southbound					Westbound	ł				Northbound					Eastbound	ł		
	Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
	12:00 AM	0	1	1	0	2	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	5
	12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
	12:30 AM	0	2	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3
	12:45 AM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	0	0	0	0	3
	Hourly Total	0	3	1	0	4	0	3	0	0	3	2	2	0	0	4	0	2	0	0	2	13
	1:00 AM	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	2	0	0	2	5
	1:15 AM	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	2	0	0	2	4
	1:30 AM	0	1	1	0	2	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	5
	1:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
	Hourly Total	0	1	1	0	2	2	2	1	0	5	0	1	1	0	2	0	6	0	0	6	15
	2:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	2:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	2:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
ge	2:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Ψ	Hourly Total	0	0	1	0	1	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	3
48	3:00 AM	0	1	0	0	1	0	0	1	0	1	0	1	0	0	1	0	1	1	0	2	5
of (	3:15 AM	0	0	0	0	0	0	2	0	0	2	0	1	1	0	2	0	3	0	0	3	7
8	3:30 AM	0	0	0	0	0	0	2	0	0	2	1	1	1	0	3	2	2	0	0	4	9
	3:45 AM	1	0	1	0	2	0	5	0	0	5	1	0	3	0	4	0	4	0	0	4	15
	Hourly Total	1	1	1	0	3	0	9	1	0	10	2	3	5	0	10	2	10	1	0	13	36
	4:00 AM	0	2	0	0	2	0	10	3	0	13	0	0	2	0	2	2	8	0	0	10	27
	4:15 AM	0	1	3	0	4	2	10	1	0	13	0	1	0	0	1	1	9	0	0	10	28
	4:30 AM	0	3	4	0	7	0	7	3	0	10	5	1	3	0	9	2	14	0	0	16	42
_	4:45 AM	0	4	2	0	6	1	10	0	0	11	2	1	2	0	5	2	14	0	0	16	38
	Hourly Total	0	10	9	0	19	3	37	7	0	47	7	3	7	0	17	7	45	0	0	52	135
	5:00 AM	2	5	4	0	11	1	12	2	0	15	3	8	5	0	16	7	30	1	0	38	80
	5:15 AM	2	6	7	0	15	1	28	3	0	32	4	9	4	0	17	3	30	1	0	34	98
	5:30 AM	2	9	11	0	22	2	55	4	0	61	5	14	12	0	31	8	46	2	0	56	170
	5:45 AM	2	26	8	0	36	1	79	9	0	89	19	11	81	0	111	14	60	2	0	76	312
	Hourly Total	8	46	30	0	84	5	174	18	0	197	31	42	102	0	175	32	166	6	0	204	660
	6:00 AM	4	30	7	0	41	6	82	13	0	101	10	22	81	0	113	25	70	6	0	101	356
	6:15 AM	9	30	5	0	44	2	96	14	0	112	8	19	10	0	37	32	100	11	0	143	336
	6:30 AM	10	44	7	0	61	3	68	25	0	96	18	25	21	0	64	16	80	10	0	106	327
_	6:45 AM	15	35	2	0	52	5	93	20	0	118	18	27	37	0	82	22	90	9	0	121	373
	Hourly Total	38	139	21	0	198	16	339	72	0	427	54	93	149	0	296	95	340	36	0	471	1392
	7:00 AM	2	22	3	0	27	4	77	19	0	100	17	27	17	0	61	21	91	5	0	117	305
	7:15 AM	2	33	6	0	41	3	88	11	0	102	12	13	14	0	39	6	62	2	0	70	252
	7:30 AM	11	34	12	0	57	3	87	14	0	104	12	13	5	0	30	16	76	4	0	96	287
	7:45 AM	8	31	7	0	46	3	77	19	0	99	19	13	10	0	42	20	82	3	0	105	292
_	Hourly Total	23	120	28	0	171	13	329	63	0	405	60	66	46	0	172	63	311	14	0	388	1136
	8:00 AM	6	19	5	0	30	3	81	30	0	114	14	17	20	0	51	24	61	3	0	88	283

																				-	-	
	8:15 AM	6	20	5	0	31	4	71	20	0	95	12	14	9	0	35	12	67	3	0	82	243
	8:30 AM	2	13	10	0	25	2	55	8	0	65	12	14	5	0	31	11	66	2	0	79	200
_	8:45 AM	5	20	10	0	35	4	52	14	0	70	15	16	12	0	43	9	63	6	0	78	226
	Hourly Total	19	72	30	0	121	13	259	72	0	344	53	61	46	0	160	56	257	14	0	327	952
	9:00 AM	0	20	6	0	26	5	34	17	0	56	8	12	9	0	29	5	47	0	0	52	163
	9:15 AM	3	7	2	0	12	5	54	14	0	73	8	14	10	0	32	15	52	3	0	70	187
	9:30 AM	3	7	5	0	15	3	40	16	0	59	12	8	9	0	29	11	56	2	0	69	172
	9:45 AM	2	10	0	0	12	1	42	8	0	51	17	13	13	0	43	14	50	5	0	69	175
	Hourly Total	8	44	13	0	65	14	170	55	0	239	45	47	41	0	133	45	205	10	0	260	697
_	10:00 AM	1	14	2	0	17	2	50	12	0	64	17	8	5	0	30	5	56	5	0	66	177
	10:15 AM	2	17	1	0	20	5	45	10	0	60	13	14	13	0	40	12	58	1	0	71	191
	10:30 AM	4	18	4	0	26	2	56	14	0	72	13	17	14	0	44	16	62	1	0	79	221
	10:45 AM	6	16	6	0	28	7	56	15	0	78	14	16	12	0	42	15	43	4	0	62	210
	Hourly Total	13	65	13	0	91	16	207	51	0	274	57	55	44	0	156	48	219	11	0	278	799
_	11:00 AM	7	11	2	0	20	3	53	6	0	62	10	12	10	0	32	23	57	4	0	84	198
	11.15 AM	5	20	4	0	29	4	55	12	0	71	18	20	9	0	47	15	57	4	0	76	223
	11:30 AM	3	17	3	0	23	5	59	13	0	77	13	11	15	0	39	18	64	4	0	86	225
	11:45 AM	4		2		15	8	61	Q	0	78	12	1/	10	0	36	10	51	10	0	72	201
	Hourly Total	10	57	11	0	87	20	228		0	288	53	57	10	0	154	67	220	22	0	318	847
_	12:00 DM	7	16			27	20	E2	40	0	200	12	17	16	0	104	26	22.9	7	0	112	255
	12:00 F M	2	14			21	2	47	10	0	<u>50</u>	10	14	0		40	10	 	1	0	66	190
	12.13 FW	3	14	4		23	7	<u> </u>	10	0	76	10	0	10	0	25	12	72	4	0	00	109
	12.30 FW	4	10	4	0	21	1		12	0	70	5	10	10	0	30	13	73	4	0	90	222
_	12:45 PW	3		0	0	21	45	010	12	0	/5	5	12	0	0	20	30			0	000	234
a) –		17	55		0	92	15	 	40	0	219	23	51	43	0	147	01	203	10	0	302	900
ge	1:00 PM	2	9	0		17	4	52		0	0/	- 13	10	13	0	42	23			0	91	217
B4	1:15 PM	3	17	4		24	3		4	0		1			0	50	12	57		0		225
00	1:30 PM	4	25	4	0	33	1	65	12	0	84	15	14	20	0	49	22	/1	8	0	101	267
<del>ີ</del> ຫ	1:45 PM	1	16	4	0	21	4	50	14	0	68	17	1/	21	0	55	59	96	10	0	165	309
œ_	Hourly I otal	10	67	18	0	95	18	231	41	0	290	52	71	79	0	202	116	285	30	0	431	1018
	2:00 PM	7	27	6	0	40	3	56	24	0	83	16	20	15	0	51	20	51	8	0	79	253
	2:15 PM	4	12	4	0	20	12	87	17	0	116	18	29	24	0	71	22	69	4	0	95	302
	2:30 PM	4	32	3	0	39	4	76	21	0	101	25	17	8	0	50	24	75	6	0	105	295
_	2:45 PM	0	27	5	0	32	6	80	14	0	100	17	23	22	0	62	21	70	6	0	97	291
_	Hourly Total	15	98	18	0	131	25	299	76	0	400	76	89	69	0	234	87	265	24	0	376	1141
	3:00 PM	4	29	6	0	39	5	76	23	0	104	11	33	32	0	76	18	68	11	0	97	316
	3:15 PM	9	28	6	0	43	10	107	20	0	137	11	21	29	0	61	22	93	3	0	118	359
	3:30 PM	10	35	5	0	50	5	86	23	0	114	24	31	32	0	87	44	84	9	0	137	388
_	3:45 PM	8	36	7	0	51	2	105	35	0	142	17	40	34	0	91	57	104	8	0	169	453
_	Hourly Total	31	128	24	0	183	22	374	101	0	497	63	125	127	0	315	141	349	31	0	521	1516
	4:00 PM	5	39	3	0	47	7	116	27	0	150	14	30	41	0	85	47	99	5	0	151	433
	4:15 PM	10	46	3	0	59	4	117	22	0	143	14	40	61	0	115	48	96	16	0	160	477
	4:30 PM	7	31	1	0	39	5	112	21	0	138	12	21	33	0	66	54	101	6	0	161	404
_	4:45 PM	10	39	4	0	53	6	117	37	0	160	20	31	56	0	107	56	62	10	0	128	448
_	Hourly Total	32	155	11	0	198	22	462	107	0	591	60	122	191	0	373	205	358	37	0	600	1762
	5:00 PM	5	36	9	0	50	5	90	28	0	123	19	23	44	0	86	62	61	12	0	135	394
	5:15 PM	3	31	4	0	38	6	115	16	0	137	27	34	36	0	97	45	66	7	0	118	390
	5:30 PM	3	21	3	0	27	4	55	15	0	74	22	34	32	0	88	23	68	3	0	94	283
	5:45 PM	4	19	4	0	27	5	71	22	0	98	32	20	34	0	86	29	49	5	0	83	294
	Hourly Total	15	107	20	0	142	20	331	81	0	432	100	111	146	0	357	159	244	27	0	430	1361
	6:00 PM	7	13	2	0	22	3	60	28	0	91	12	24	30	0	66	56	88	12	0	156	335
	6:15 PM	10	15	1	0	26	9	53	18	0	80	44	29	42	0	115	59	86	12	0	157	378
	6-30 PM	1	9	2	0	12	1	43	12	0	56	22	14	31	0	67	27	66	10	0	103	238

	6:45 PM	1	9	3	0	13	2	49	7	0	58	12	14	32	0	58	17	44	5	0	66	195
	Hourly Total	19	46	8	0	73	15	205	65	0	285	90	81	135	0	306	159	284	39	0	482	1146
	7:00 PM	1	15	1	0	17	2	42	7	0	51	8	9	27	0	44	14	38	3	0	55	167
	7:15 PM	0	12	2	0	14	4	35	6	0	45	7	18	10	0	35	21	42	2	0	65	159
	7:30 PM	2	11	1	0	14	0	34	4	0	38	10	15	6	0	31	16	33	5	0	54	137
	7:45 PM	0	6	0	0	6	3	27	8	0	38	5	11	7	0	23	4	25	1	0	30	97
	Hourly Total	3	44	4	0	51	9	138	25	0	172	30	53	50	0	133	55	138	11	0	204	560
	8:00 PM	1	8	2	0	11	5	31	6	0	42	9	8	7	0	24	13	33	2	0	48	125
	8:15 PM	0	9	2	0	11	4	36	7	0	47	15	13	13	0	41	14	25	1	0	40	139
	8:30 PM	0	4	5	0	9	1	29	7	0	37	6	4	4	0	14	8	21	2	0	31	91
	8:45 PM	2	7	2	0	11	2	15	0	0	17	7	5	0	0	12	2	4	2	0	8	48
	Hourly Total	3	28	11	0	42	12	111	20	0	143	37	30	24	0	91	37	83	7	0	127	403
	9:00 PM	2	5	1	0	8	1	25	1	0	27	1	7	3	0	11	2	13	2	0	17	63
	9:15 PM	2	2	0	0	4	1	11	4	0	16	2	9	3	0	14	5	7	0	0	12	46
	9:30 PM	0	3	0	0	3	0	8	2	0	10	1	10	5	0	16	5	13	0	0	18	47
	9:45 PM	2	5	0	0	7	0	8	0	0	8	1	2	3	0	6	0	6	1	0	7	28
	Hourly Total	6	15	1	0	22	2	52	7	0	61	5	28	14	0	47	12	39	3	0	54	184
	10:00 PM	0	3	0	0	3	2	9	1	0	12	3	3	0	0	6	3	7	2	0	12	33
	10:15 PM	0	1	0	0	1	3	11	0	0	14	2	0	0	0	2	2	4	0	0	6	23
	10:30 PM	1	3	0	0	4	0	6	3	0	9	2	1	2	0	5	1	6	0	0	7	25
	10:45 PM	0	1	1	0	2	1	5	2	0	8	1	1	0	0	2	0	5	0	0	5	17
	Hourly Total	1	8	1	0	10	6	31	6	0	43	8	5	2	0	15	6	22	2	0	30	98
	11:00 PM	0	2	0	0	2	1	5	0	0	6	0	1	1	0	2	0	4	0	0	4	14
P	11:15 PM	0	0	0	0	0	1	3	0	0	4	1	0	2	0	3	1	5	1	0	7	14
age	11:30 PM	0	0	1	0	1	0	3	0	0	3	0	0	0	0	0	2	0	0	0	2	6
ω.	11:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
50	Hourly Total	0	2	1	0	3	2	12	0	0	14	1	1	3	0	5	3	9	2	0	14	36
<b>9</b>	Grand Total	281	1311	296	0	1888	270	4222	955	0	5447	939	1198	1368	0	3505	1476	4149	345	0	5970	16810
58	Approach %	14.9	69.4	15.7	0.0	-	5.0	77.5	17.5	0.0	-	26.8	34.2	39.0	0.0	-	24.7	69.5	5.8	0.0	-	-
	Total %	1.7	7.8	1.8	0.0	11.2	1.6	25.1	5.7	0.0	32.4	5.6	7.1	8.1	0.0	20.9	8.8	24.7	2.1	0.0	35.5	-
	Lights	257	1284	274	0	1815	250	4033	935	0	5218	910	1168	1315	0	3393	1429	3942	325	0	5696	16122
	% Lights	91.5	97.9	92.6	-	96.1	92.6	95.5	97.9	-	95.8	96.9	97.5	96.1	-	96.8	96.8	95.0	94.2		95.4	95.9
	Mediums	18	24	19	0	61	14	171	17	0	202	20	26	52	0	98	47	186	14	0	247	608
	% Mediums	6.4	1.8	6.4	-	3.2	5.2	4.1	1.8	-	3.7	2.1	2.2	3.8	-	2.8	3.2	4.5	4.1	-	4.1	3.6
	Articulated Trucks	6	3	3	0	12	6	18	3	0	27	9	4	1	0	14	0	21	6	0	27	80
	% Articulated Trucks	2.1	0.2	1.0	-	0.6	2.2	0.4	0.3	-	0.5	1.0	0.3	0.1	-	0.4	0.0	0.5	1.7	-	0.5	0.5

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Count Name: Home Road Signal Timing Study Site Code: 10121702 Start Date: 10/12/2017 Page No: 4



Turning Movement Data Plot

Count Name: Home Road Signal Timing Study Site Code: 10121702 Start Date: 10/12/2017 Page No: 5

## Chicago, Illinois, United States 60631 (773) 283-2600 sslezakdlz@gmail.com

### Turning Movement Peak Hour Data (6:00 AM)

			Liberty Road	ł				Home Road	I			,	Liberty Road	i i				Home Road			
Start Time			Southbound	I				Westbound					Northbound					Eastbound			
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
6:00 AM	4	30	7	0	41	6	82	13	0	101	10	22	81	0	113	25	70	6	0	101	356
6:15 AM	9	30	5	0	44	2	96	14	0	112	8	19	10	0	37	32	100	11	0	143	336
6:30 AM	10	44	7	0	61	3	68	25	0	96	18	25	21	0	64	16	80	10	0	106	327
6:45 AM	15	35	2	0	52	5	93	20	0	118	18	27	37	0	82	22	90	9	0	121	373
Total	38	139	21	0	198	16	339	72	0	427	54	93	149	0	296	95	340	36	0	471	1392
Approach %	19.2	70.2	10.6	0.0	-	3.7	79.4	16.9	0.0	-	18.2	31.4	50.3	0.0	-	20.2	72.2	7.6	0.0	-	-
Total %	2.7	10.0	1.5	0.0	14.2	1.1	24.4	5.2	0.0	30.7	3.9	6.7	10.7	0.0	21.3	6.8	24.4	2.6	0.0	33.8	-
PHF	0.633	0.790	0.750	0.000	0.811	0.667	0.883	0.720	0.000	0.905	0.750	0.861	0.460	0.000	0.655	0.742	0.850	0.818	0.000	0.823	0.933
Lights	33	138	18	0	189	14	327	68	0	409	52	92	147	0	291	91	325	32	0	448	1337
% Lights	86.8	99.3	85.7	-	95.5	87.5	96.5	94.4	-	95.8	96.3	98.9	98.7	-	98.3	95.8	95.6	88.9	-	95.1	96.0
Mediums	3	1	3	0	7	2	10	4	0	16	2	1	2	0	5	4	13	3	0	20	48
% Mediums	7.9	0.7	14.3	-	3.5	12.5	2.9	5.6	-	3.7	3.7	1.1	1.3	-	1.7	4.2	3.8	8.3	-	4.2	3.4
Articulated Trucks	2	0	0	0	2	0	2	0	0	2	0	0	0	0	0	0	2	1	0	3	7
% Articulated Trucks	5.3	0.0	0.0	-	1.0	0.0	0.6	0.0	-	0.5	0.0	0.0	0.0	-	0.0	0.0	0.6	2.8	-	0.6	0.5

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Count Name: Home Road Signal Timing Study Site Code: 10121702 Start Date: 10/12/2017 Page No: 6



Turning Movement Peak Hour Data Plot (6:00 AM)

Count Name: Home Road Signal Timing Study Site Code: 10121702 Start Date: 10/12/2017 Page No: 7

## Chicago, Illinois, United States 60631 (773) 283-2600 sslezakdlz@gmail.com

### Turning Movement Peak Hour Data (3:45 PM)

			Liberty Road	ł				Home Road				,	Liberty Road	i				Home Road			
Start Time			Southbound					Westbound					Northbound					Eastbound			
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
3:45 PM	8	36	7	0	51	2	105	35	0	142	17	40	34	0	91	57	104	8	0	169	453
4:00 PM	5	39	3	0	47	7	116	27	0	150	14	30	41	0	85	47	99	5	0	151	433
4:15 PM	10	46	3	0	59	4	117	22	0	143	14	40	61	0	115	48	96	16	0	160	477
4:30 PM	7	31	1	0	39	5	112	21	0	138	12	21	33	0	66	54	101	6	0	161	404
Total	30	152	14	0	196	18	450	105	0	573	57	131	169	0	357	206	400	35	0	641	1767
Approach %	15.3	77.6	7.1	0.0	-	3.1	78.5	18.3	0.0	-	16.0	36.7	47.3	0.0	-	32.1	62.4	5.5	0.0	-	-
Total %	1.7	8.6	0.8	0.0	11.1	1.0	25.5	5.9	0.0	32.4	3.2	7.4	9.6	0.0	20.2	11.7	22.6	2.0	0.0	36.3	-
PHF	0.750	0.826	0.500	0.000	0.831	0.643	0.962	0.750	0.000	0.955	0.838	0.819	0.693	0.000	0.776	0.904	0.962	0.547	0.000	0.948	0.926
Lights	30	152	14	0	196	15	441	104	0	560	55	129	168	0	352	206	391	34	0	631	1739
% Lights	100.0	100.0	100.0	-	100.0	83.3	98.0	99.0	-	97.7	96.5	98.5	99.4	-	98.6	100.0	97.8	97.1	-	98.4	98.4
Mediums	0	0	0	0	0	1	8	1	0	10	0	0	1	0	1	0	8	0	0	8	19
% Mediums	0.0	0.0	0.0	-	0.0	5.6	1.8	1.0	-	1.7	0.0	0.0	0.6	-	0.3	0.0	2.0	0.0	-	1.2	1.1
Articulated Trucks	0	0	0	0	0	2	1	0	0	3	2	2	0	0	4	0	1	1	0	2	9
% Articulated Trucks	0.0	0.0	0.0	-	0.0	11.1	0.2	0.0	-	0.5	3.5	1.5	0.0	-	1.1	0.0	0.3	2.9	-	0.3	0.5

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Count Name: Home Road Signal Timing Study Site Code: 10121702 Start Date: 10/12/2017 Page No: 8



Turning Movement Peak Hour Data Plot (3:45 PM)



# **Appendix C – Trip Generation**



Project Information	
	2018.01836 Redwood Home Road TIS -
Project Name:	Opening Year (Phase 1)
No:	2018.01836
Date:	7/3/2019
City:	Delaware
State/Province:	Ohio
Zip/Postal Code:	43015
Country:	United States
Client Name:	Redwood Acquisitions
Analyst's Name:	American Structurepoint
Edition:	Trip Generation Manual, 10th Ed

Land Lico	Sizo	Initial Build -	AM Peak	Initial Build -	PM Peak
Land Ose	Size	Entry	Exit	Entry	Exit
220 - Multifamily Housing (Low-Rise)	100 Dwolling Units	11	27	27	22
(General Urban/Suburban)	100 Dwelling Offics	11	57	57	22
Reduction		0	0	0	0
Internal		0	0	0	0
Pass-by		0	0	0	0
Non-pass-by		11	37	37	22
Total		11	37	37	22
Total Reduction		0	0	0	0
Total Internal		0	0	0	0
Total Pass-by		0	0	0	0
Total Non-pass-by		11	37	37	22

Project Information	
	2018.01836 Redwood Home Road TIS -
Project Name:	Horizon Year (Phases 1-3)
No:	2018.01836
Date:	7/3/2019
City:	Delaware
State/Province:	Ohio
Zip/Postal Code:	43015
Country:	United States
Client Name:	Redwood Acquisitions
Analyst's Name:	American Structurepoint
Edition:	Trip Generation Manual, 10th Ed

Land Lico	Sizo	Full Build -	AM Peak	Full Build -	PM Peak
Land Ose	Size	Entry	Exit	Entry	Exit
220 - Multifamily Housing (Low-Rise) (General Urban/Suburban)	224 Dwelling Units	35	115	109	64
Reduction		0	0	0	0
Internal		0	0	0	0
Pass-by		0	0	0	0
Non-pass-by		35	115	109	64
Total		35	115	109	64
Total Reduction		0	0	0	0
Total Internal		0	0	0	0
Total Pass-by		0	0	0	0
Total Non-pass-by		35	115	109	64



# **Appendix D – Capacity Analysis Results**



		HUS	7 Sigi	nalize		terse	Cti	ION R	esi	uits	s Sun	nmar	y				
										V.							
General Inform	nation	v								In	tersect	ion Inf	ormatio	on		474+1	× L.
Agency		American Structure	point							Dı	uration,	h	0.25			2++4	K.
Analyst		SBG		Analys	sis Dat	e Jul 8	3, 2	019		Ar	rea Typ	е	Other		4		<b>₹_</b> 5
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM	Pea	ak		P	HF		0.92			w≨t	- - - -
Urban Street		Home Rd		Analys	sis Yea	ar Sc1/	A - 2	2020 N	10-	Ar	nalysis	Period	1> 7:	00			4
						build	y) p	Vith								511	
lutovo o oti o v		Llama Dd & Caurail				Apa Se1		ents)	0 0						- 1	41491	* (*
Draiset Deserin	<b>1</b> :	Home Ru & Sawmin			ame	501	A_I	πια	2_Ai	VI.XI	us				-		
Project Descrip	lion	Reawood Home Ro	115														
Demand Inform	nation				FB				V	VB			NB			SB	
Approach Move	ement			1	Т	R			1.	т	R		Т	R		Т	R
Demand (v), v	eh/h			130	314	10	6	171	3	23	147	220	711	136	116	448	68
Signal Informa	tion			*	Ľ		5		_	Ļ	~					_	I
Cycle, s	100.0	Reference Phase	2		P		2	i i i i		~	1 54	7 5	1≥7		<b>A</b>	<b>``\</b>   <b>'</b>	$\Phi$
Offset, s	79	Reference Point	Begin	Green	73	0.7		20.7	7	5	1.6	22 5		1	<b>Y</b> 2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	0.0		5.2	3.	9	3.9	4.8	╧	▶ '	$\rightarrow$		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	0.0		1.0	2.	2	2.2	1.0		5	6	7	8
<b>Timer Results</b>				EBI	-	EBT		WBI	-	V	VBT	NBI	-	NBT	SBI	-	SBT
Assigned Phase	е			5		2		1			6	3		8	7		4
Case Number	e Number					4.0		1.1		;	3.0	1.1		4.0	1.1		3.0
Phase Duration	I, S		13.8	3	35.9		14.5	;	3	36.6	21.3	3	36.0	13.6	; ;	28.3	
Change Period	, ( Y+R (		6.5		6.2		6.5		(	6.2	6.1		5.8	6.1		5.8	
Max Allow Head	dway(A	<i>MAH</i> ), s		4.0		0.0		4.0		(	0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		7.4			Т	9.9				11.4		25.7	7.3		14.3
Green Extensio	n Time	(ge),s		0.0		0.0		0.0		(	0.0	0.3		2.5	0.0		3.8
Phase Call Pro	bability			1.00	)		Т	1.00	)			1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)			1.00	)			1.00	)	0.93	1.00	) (	0.58
Movement Gro	oup Res	sults			EB				W	B			NB			SB	
Approach Move	ement			L	Т	R		L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12		1	6		16	3	8	18	7	4	14
Adjusted Flow I	Rate ( v	), veh/h		141	457		_	200	37	8	172	239	474	447	126	487	74
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1789			1781	187	70	1585	1781	1870	1765	1781	1781	1585
Queue Service	Time ( g	g s ), S		5.4	24.1		_	7.9	18.	9	8.6	9.4	23.7	23.7	5.3	12.3	3.4
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		5.4	24.1			7.9	18.	9	8.6	9.4	23.7	23.7	5.3	12.3	3.4
Green Ratio ( g	/C)			0.37	0.30			0.38	0.3	0	0.38	0.40	0.30	0.30	0.30	0.22	0.30
Capacity ( c ), v	/eh/h			297	531			267	56	9	601	436	565	533	233	801	472
Volume-to-Cap	acity Ra	itio(X)		0.475	0.859	)	_	0.750	0.66	66	0.287	0.549	0.838	0.839	0.541	0.608	0.156
Back of Queue	( Q ), ft/	In (95 th percentile)		100.5	451.4	1		157.7	350	.2	175.8	174.2	455.9	430.8	105.8	235.8	60.6
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	le)	4.0	17.8		_	6.2	13.	8	6.9	6.9	17.9	17.2	4.2	9.3	2.4
Queue Storage	Ratio (	RQ) (95 th percent	ile)	0.27	0.00			0.32	0.0	0	0.59	0.29	0.00	0.00	0.21	0.00	0.00
Uniform Delay (	( d 1 ), s	/veh		23.9	33.2			25.5	36.	6	26.5	22.4	32.6	32.6	28.4	34.8	25.8
Incremental De		1.2	16.4			7.9	4.2	2	0.8	1.5	13.9	14.6	2.5	3.4	0.7		
Initial Queue De		0.0	0.0			0.0	0.0	כ	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Control Delay (		25.1	49.6			33.4	40.	8	27.3	23.8	46.5	47.2	30.9	38.2	26.6		
Level of Service		С	D			С	D		С	С	D	D	С	D	С		
Approach Delay		43.8	3	D		35.8	6		D	42.1		D	35.6	5	D		
Intersection De				:	39.	5							D				
	Multimodal Posults															-	
Multimodal Re			EB				W	В			NB	_		SB	_		
Pedestrian LOS	S Score	/LOS		2.8		C		3.0			С	2.4		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		1.5		Α		1.6			В	1.4		A	1.1		A

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		HUS	7 Sig	nalize		ersed		kesu	lits a	Sun	nmar	У				
														1/		
General Inform	nation								Inter	sect	ion Infe	ormatio	on		4 L4 4 ↓ \$	a l <u>a</u>
Agency		American Structure	point						Durat	tion,	h	0.25			44	R.
Analyst		SBG		Analys	sis Dat	e Jul 8	2019		Area	Тур	е	Other		4		4 1
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM F	eak		PHF			0.92			wit	
Urban Street		Home Rd		Analys	sis Yea	r Sc1A	- 2020	No-	Analy	ysis	Period	1> 7:(	00			*
						build	(With								ካቱ	H
				<u> </u>		Apar	ments)								4 1 4 Y 1	* (*
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc1A	_Int 1 &	2_AN	1.xus							
Project Descrip	tion	Redwood Home Ro	ITIS													
							_		-							
Demand Inform	nation				EB			VV	B			NB			SB	
Approach Move	ement			L	Т	R				R	L	Т	R	L	Т	R
Demand ( <i>v</i> ), v	eh/h			43	413	121	78	44	8	17	195	101	59	23	152	48
Signal Informa	tion			1	1	1			1 1	117	1	-				
Signal morma		Deference Dhees	0	1	La.	4	), I	Ħ	2	2454				~	<b>N</b> 1	ሐ
Cycle, s	100.0	Reference Phase	2		×		° 📑 '	• •	S L	- 51	2		1		3	4
Offset, s	34	Reference Point	Begin	Green	7.1	1.4	38.8	9.2	2 '	19.6	0.0			<u>5</u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.9	9 !	5.2	0.0		<b>~</b>			$\nabla$
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	1.9	) (	1.0	0.0	-	5	6	7	8
										-		1				
Timer Results				EBL		EBT	WB		WB	T	NBL	-	NBT	SBI		SBT
Assigned Phase	e			5		2	1	_	6		3		8	7		4
Case Number				1.1		4.0	1.1		4.0		1.1		4.0	1.1		4.0
Phase Duration	, S			12.8	3	45.0	14.2	2	46.4	1	15.0	)	25.8	15.0	)	25.8
Change Period,	, ( Y+R )	c ), S		5.7		6.2	7.1		6.2		5.8		6.2	6.3		6.2
Max Allow Head	dway(A	MAH ), s		4.0		0.0	4.0		0.0		4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		3.4			4.7	, I			11.2	2	10.8	3.0	· · ·	13.1
Green Extensio	n Time	(g e ), s		0.0		0.0	0.0		0.0		0.0		0.9	0.0		0.7
Phase Call Prol	bability			1.00	)		1.0	0			1.00	)	1.00	1.00	) (	1.00
Max Out Proba	bility			1.00	)		1.0	о –			1.00	)	0.09	0.07	, (	0.29
												1				
Movement Gro	oup Res	sults			EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т	F	२	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	1	6	3	8	18	7	4	14
Adjusted Flow F	Rate( <i>v</i>	), veh/h		46	569		85	505	5		212	174		25	217	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1797		1781	185	8		1781	1754		1781	1793	
Queue Service	Time ( g	g s ), s		1.4	29.9		2.7	22.3	3		9.2	8.8		1.0	11.1	
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		1.4	29.9		2.7	22.3	3		9.2	8.8		1.0	11.1	
Green Ratio ( g	/C)			0.46	0.39		0.46	0.40	)		0.29	0.20		0.28	0.20	
Capacity ( c ), v	/eh/h			340	697		274	747	·		312	344		333	351	
Volume-to-Capa	acity Ra	atio(X)		0.135	0.817	'	0.310	0.67	7		0.680	0.506		0.075	0.619	
Back of Queue	(Q), ft/	/In (95 th percentile)	)	24.5	475.2	2	47.9	383.	9		197.3	168.7		19.1	216.8	
Back of Queue	(Q), ve	eh/ln ( 95 th percenti	ile)	1.0	18.7		1.9	15.1	1		7.8	6.6		0.8	8.5	
Queue Storage	Ratio (	RQ) (95 th percent	, tile)	0.04	0.00		0.15	0.00	)		0.61	0.00		0.06	0.00	
Uniform Delay (	(d1). s	/veh		17.8	34.3		20.3	24.6	3		30.3	35.9		26.7	36.8	
Incremental De	lav ( d 2	) s/veh		0.1	5.6		0.6	49			59	12		0.1	3.3	
Initial Queue De	elav ( d	3) s/veh		0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0	
Control Delay (	d) e///	eh		17 9	30 0		21.0	29.0	1		36.2	37.1		26.8	40.1	
Level of Service		R	о <u>э</u> .э		21.0 C	29.			D			20.0				
Approach Dolo		20 0							36.0			207				
		30.2	-	0	4 7	-			50.0	,	U			U		
				3	<del>4</del> .1							0				
Multimodal Po	Multimodal Results							\//F	3			NR			SB	
Pedestrian I OS	edestrian LOS Score / LOS					R	2.2		R		22		B	22		B
Ricycle I OS So	destrian LOS Score / LOS					B	2.5		^		2.0		Δ	2.0	_	Δ
				1.5		5	1.0		Л		1.1		~	0.9		~

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		HUS	7 Sig	nalize	ain	terse	ctio	on R	esi	lits 5	un	nmar	y				
										_							
General Inform	nation									Inters	ect	ion Inf	ormatio	on		4 244 + 4	× L.
Agency		American Structure	point							Durati	on,	h	0.25			2++4	R.
Analyst		SBG		Analys	sis Dat	e Jul 8	, 201	19		Area T	Гуре	е	Other	-	4		<b>₹_</b> ₹
Jurisdiction		Delaware County, C	ЭН	Time F	Period	PM F	Peak	k		PHF			0.92			wit	<b>↓</b>
Urban Street		Home Rd		Analys	sis Yea	ar Sc1A	۹-20	020 N	<b>l</b> o-	Analys	sis I	Period	1> 7:	00			*
				-		build	(Wit	ith		-						5 1 1	E F
						Apar	tmer	ents)								41471	× (*
Intersection		Home Rd & Sawmi	l Pkwy	File Na	ame	Sc14	A_Int	it 1 & 2	2_PN	1.xus					_		
Project Descrip	tion	Redwood Home Ro	ITIS														
										-							
Demand Inform	nation				EB				W	B			NB			SB	1 -
Approach Move	ement				Т	R		L		F	R		Т	R		T	R
Demand ( <i>v</i> ), v	eh/h			98	392	2   186	5	170	38	33 9	97	328	511	243	149	471	64
Signal Informa	tion			Ĭ	2		P										
Signal morma		Deference Dhees	2		Ľ,	7	∖∃.	., 3	=	20		245	a 🛛		~	<b>N</b>	<u>ተ</u>
Cycle, s	120.0	Reference Phase	2		'	2	۴F	₹.	'   '	S L	51	7 Y	17 T	1		3	4
Offset, s	0	Reference Point	Begin	Green	7.3	2.9	4	44.0	8.9	9 5	.9	20.3			<u>×</u>	IL	
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	0.0	5	5.2	3.9	3	.9	4.8	` <b></b>				$\nabla$
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	0.0	1	1.0	2.2	2   2.	.2	1.0	_	5	6	7	8
Timer Results				EBL	-	EBI	+	WBL	-  -	WBI		NBL	-	NBI	SBL		SBI
Assigned Phase	e			5		2	_	1		6		3		8	7	$\rightarrow$	4
Case Number				1.1		4.0		1.1		3.0		1.1		4.0	1.1		3.0
Phase Duration	e Duration, s					50.2		16.7	·	53.1		27.0	)	38.1	15.0	) :	26.1
Change Period	, ( Y+R	c ), S		6.5		6.2		6.5		6.2		6.1		5.8	6.1		5.8
Max Allow Head	dway( <i>I</i>	MAH ), s		4.0		0.0		4.0		0.0		4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		6.4				12.0				21.2	2	28.5	10.9		18.7
Green Extensio	n Time	(ge), s		0.0		0.0		0.0		0.0		0.0		2.1	0.0		1.0
Phase Call Pro	bability			1.00	)			1.00				1.00	)	1.00	1.00		1.00
Max Out Proba	bility			1.00	)			1.00				1.00	)	1.00	1.00	) .	1.00
Movement Gro	oup Res	sults			EB				WE	3			NB			SB	
Approach Move	ement			L	Т	R		L	Т	R		L	Т	R	L	Т	R
Assigned Move	ment			5	2	12		1	6	16	5	3	8	18	7	4	14
Adjusted Flow I	Rate( <i>v</i>	), veh/h		107	628		2	223	502	2 12	7	357	433	387	162	512	70
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1768		17	781	187	0 158	35	1781	1870	1666	1781	1781	1585
Queue Service	Time ( g	g ₅ ), s		4.4	41.9		1	10.0	23.	5 5.3	3	19.2	26.4	26.5	8.9	16.7	4.2
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		4.4	41.9		1	10.0	23.	5 5.3	3	19.2	26.4	26.5	8.9	16.7	4.2
Green Ratio ( g	/C)			0.43	0.37		0	0.45	0.3	9 0.4	7	0.36	0.27	0.27	0.24	0.17	0.23
Capacity ( c ), v	/eh/h			328	648		2	225	73′	73	7	397	503	448	213	602	365
Volume-to-Cap	acity Ra	itio(X)		0.325	0.969	)	0.	.989	0.68	7 0.17	73	0.899	0.860	0.862	0.760	0.850	0.191
Back of Queue	(Q), ft/	/In ( 95 th percentile)	)	81.4	755.7	7	23	38.5	317	2 84.	7	398.5	515.4	468.9	210.3	333.7	78.9
Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	3.2	29.8	1	9	9.4	12.	5 3.3	3	15.7	20.3	18.8	8.3	13.1	3.1
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.22	0.00		0	0.48	0.0	0.2	8	0.66	0.00	0.00	0.42	0.00	0.00
Uniform Delay (	(d1), s	/veh		23.3	37.3	1	2	27.9	22.	1 17.	4	32.7	41.7	41.7	39.6	48.4	37.2
Incremental De	lay ( d 2	), s/veh		0.6	28.5		4	44.1	3.3	0.3	3	22.7	17.2	19.2	14.6	14.0	1.2
Initial Queue De		0.0	0.0		1	0.0	0.0	0.0	5	0.0	0.0	0.0	0.0	0.0	0.0		
Control Delav (		23.9	65.9		7	71.9	25	1 17	7	55.3	58.9	60.9	54.2	62.4	38.4		
Level of Service	_	C	F		+	F		R	-	F	F	F	D	F	D		
Approach Delay		59.8		F	┢	36.4		ם		58.5		F	58 /		F		
Intersection De		00.0			53.4	00.4		0	-	00.0		-	D		-		
							. <del></del> т								_		
Multimodal Re			EB				WF	3			NB			SB			
Pedestrian I OS	edestrian LOS Score / LOS					С		2.9	T	C		24		В	23		В
Bicycle LOS Sc	lestrian LOS Score / LOS					B		1.7		B		1.5		A	1.1		A
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		HUS	7 Sig	nalize		ersed		kesu		Sun	nmar	У				
General Inform	nation	-							Inte	rsect	ion Infe	ormatic	on	_	▲☆∲↑\$ 】	a L <u>a</u>
Agency		American Structure	point						Dura	ation,	h	0.25			4 4	R.
Analyst		SBG		Analys	sis Dat	e Jul 8	2019		Area	а Тур	е	Other		4		4
Jurisdiction		Delaware County, C	ЭН	Time F	Period	PM F	eak		PHF	:		0.92			wiji	
Urban Street		Home Rd		Analys	sis Yea	r Sc1A	- 2020 I	No-	Anal	lysis	Period	1> 7:0	00			*
						build	(With							-	ጎኑ	
Interportion		Homo Dd & Liborty	Dd N	Eilo N		Apar So14	ments)	2 DA							* 1 * * 1	
Draiget Desering	tion	Rodwood Home Rd			ame	3017		2_FN	1.xus					-		
Project Descrip	lion		115													
Demand Inform	nation				EB			W	Β			NB			SB	
Approach Move	ement			L	Т	R	L	1	-	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			47	537	267	114	54	10	20	205	143	62	15	166	39
Signal Informa	tion				_		5	<u> </u>	5		- 20	3			-	
Cycle, s	120.0	Reference Phase	2		F.		2₩	η,	8	-51	2 5	12 K		<b>4</b>	<u>`</u>	фх I
Offset, s	0	Reference Point	Begin	Green	71	22	58.6	71	<u>.</u>	22	18 (		1	<b>Y</b> <sup>2</sup>	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	4.3	3	0.0	5.2	_	<b>×</b>	$\rightarrow$	ι I	512
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	2.0	)	0.0	1.0		5	6	7	<b>Y</b> <sup>8</sup>
<b>Timer Results</b>				EBI	-	EBT	WB	L	WB	3T	NBL	-	NBT	SBL	-	SBT
Assigned Phase	е			5		2	1		6		3		8	7		4
Case Number				1.1		4.0	1.1		4.0	0	1.1		4.0	1.1		4.0
Phase Duration	i, s			12.8	3	64.8	15.0	)	67.	.0	16.0	) :	26.4	13.8	; ;	24.2
Change Period,	, ( Y+R (	c ), S		5.7		6.2	7.1		6.2	2	5.8		6.2	6.3		6.2
Max Allow Head	dway(A	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	D	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( <i>g</i> s ), s		3.5			6.0				12.2	2	16.3	2.9	· ·	16.3
Green Extensio	n Time	(g <sub>e</sub> ), s		0.0		0.0	0.1		0.0	0	0.0		0.6	0.0		0.3
Phase Call Prol	bability			1.00	)		1.00	)			1.00	)	1.00	1.00	) .	1.00
Max Out Proba	bility			1.00	)		1.00	)			1.00	)	1.00	0.32	2	1.00
	_															
Movement Gro	oup Res	sults			EB		<u> </u>		3	_		NB			SB	D
Approach Move	ement					R 10				R 40			R 10		1	R
Assigned Move	meni Dete ( v	) voh/h		5 47	2	12	124	600		10	3	0 000	18	16	4	14
Adjusted Flow F	Rale (V	), ven/n		47	805		124	105	,	_	4704	4774		10	223	
			n	1/01	1/00	+	1/01	100	0	_	1/01	1//4		0.0	14.2	
	learance	$g_{s}$ , s e Time $(a_{c})$ s		1.5	40.3		4.0	28.8	י א		10.2	14.3		0.9	14.3	
Green Ratio ( g	/C)			0.55	0.49		0.55	0.5	1		0.23	0.17		0.21	0.15	
Capacity ( c ), v	/eh/h			368	862		235	942	2		247	299		209	271	
Volume-to-Cap	acitv Ra	tio(X)		0.128	0.934	-	0.526	0.64	6		0.903	0.746		0.078	0.821	
Back of Queue	( Q ), ft/	(In ( 95 th percentile)	)	25.2	452.8	3	77.1	459.	8		102.9	285.1		17.3	307.4	
Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	1.0	17.8		3.0	18.1	1		4.1	11.2		0.7	12.1	
Queue Storage	Ratio (	RQ) (95 th percent	, tile)	0.05	0.00	+	0.24	0.00	5		0.32	0.00		0.05	0.00	
Uniform Delay (	(d1), s	/veh		16.3	18.1		24.7	21.7	7		44.0	47.5		38.4	49.4	
Incremental De	lay ( d 2	), s/veh		0.0	7.6		2.2	3.4			32.8	9.8		0.2	18.0	
Initial Queue De	elay ( d	з ), s/veh		0.0	0.0	1	0.0	0.0	1		0.0	0.0		0.0	0.0	
Control Delay (	eh		16.4	25.7		26.9	25.1	1		76.8	57.3		38.6	67.4		
Level of Service		В	С		С	С			E	E		D	E			
Approach Delay		25.2	2	С	25.4	1	С		67.1		E	65.4		E		
Intersection De				3	7.7							D				
	Multimedal Deculta															
Multimodal Re			EB			WE	3			NB			SB			
Pedestrian LOS	edestrian LOS Score / LOS					В	2.3		В		2.3		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		2.0		В	1.7		В		1.2		А	0.9		А

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									1					11		
General Inform	nation	v							Inte	ersect	ion Inf	ormati	on	_	4441	ba l <u>a</u>
Agency		American Structure	point						Du	ration,	h	0.25			2 + + 4	L
Analyst		SBG		Analys	sis Dat	e Jul 8,	2019		Are	еа Тур	е	Othe	~	4		<b>~</b> _⊳
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM P	eak		PH	łF		0.92			wijit	↓ ↓ ↓
Urban Street		Home Rd		Analys	sis Yea	ar Sc1B	- 2020	No-	Ana	alysis	Period	1> 7:	00			*
						build	(Withou	t							ንተጅ	
laters estimat						Apan	ments)	0 4							41491	1
Intersection	4	Home Ro & Sawmi		File Na	ame	SCIB	_int i &	2_AI	vi.xu	IS				_		
Project Descrip	tion	Reawood Home Ro	1115													
Demand Inform	nation				FB			V	/R			NB			SB	
Approach Move	ement			1	Т	R			т	R		Т	R		Т	R
Demand $(v)$ , v	eh/h			130	309	106	145	3	07	136	220	711	126	114	448	68
Domand ( 7 ), 7	01/11			100	000		110		01	100			120		110	
Signal Informa	tion				Ľ	Ľ		<u> </u>	50	<		3				I
Cycle, s	100.0	Reference Phase	2		P	r¥.	- 📑 -	- T	2	] 84	2 6/	⊳21 ∎		4	<u>י</u> ר	$\Phi$
Offset, s	90	Reference Point	Begin	Croop	7.5	12	20.5		<u> </u>				1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.	9 9	3.9	4.8	°	▶ .	$\rightarrow$	L	<b>51</b> 2
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.2	0.0	1.0	2.	2	2.2	1.0		5	6	7	8
			1													
Timer Results				EBL	-	EBT	WB	L	W	/BT	NBL	-	NBT	SBI		SBT
Assigned Phase	е			5		2	1		(	6	3		8	7		4
Case Number				1.1		4.0	1.1		3	3.0	1.1		4.0	1.1		3.0
Phase Duration	e Duration, s					37.0	14.0	)	35	5.7	20.4		35.4	13.6	3	28.6
Change Period,	, ( Y+R	c ), S		6.5		6.2	6.5		6	6.2	6.1		5.8	6.1		5.8
Max Allow Head	dway ( /	MAH ), s		4.0		0.0	4.0		0	).0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		7.3			9.4				11.4	-	25.4	7.2		14.2
Green Extensio	n Time	(ge), s		0.1		0.0	0.0		0	).0	0.2		2.3	0.0		3.9
Phase Call Prol	bability			1.00	)		1.00	5			1.00	)	1.00	1.00	5	1.00
Max Out Proba	bility			1.00	)		1.00	)			1.00	)	0.98	1.00	)	0.55
								1								
Movement Gro	oup Res	sults			EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate( <i>v</i>	), veh/h		141	451		183	38	8	172	239	467	443	124	487	74
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1788	;	1781	187	′0 <sup>′</sup>	1585	1781	1870	1772	1781	1781	1585
Queue Service	Time ( g	g s ), S		5.3	23.3		7.4	16.	0	6.6	9.4	23.4	23.4	5.2	12.2	3.3
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		5.3	23.3		7.4	16.	0	6.6	9.4	23.4	23.4	5.2	12.2	3.3
Green Ratio ( g	/C)			0.38	0.31		0.37	0.2	9	0.37	0.39	0.30	0.30	0.30	0.23	0.32
Capacity ( <i>c</i> ), v	/eh/h			363	551		257	55	2	586	423	554	524	231	812	501
Volume-to-Capa	acity Ra	itio(X)		0.389	0.819	9	0.714	0.70	)4 C	0.293	0.566	0.844	0.844	0.536	0.600	0.148
Back of Queue	( Q ), ft/	In ( 95 th percentile)	)	96.8	426.4	1	134.7	228	.3	99.9	177.7	454.7	430.9	103	234.7	58.7
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	3.8	16.8		5.3	9.0	)	3.9	7.0	17.9	17.2	4.1	9.2	2.3
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.26	0.00		0.27	0.0	0	0.33	0.30	0.00	0.00	0.21	0.00	0.00
Uniform Delay (	( <b>d</b> 1 ), s	/veh		22.2	32.0		24.0	21.	5	17.9	22.8	33.0	33.0	28.3	34.5	24.5
Incremental De	lay ( <i>d</i> 2	), s/veh		0.7	12.8		6.0	4.8	3	0.8	1.8	14.6	15.3	2.4	3.3	0.6
Initial Queue De	elay(d	з ), s/veh		0.0	0.0		0.0	0.0	)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	d ), s/ve	eh		22.8	44.8		30.0	26.	4	18.7	24.5	47.6	48.3	30.7	37.8	25.2
Level of Service		С	D		С	С		В	С	D	D	С	D	С		
Approach Delay		39.6	6	D	25.5	5	(	С	43.1		D	35.1	1	D		
Intersection De				3	6.6							D				
Multimodal Re	Iultimodal Results							W	В			NB			SB	
Pedestrian LOS	destrian LOS Score / LOS					С	3.0		(	С	2.4		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		1.5		А	1.5		E	В	1.4		А	1.1		А

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		HUS	7 Sig	nalize	ain	terse	CI		esu	IIts	s Sun	nmar	У				
															W		
General Inform	nation									Int	tersect	ion Infe	ormatio	on		4 L4 4 ↓ 4	a ( <u>.</u>
Agency		American Structure	point							Du	iration,	h	0.25			4 4	K.
Analyst		SBG		Analys	sis Dat	e Jul	8, 2	2019		Are	еа Тур	е	Other		4		주 - 신
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM	Pe	eak		РH	ΗF		0.92			w į L	
Urban Street		Home Rd		Analys	sis Yea	ar Sc1	B-	- 2020 M	No-	An	alysis	Period	1> 7:	00			¥
						buil	d ('	Without	:							ግጅ	
			<u> </u>			Ара	artn	nents)								41471	* (*
Intersection		Home Rd & Liberty		File Na	ame	Sc1	В_	Int 1 &	2_AN	/I.xu	JS				_		
Project Descrip	tion	Redwood Home Ro	IIIS													_	
Domand Inform	nation				EB				۱۸/	'B			NB			SB	
Approach Move	mont				Т		>		vv	-	P		Т	P		<u> </u>	P
Demand ( v ) v	ah/h				306	: 11	` 1Л	78		13	17	103	101	59	23	152	18
Demand (V), V	en/n			41	0.90	, , , , , ,	14	10		+5	11	195		- 39	23	152	40
Signal Informa	tion						5	_	<u> </u>	L,							
Cvcle, s	100.0	Reference Phase	2	1		4	2		Ξ,	- 24	EV3				2	<b>\</b>	$\Phi$
Offset, s	90	Reference Point	Begin							)		Γ _	_	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green	1.1	1.4	)	31.8	14	<u>.2</u> ג	21.6	0.0	-		$\rightarrow$	L	<b>r</b> †3
Force Mode	Fixed	Simult, Gap N/S	On	Red	1.4	0.0	, )	1.0	1.9	, )	1.0	0.0		5	6	7	
					.,			1	Щ								
Timer Results				EBL	-	EBT		WB	L	W	VBT	NBI	-	NBT	SBI	-	SBT
Assigned Phase	е			5		2		1			6	3		8	7		4
Case Number			1.1		4.0		1.1		4	1.0	1.1		4.0	1.1		4.0	
Phase Duration	. S			12.8	3	38.0		14.2	2	39	9.4	20.0	)	27.8	20.0	)	27.8
Change Period.	, (Y+R)		5.7		6.2		7.1		6	5.2	5.8		6.2	6.3		6.2	
Max Allow Head	dwav ( A	идн ). s		4.0		0.0	1	4.0		0	).0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( q s ). S		3.5	-		1	5.1				10.6	;	10.6	2.9		12.8
Green Extensio	n Time	(ge), s		0.0		0.0		0.0		0	).0	0.2		1.0	0.0		0.9
Phase Call Pro	bability	( 9 ° ), °		1.00	)			1.00	)			1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)			1.00	)			1.00	)	0.03	0.00	) /	0.09
															0.00		
Movement Gro	oup Res	sults			EB				WE	3			NB			SB	
Approach Move	ement			L	Т	R	П	L	Т	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	2	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate( <i>v</i>	), veh/h		44	552			85	500	)		210	174		25	217	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1798	;		1781	185	8		1781	1754		1781	1793	
Queue Service	Time ( g	g s ), S		1.5	29.9			3.1	24.6	3		8.6	8.6		0.9	10.8	
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		1.5	29.9			3.1	24.6	3		8.6	8.6		0.9	10.8	
Green Ratio ( g	/C )			0.39	0.32			0.39	0.33	3		0.36	0.22		0.35	0.22	
Capacity ( c ), v	/eh/h			258	572			215	617	7		427	379		449	387	
Volume-to-Capa	acity Ra	atio(X)		0.172	0.966	6		0.395	0.81	1		0.491	0.459		0.056	0.561	
Back of Queue	( Q ), ft/	/In ( 95 th percentile)	)	26.9	447.2	2		56.6	448.	4		157.1	162.8		16.7	207.7	
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	1.1	17.6			2.2	17.7	7		6.2	6.4		0.7	8.2	
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.05	0.00			0.17	0.00	2		0.48	0.00		0.05	0.00	
Uniform Delay (	(d1), s	/veh		21.7	27.3			24.5	30.5	5		24.4	34.1		21.8	35.0	
Incremental De	Incremental Delay ( <i>d</i> <sup>2</sup> ), s/veh							1.2	11.1	1		0.9	0.9		0.1	1.8	
Initial Queue De		0.0	0.0			0.0	0.0			0.0	0.0		0.0	0.0			
Control Delay (		21.9	48.2			25.7	41.6	3		25.2	35.0		21.9	36.8			
Level of Service		С	D			С	D			С	С		С	D			
Approach Delay		46.3	3	D		39.3	3		D	29.7	7	С	35.3	}	D		
Intersection De					39	0.0							D				
Multimodal Re	Aultimodal Results								WE	3			NB			SB	
Pedestrian LOS	estrian LOS Score / LOS					В		2.3			В	2.3		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		1.5		А		1.5			A	1.1		А	0.9		А

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		псэ	/ Sig	nalize	a m	tersec		kesi	lits	Sun	nmar	y				
									11							
General Inform	nation	N-							Inte	ersect	ion Infe	ormatio	on		4 74 40 1 1	× ( <u>4</u> )
Agency		American Structure	point	0					Dur	ration,	h	0.25			****	K_
Analyst		SBG		Analys	sis Dat	e Jul 8,	2019		Are	еа Тур	е	Other		4		<b>₹_</b> 5-
Jurisdiction		Delaware County, C	ЭН	Time F	Period	PM P	eak		PHF	F		0.92			₩ĴĽ	+ - -
Urban Street		Home Rd		Analys	sis Yea	r Sc1B	- 2020	No-	Ana	alysis	Period	1> 7:0	00	74		*
						build	(Without	t							511	
laters estimat						Apan	ments)	0.0	4					- 1	* 1 * * * 1	* [*
Intersection		Home Rd & Sawmi	I PKWY	File Na	ame	SCIB	_Int 1 &	2_PI	vi.xus	S				-		
Project Descrip	tion	Redwood Home Ro	IIS												_	
Demand Inform	nation				FB			V	/R			NB			SB	
Approach Move	mont				Т	R	1		т	R		Т	R		Т	R
Demand $(v)$ v	eh/h			98	377	186	155	3	74	91	328	511	212	141	471	64
Demand (V), V	CHI/H			30	511	100	100	0	/ -	51	520	511	212	141	4/1	04
Signal Informa	tion				Ľ	Ľ		<u>.                                    </u>	L s							I
Cvcle, s	120.0	Reference Phase	2	1		∕¦⊰_`	- <u>14</u>	-	51 ° 5	۳.	2 5			2	<b>\</b>	$\Phi$
Offset, s	100	Reference Point	Begin		7.5		45.0		<u>)</u>			Ir _	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green	1.5	1.0	45.8	1.	9 0	6.9 3.0	20.2	<u> </u>	<b>X</b>	$\rightarrow$	L	r <b>†</b> 7
Force Mode	Fixed	Simult, Gap N/S	On	Red	2.2	0.0	1.0	2.	2	2.2	1.0		5	6	7	
			-													
Timer Results				EBL	-	EBT	WB	L	W	'BT	NBL	_	NBT	SBL		SBT
Assigned Phase	e			5		2	1		6	6	3		8	7		4
Case Number				1.1		4.0	1.1		3.	.0	1.1		4.0	1.1		3.0
Phase Duration	ase Duration, s					53.0	14.0	)	52	2.0	27.0	)	39.0	14.0	) :	26.0
Change Period.	nase Duration, s nange Period, ( Y+ <i>R c</i> ), s					6.2	6.5		6.	.2	6.1		5.8	6.1		5.8
Max Allow Head	dwav ( A	ман ). s		4.0		0.0	4.0		0.	.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ). S		6.2			9.5			-	21.2	2	26.7	9.9		18.8
Green Extensio	n Time	(ge) s		0.1		0.0	0.0	-	0.	.0	0.0		3.1	0.0		0.9
Phase Call Pro	bability	(3,),0		1.00	,	0.0	1.00	<u>,</u>	•		1 00		1 00	1.00	, ,	1 00
Max Out Proba	bility			1.00	)		1.00	) )			1.00	)	0.70	1.00	)	1.00
													• • •		and the second	
Movement Gro	oup Res	sults			EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h		107	612		207	49	9 '	121	357	413	373	153	512	70
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1765		1781	187	'0 1	1585	1781	1870	1683	1781	1781	1585
Queue Service	Time ( g	g s ), S		4.2	38.8		7.5	24.	6	4.9	19.2	24.6	24.7	7.9	16.8	4.2
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		4.2	38.8		7.5	24.	6	4.9	19.2	24.6	24.7	7.9	16.8	4.2
Green Ratio ( g	/C)			0.45	0.39		0.44	0.3	8 0	0.45	0.36	0.28	0.28	0.23	0.17	0.24
Capacity ( c ), v	/eh/h			345	689		212	71	4 7	709	396	517	466	215	599	379
Volume-to-Capa	acity Ra	itio(X)		0.309	0.889	)	0.977	0.69	99 0	).171	0.901	0.798	0.801	0.714	0.854	0.184
Back of Queue	(Q), ft/	/In (95 th percentile)	)	77	650.7	7	330.7	352	.3 7	78.2	400.2	468.4	429.3	196.2	334.6	77.7
Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	3.0	25.6	1	13.0	13.	9	3.1	15.8	18.4	17.2	7.7	13.2	3.1
Queue Storage	Ratio (	RQ) (95 th percent	ile)	0.21	0.00		0.66	0.0	0 0	0.26	0.67	0.00	0.00	0.39	0.00	0.00
Uniform Delay (	(d1), s	/veh		22.0	34.2		32.3	24.	8 1	17.2	32.7	40.3	40.3	40.7	48.5	36.3
Incremental De		0.5	15.9		43.4	3.7	7	0.3	23.0	12.1	13.5	10.7	14.4	1.1		
Initial Queue De	з ), s/veh		0.0	0.0		0.0	0.0	)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delav (	eh		22.5	50.0		75.7	28.	5 1	17.5	55.8	52.4	53.8	51.4	62.9	37.4	
Level of Service		С	D		E	С		В	E	D	D	D	E	D		
Approach Delay		46.0	)	D	38.7	7		-	53.9	)	 D	- 58.1		E		
Intersection De				4	9.5							D				
		I		,												
Multimodal Re			EB			W	В			NB			SB			
Pedestrian LOS	edestrian LOS Score / LOS					С	2.9		С	2	2.4		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		1.7		В	1.6		В	3	1.4		А	1.1		А

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#### alizad Inta .14- 0 4:-**D**-

		HUS	7 Sig	nalize		ersed		kesi	lits	s Sun	nmar	У				
									1					1/		
General Inform	nation								Int	ersect	ion Infe	ormatio	on		↓↓↓↓ 	a l <u>a</u>
Agency		American Structure	point						Du	iration,	h	0.25			4 4	L
Analyst		SBG		Analys	sis Dat	e Jul 8	2019		Are	еа Тур	е	Other		4		4 5
Jurisdiction		Delaware County, C	ЭН	Time F	Period	PM F	eak		PH	łF		0.92			₩ĴĽ	
Urban Street		Home Rd		Analys	sis Yea	r Sc1B	- 2020	No-	An	alysis	Period	1> 7:	00			*
						build	(Withou	t							ንጅ	
						Apar	ments)								* * * * *	* (*
Intersection	-	Home Rd & Liberty	Rd N	File Na	ame	Sc1B	_Int 1 &	2_PN	/l.xu	IS				_		
Project Descrip	tion	Redwood Home Ro	ITIS													
					<b>ED</b>			10	/D			ND			C D	
Demand Inform	nation				EB		_		′В г		<u> </u>			<u> </u>	<u>58</u>	
Approach wove				L 46	507			E'	۱ ۲	<u>к</u>	100	142	<u>к</u>	15	166	<u>к</u> 27
Demand (V), V	en/n			40	527	263	114	52	25	20	199	143	62	15	100	37
Signal Informa	tion					1			l							
Cycle s	120.0	Reference Phase	2						2		245	) ¥		2	<b>N</b>	$\Phi$
Offset s	110	Reference Point	Begin			- Ň	<b>```</b>		Ì	<u> </u>	r Y	<u> </u>	1	2	3	4
	No	Simult Gap F/W	On	Green	7.3	1.2	57.6	8.0	6	1.3	19.6	<u> </u>		ð-	L	
Force Mode	Fixed	Simult, Gap N/S	On	Red	4.3	0.0	5.2	4.	3 1	0.0	5.Z		5	<b>K</b>		Y
	TIXCU	onnuit. Cap N/C		Tteu	1.4	0.0	1.0	2.	5	0.0	1.0		0			
Timer Results				EBI		FBT	WB	1	W	/BT	NBI		NBT	SBI		SBT
Assigned Phase	<u> </u>			5	-	2	1			6	3	-	8	7		4
Case Number	5			11		4.0	1 1		1		11		4.0	11		4.0
Phase Duration	C			14.5	,	4.0 65.0	12 (	2	- 6'	2.0	16.2	,	+.0 27.1	1.1		7.0 25.9
Change Period	, 3 (V+P			7 1		6.2	5.7		6	3.0 3.2	5.8	-	62	63		<u>62</u>
Max Allow Hoa		(), S		1.1		0.2	3.7		0	).Z	1.0		4.0	0.5		4.0
	co Timo	$(\alpha_{r})$		4.0	+	0.0	4.0		0	.0	4.0		4.0	4.0		4.0
Queue Clearan		(gs), s		3.4		0.0	0.1				12.4	•	0.7	2.0	<u> </u>	0.6
Green Extensio	n Time	( <i>g</i> e), s		0.0	-	0.0	0.0		0	).0	0.0		0.7	0.0	$\rightarrow$	0.6
Phase Call Pro				1.00	) \		1.00	) )			1.00	)	1.00	1.00	<u> </u>	1.00
Max Out Proba	onity			1.00	)		1.00	J			1.00	)	0.73	0.05	,	1.00
Movement Gro	oup Res	sults			EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h		44	750		124	592	2		216	223		16	221	
Adjusted Satura	ation Flo	w Rate ( <i>s</i> ), veh/h/l	n	1781	1765		1781	185	8		1781	1774		1781	1811	
Queue Service	Time ( g	g s ), S		1.4	43.2		4.1	29.	2		10.4	14.2		0.8	13.9	
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		1.4	43.2		4.1	29.	2		10.4	14.2		0.8	13.9	
Green Ratio ( g	/C )			0.54	0.49		0.54	0.4	8		0.25	0.17		0.24	0.16	
Capacity ( c ), v	/eh/h			360	865		249	892	2		269	309		233	296	
Volume-to-Cap	acity Ra	itio(X)		0.121	0.867	,	0.498	0.66	64		0.803	0.721		0.070	0.746	
Back of Queue	( Q ), ft/	/In (95 th percentile)	)	24.2	514.6	;	75.1	472	.5		105.7	279.3		16.7	283.6	
Back of Queue	(Q), ve	eh/In ( 95 th percenti	ile)	1.0	20.3		3.0	18.	6		4.2	11.0		0.7	11.2	
Queue Storage	Ratio (	RQ) (95 th percent	, tile)	0.04	0.00		0.23	0.0	0		0.33	0.00		0.05	0.00	
Uniform Delay (	(d1), s	/veh	,	17.0	22.2		23.4	23.	8		41.6	46.8		36.4	47.8	
Incremental De	lay ( <i>d</i> 2	), s/veh		0.1	5.6		1.5	3.9	,		16.0	8.0		0.1	9.9	
Initial Queue De	elay ( d	3), s/veh		0.0	0.0		0.0	0.0	,		0.0	0.0		0.0	0.0	
Control Delav (	d ). s/ve	eh		17.1	27.8		24.9	27.	7		57.6	54.8		36.5	57.7	
Level of Service		В	C		С	C	+		E	D		D	E			
Approach Delay		27.2		С	27.2	2		С	- 56.2	2	E	56.3		E		
Intersection De				.3	6.2			-				D				
		II														
Multimodal Re			EB			WE	3			NB			SB			
Pedestrian LOS	edestrian LOS Score / LOS					В	2.3			В	2.3		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		2.0		В	1.7			В	1.2		А	0.9		А

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General Inform	ation								Intersec	tion Inf	ormatio	on		****	× L
Agency		American Structure	point						Duration	h	0.25			7++7	
Analyst		SBG	•	Analys	is Date	Jul 8,	2019		Area Typ	е	Other	-	4		4
Jurisdiction		Delaware County, C	ЭН	Time P	eriod	AM P	eak		PHF		0.92			W L	
Urban Street		Home Rd		Analys	is Yea	· Sc2A	- 2020 E	Build	Analysis	Period	1> 7:	00			4
						(With	Apartme	ents)						117	
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ime	Sc2A	_Int 1 &	2_AM	.xus					14 1 <del>4</del> 17 1	* (*
Project Descript	lion	Redwood Home Ro	IIIS												
Demand Inform	nation				EB			W	3		NB			SB	
Approach Move	ment			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			130	316	106	183	33	0 153	220	711	141	117	448	68
Signal Informa	tion				2	5									
Cvcle, s	100.0	Reference Phase	2			- 2	7.	Η.	20	202	) • ~ =   ■		2	5	<b>小</b>
Offset, s	79	Reference Point	Begin				<b>1</b>		1 1	<u>r y</u>	ľ′	1	2	3	4
Uncoordinated	No	Simult Gap E/W	On	Green	7.3	0.7	29.7	7.5	1.6	22.5	シ_┥┩┛	<b>"</b>	$\mathbf{A}$	LJ	-+-
Force Mode	Fixed	Simult, Gap N/S	On	Red	2.6	0.0	1.0	2.2	2.2	4.0		5	6	7	Y
				J	,			1	1	1					
Timer Results				EBL		EBT	WB	L	WBT	NBI	-	NBT	SBI	-	SBT
Assigned Phase	e			5		2	1		6	3		8	7		4
Case Number				1.1		4.0	1.1		3.0	1.1		4.0	1.1		3.0
Phase Duration	, S			13.8		35.9	14.5	5	36.6	21.3	3	36.0	13.6	3	28.3
Change Period,	( Y+R	c ), S		6.5		6.2	6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Head	lway ( <i>N</i>	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		7.4			10.0	)		11.4		25.9	7.4		14.3
Green Extensio	n Time	(ge),s		0.0		0.0	0.0		0.0	0.3		2.4	0.0		3.9
Phase Call Prot	pability			1.00			1.00	)		1.00	)	1.00	1.00	)	1.00
Max Out Probal	oility			1.00			1.00	)		1.00	)	0.96	1.00	)	0.59
Movement Gre	un Pos	ulte			ER			W/B			NR	_		SB	
Approach Move	ment	Suits			Т	R	1	Т	R			R	1	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h		141	459		207	374	173	239	477	449	127	487	74
Adjusted Satura	ation Flo	w Rate ( s ), veh/h/l	n	1781	1789		1781	1870	1585	1781	1870	1762	1781	1781	1585
Queue Service	Time ( g	g s ), S		5.4	24.2		8.0	18.7	8.7	9.4	23.9	23.9	5.4	12.3	3.4
Cycle Queue Cl	earance	e Time ( g c ), s		5.4	24.2		8.0	18.7	8.7	9.4	23.9	23.9	5.4	12.3	3.4
Green Ratio ( g	/C )			0.37	0.30		0.38	0.30	0.38	0.40	0.30	0.30	0.30	0.22	0.30
Capacity ( c ), v	eh/h			300	531		266	569	601	436	565	532	232	801	472
Volume-to-Capa	acity Ra	tio(X)		0.470	0.863		0.781	0.65	7 0.288	0.549	0.844	0.844	0.549	0.608	0.156
Back of Queue	( Q ), ft/	In ( 95 th percentile)	)	100.4	454.5		166.2	345.3	3 176.4	174.2	460.6	434.7	107.2	235.8	60.6
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	4.0	17.9		6.5	13.6	6.9	6.9	18.1	17.4	4.2	9.3	2.4
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.27	0.00		0.33	0.00	0.59	0.29	0.00	0.00	0.21	0.00	0.00
Uniform Delay (	d 1 ), si	/veh		23.9	33.2	<u> </u>	26.2	36.5	26.5	22.4	32.7	32.7	28.5	34.8	25.8
Incremental Del	ay ( d 2	), s/veh		1.1	16.8	<u> </u>	9.8	4.0	0.8	1.5	14.3	15.1	2.7	3.4	0.7
Initial Queue De	nitial Queue Delay ( $d_3$ ), s/veh						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (		25.0	50.0		36.0	40.6	27.4	23.8	47.0	47.8	31.2	38.2	26.6		
Level of Service			U		D						0	, U			
Approaction Delay		44.1		U 20	30.3		U	42.6		U	35. <i>1</i>		U		
	mersection Delay, s/ven / LOS					3	J.J								
Multimodal Re	ultimodal Results							WB			NB			SB	
Pedestrian LOS	Score	/LOS		2.8		С	3.0		С	2.4		В	2.3		В
Bicycle LOS Sc	ore / LC	)S		1.5		Α	1.7		В	1.4		А	1.1		А

General Inform	nation								Intersect	tion Inf	ormati	on		╡┟╺┿╸┾╴╞	s l <u>s</u>
Agency		American Structure	point						Duration,	, h	0.25			<mark>91 A. A. 1</mark> 9	
Analyst		SBG		Analys	is Date	Jul 8,	2019		Area Typ	е	Othe	r	4		4
Jurisdiction		Delaware County, 0	ЭН	Time F	Period	AM Pe	eak		PHF		0.92		\$	w I L	4
Urban Street		Home Rd		Analys	is Year	Sc2A (With	- 2020 E Apartme	Build	Analysis	Period	1> 7:	00			÷ F
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame	Sc2A	Int 1 &	2 AN	/I - With In	nprovem	nents.x	us		4 1 <b>4 1</b>	۲ ۲
Project Descript	tion	Redwood Home Ro	I TIS					_		•			-		
Demand Inform	nation				EB			W	′B		NB			SB	
Approach Move	ment			L	Т	R	L	٦	Г R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			130	316	106	183	33	30 153	220	711	141	117	448	68
						<u>.</u>		1							_
Signal Informa	tion				2	Ę	╡. ネ	<u> </u>	50	- 243	3		_	ĸ	$\mathbf{k}$
Cycle, s	100.0	Reference Phase	2		F' 4	7 0	713 •	- h- 1	5 10 51	v N	12		€ , -	ן <b>ר</b> ו	
Offset, s	79	Reference Point	Begin	Green	7.3	0.7	29.7	7.5	5 1.6	22.5	5 4		K		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	0.0	5.2	3.9	9 3.9	4.8					<b>N</b>
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	0.0	1.0	2.2	2 2.2	1.0		5	6	7	8
			_		11								0		
Timer Results				EBL	-	EBT	WB	L	WBT	NBL	-	NBT	SBL	-	SBT
Assigned Phase	e			5		2	1		6	3		8	7		4
Case Number				1.1		3.0	1.1		3.0	1.1		4.0	1.1		3.0
Phase Duration	, S		13.8	;	35.9	14.5	5	36.6	21.3	3	36.0	13.6	3 2	28.3	
Change Period,	(Y+R	c ), S		6.5		6.2	6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Head	dway(A	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		7.4			10.0	)		11.4		25.9	7.4	· · · · ·	14.3
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.0	0.3		2.4	0.0		3.9
Phase Call Prot	oability			1.00	)		1.00	)		1.00	)	1.00	1.00	) ·	1.00
Max Out Probal	bility			1.00			1.00	)		1.00	)	0.96	1.00	) (	0.59
										1					
Movement Gro	up Res	sults			EB		<u> </u>	WE	3		NB			SB	
Approach Move	ement			L		R	L		R	L		R	L	1	R
Assigned Move	ment	<u> </u>		5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h		141	343	115	207	374	173	239	477	449	127	487	74
Adjusted Satura	ation Flo	w Rate ( $s$ ), veh/h/l	In	1781	1870	1610	1/81	187	0 1585	1781	1870	1/62	1/81	1/81	1585
Queue Service	Time ( g	g s ), S		5.4	15.8	4.2	8.0	18.	7 8.7	9.4	23.9	23.9	5.4	12.3	3.4
Cycle Queue Cl	learance	e Time ( <i>g c</i> ), s		5.4	15.8	4.2	8.0	18.7	7 8.7	9.4	23.9	23.9	5.4	12.3	3.4
Green Ratio (g	/C)			0.37	0.30	0.45	0.38	0.30	0.38	0.40	0.30	0.30	0.30	0.22	0.30
Capacity ( c ), v	eh/h			300	555	723	359	569	601	436	565	532	232	801	472
Volume-to-Capa	acity Ra	itio ( X )		0.470	0.618	0.159	0.578	0.65	0.288	0.549	0.844	0.844	0.549	0.608	0.156
Back of Queue	(Q),π/	In (95 th percentile)	)	100.4	301.5	68.5	146.7	345.	3 176.4	174.2	460.6	434.7	107.2	235.8	60.6
Back of Queue	(Q), ve	RO (95 th percent	tile)	4.0	0.00	2.7	5.8 0.20	0.00	0.9	0.9	18.1	0.00	4.2	9.3	2.4
Liniform Delay (				23.0	30.3	16.3	23.8	36	5 26 5	22.4	32.7	32.7	28.5	34.8	25.8
	av(d)	) s/veh		1 1	5 1	0.5	1.6	4.0	0.8	15	14.3	15.1	20.0	34	0.7
Initial Queue De	ay (a z	3) s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	d) s/ve	-h		25.0	35.4	16.8	25.4	40.6	6 27 4	23.8	47.0	47.8	31.2	38.2	26.6
Level of Service	evel of Service (LOS)					-10.0 R	<u> </u>		<u> </u>	<u> </u>	л.0 П	<i>п.</i> о	C.	D	20.0 C
Approach Delay	Approach Delay, s/veh / LOS					C	33/		C	126			35.7	7	
Intersection Del		20.4		36	3.4	•		72.0			D		-		
	nersection Delay, s/ven / LOS												_		
Multimodal Re	sults				EB			WE	3		NB			SB	
Pedestrian LOS	Score	/ LOS		2.8		С	3.0		С	2.4		В	2.4		В
Bicycle LOS Sc	ore / LC	DS		1.5		А	1.7		В	1.4		A	1.1		А

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General Inform	nation								Inte	ersect	ion Infe	ormatio	on		4241	bi lu
Agency		American Structure	point						Du	ration,	h	0.25			44	_
Analyst		SBG		Analys	is Date	Jul 8,	2019		Are	ea Typ	е	Other		-		4
Jurisdiction		Delaware County, C	ЭΗ	Time P	eriod	AM P	eak		PH	IF		0.92			wit	
Urban Street		Home Rd		Analys	is Year	Sc2A	- 2020 E	Build	Ana	alysis	Period	1> 7:0	00	4		÷ *
						(With	Apartme	ents)							ጎዮ	· ·
Intersection		Home Rd & Liberty		File Na	ime	Sc2A	_Int 1 &	2_AN	M.xu	IS				_	* 1 * *	
Project Descrip	tion	Redwood Home Ro	i lis													
Demand Inform	nation				EB			W	/B			NB			SB	
Approach Move	ment			L	Т	R	L		Г	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			44	421	124	78	4	50	17	196	101	59	23	152	48
Signal Informa	tion					8			L	UE.						
Cycle s	100.0	Reference Phase	2		12	- 6	7		2	243		×		2	5	$\Phi$
Offset s	34	Reference Point	Begin				<b></b>		<u> </u>		<u> </u>		1	2	3	4
Uncoordinated	No	Simult Gap F/W	On	Green	7.1	1.4	38.8	9.2	2	19.6	0.0	_		ð-	l	-+-
Force Mode	Fixed	Simult, Gap N/S	On	Red	4.3	0.0	5.2	3.	9 9	5.2	0.0	_	5	6	<b>Y</b> 7	Y
l'oroc mode	1 IXOU		on	Ttou		0.0	1.0			1.0	0.0					•
Timer Results				EBL		EBT	WB	L	W	/BT	NBL	-	NBT	SBI	-	SBT
Assigned Phase	e			5		2	1		(	6	3		8	7		4
Case Number				1.1		4.0	1.1		4	.0	1.1		4.0	1.1		4.0
Phase Duration	, s			12.8		45.0	14.2	2	46	6.4	15.0	)	25.8	15.0	)	25.8
Change Period,	(Y+R	c ), S		5.7		6.2	7.1		6	6.2	5.8		6.2	6.3		6.2
Max Allow Head	dway ( A	<i>ИАН</i> ), s		4.0		0.0	4.0		0	0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	( g s ), s		3.5			4.7				11.2	2	10.8	3.0		13.1
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0	0.0	0.0		0.9	0.0		0.7
Phase Call Prol	oability			1.00			1.00	)			1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00			1.00	)			1.00		0.09	0.07	,	0.29
Movement Cre	un Dee	ulto			ГР			\^/[	ר ר			ND			CD.	
Movement Gro	up Res	suits			<u>ЕВ</u>	D			5	Р	1		Р		<u>5В</u>	Р
Approach Nove	mont			5	ו 2	12		6	+	16	2	Q	19	 	1	14
Adjusted Flow F	Rate ( v	) veh/h		17	577	12	85	508	2	10	213	17/	10	25	217	14
Adjusted Satura	ation Flo	w Rate (s) veh/h/	In	1781	1797		1781	185	8		1781	1754		1781	1793	
Queue Service	Time ( c	7 s ). S		1.5	30.4		2.7	22.	5		9.2	8.8		1.0	11.1	
Cvcle Queue C	learance	e Time (		1.5	30.4		2.7	22.	5		9.2	8.8		1.0	11.1	
Green Ratio ( g	/C )			0.46	0.39		0.46	0.4	0		0.29	0.20		0.28	0.20	
Capacity ( c ), v	, eh/h			339	697		269	747	7		312	344		333	351	
Volume-to-Capa	acity Ra	tio(X)		0.138	0.828		0.316	0.68	30		0.684	0.506		0.075	0.619	
Back of Queue	( Q ), ft/	In ( 95 th percentile)	)	24.9	483.8		47.9	386	6		198.7	168.7		19.1	216.8	
Back of Queue	( Q ), ve	eh/In ( 95 th percent	ile)	1.0	19.0		1.9	15.	2		7.8	6.6		0.8	8.5	
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.05	0.00		0.15	0.0	0		0.61	0.00		0.06	0.00	
Uniform Delay (	d 1 ), s/	/veh		17.8	34.5		20.5	24.	6		30.4	35.9		26.7	36.8	
Incremental De	lay ( <i>d</i> 2	), s/veh		0.1	5.9		0.7	4.9	)		6.0	1.2		0.1	3.3	
Initial Queue De	elay ( d	3 ), s/veh		0.0	0.0		0.0	0.0	)		0.0	0.0		0.0	0.0	
Control Delay (		17.9	40.4		21.2	29.	5		36.4	37.1		26.8	40.1			
Level of Service		В	D		C	C			D	D		C	D	Ļ		
Approach Delay		38.7		D	28.3	5	(	C	36.7		D	38.7		D		
Intersection Del				35	5.0											
Multimodal Re	Iultimodal Results							WE	3			NB			SB	
Pedestrian LOS	Score	/ LOS		2.3		В	2.3		E	В	2.3		В	2.3		В
Bicycle LOS Sc	ore / LC	)S		1.5		В	1.5		/	A	1.1		А	0.9		А

													v		
General Inform	nation								Interse	ction Inf	ormati	on	_		s l <u>s</u>
Agency		American Structure	point						Duratio	n, h	0.25			4 4	
Analyst		SBG		Analys	is Date	Jul 8,	2019		Area Ty	ре	Othe	r	<b>▲</b>		4
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM Pe	eak		PHF		0.92			w ji L	÷
Urban Street		Home Rd		Analys	is Year	Sc2A (With)	- 2020 E Apartme	Build ents)	Analysi	s Period	1> 7	:00	7 4	5.1	r T
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc2A	_Int 1 &	2_AN	/I - With	mprover	nents.x	us		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	* (*
Project Descrip	tion	Redwood Home Ro	I TIS												
							1								
Demand Inform	nation				EB			W	/B		NE			SB	
Approach Move	ement			L	Т	R	L		Г R	L	Т	R		Т	R
Demand ( <i>v</i> ), v	eh/h			44	421	124	78	45	50 17	196	10	59	23	152	48
Signal Informa	tion				1	3		•	1 1 11		_				
	100.0	Reference Phase	2	1		-1 2		Ħ	2 61	9			~	5	<u>ት</u>
Offset s	3/	Reference Point	2 Begin						<u> </u>	17		1	<b>Y</b> 2 .	3	4
	No	Simult Gap F/W	On	Green	7.1	1.4	38.8	9.2	2 19	6 0.0	_	-	Ж	l	_
Force Mode	Fixed	Simult, Gap N/S	On	Red	4.3	0.0	5.2	3.	9 5.2 0 1 (		_	5	<b>×</b>		Y
T OICE MODE	TIXEU	Sindit. Gap 14/5		Reu	1.4	0.0	1.0	1.3	9  1.0	0.0		0	0		
Timer Results				EBL	_	EBT	WB	L	WBT	NB	L	NBT	SBI	_	SBT
Assigned Phase	e			5		2	1	-	6	3	_	8	7		4
Case Number	-			1.1		3.0	1.1	+	4.0	1.1		4.0	1.1		4.0
Phase Duration	. S						14.2	2	46.4	15.	0	25.8	15.0	)	25.8
Change Period	, (Y+R)	c ). S		5.7		6.2	7.1	-	6.2	5.8	}	6.2	6.3		6.2
Max Allow Head	dwav ( /	идн), - Идн). s		4.0		0.0	4.0		0.0	4.0	)	4.0	4.0		4.0
Queue Clearan	ce Time	e (gs), s		3.5			4.7	-		11.3	2	10.8	3.0		13.1
Green Extensio	n Time	(ge),s		0.0		0.0	0.0		0.0	0.0	)	0.9	0.0		0.7
Phase Call Pro	bability	·- ·		1.00	)		1.00	)		1.0	0	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.0	0	0.09	0.07	· .	0.29
Movement Gro	oup Res	sults			EB			WE	3	<u> </u>	NB	1		SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate ( v	), veh/h		47	446	131	85	508	3	213	174		25	217	
Adjusted Satura	ation Flo	w Rate ( $s$ ), veh/h/l	In	1781	1870	1610	1781	185	8	1781	1754		1781	1793	
Queue Service	lime (g	gs), s		1.5	18.4	2.8	2.7	22.	5	9.2	8.8		1.0	11.1	
Cycle Queue C	learanc	e lime ( <i>g c</i> ), s		1.5	18.4	2.8	2.7	22.	5	9.2	8.8		1.0	11.1	
Green Ratio (g	/C)			0.46	0.39	0.48	0.46	0.40		0.29	0.20		0.28	0.20	
Capacity ( c ), v	en/n	tic (X)		339	726	1/3	391	747		312	344		333	351	
Volume-to-Capa		IIIO (X) (In (OE th percentile)	\	0.138	0.015	0.170	0.217	0.08		109.7	169.7	•	0.075	0.019	
Back of Queue	$\frac{(Q), W}{(Q), W}$	hin ( 95 in percentile)	) ile)	20.1	200.0	39.7	4/	300	2	190.7	100.7		19.1	210.0	
	(Q), Ve	PO(0.5  th percent)	tilo)	0.05	0.00	0.00	0.14	0.0	2	7.0	0.0		0.0	0.0	
			uie)	18.6	22.6	8.3	17.2	24.6	6	30.4	35.0		26.7	36.8	
Incremental De	(u + ), s			0.1	22.0	0.3	0.3	24.0		6.0	1.2	-	20.7	30.0	
Initial Queue De	ay (u z			0.1	2.7	0.0	0.0	4.3	, ,	0.0	0.0		0.1	0.0	
Control Delay (	tial Queue Delay ( d ȝ ), s/veh					8.6	17.5	20	5	36.4	37.1		26.8	40.1	
Level of Service	ontrol Delay ( <i>d</i> ), s/veh					Δ	R R	29.	-	D			20.0	-0.1	
Approach Dela	evel of Service (LOS)					C	27 0		C	36	7		387		D
Intersection De		21.0		25	3.9		0	50.		0	C 30.7				
	ntersection Delay, s/ven / LOS					20							J		
Multimodal Re	sults			EB			WE	3		NB			SB		
Pedestrian LOS	Score	/ LOS	2.3		В	2.3		В	2.3	3	В	2.4		В	
Bicycle LOS Sc	ore / LC	DS		1.5		В	1.5		Α	1.1		А	0.9		А

## HCS7 Two-Way Ston-Control Repor

General Information		Site Information										
Analyst	SBG	Intersection	Home Rd & Access Rd									
Agency/Co.	American Structurepoint	Jurisdiction	Delaware County									
Date Performed	7/5/2019	East/West Street	Home Rd									
Analysis Year	2020	North/South Street	Access Rd									
Time Analyzed	Sc2A - AM Peak Hour	Peak Hour Factor	0.92									
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25									
Project Description	Redwood Home Rd TIS											

#### Lanes



Major Street: East-West

Vehicle Volumes and Ad	justmo	ents																
Approach		Eastk	oound			West	bound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0		
Configuration				TR		L	Т				LR							
Volume, V (veh/h)			577	8		3	659			25		12						
Percent Heavy Vehicles (%)						2				0		0						
Proportion Time Blocked																		
Percent Grade (%)											0							
Right Turn Channelized		١	١o		No					Ν	lo		No					
Median Type/Storage		Left Only 1																
Critical and Follow-up H	eadwa	iys																
Base Critical Headway (sec)																		
Critical Headway (sec)																		
Base Follow-Up Headway (sec)																		
Follow-Up Headway (sec)																		
Delay, Queue Length, an	d Leve	el of S	Service	e														
Flow Rate, v (veh/h)						3					40							
Capacity, c (veh/h)						947					348							
v/c Ratio						0.00					0.11							
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.4							
Control Delay (s/veh)						8.8					16.7							
Level of Service, LOS						A					С							
Approach Delay (s/veh)						C	.0			16.7								
Approach LOS											с							

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HCS7<sup>™</sup> TWSC Version 7.2

Sc2A\_Int 3\_Home Rd & Acces Rd\_AM.xtw

General Inform	nation								Interse	ction Inf	ormati	on		4241	× L
Agency		American Structure	point						Duratio	ո, h	0.25			7++7	
Analyst		SBG		Analys	is Date	Jul 8,	2019		Area Ty	pe	Othe	r	4		4
Jurisdiction		Delaware County. C	ЭН	Time F	Period	PM P	eak		PHF	•	0.92			w t	~_ ↓
Urban Street		Home Rd		Analys	is Year	Sc2A	- 2020 E	Build	Analysi	s Period	1> 7:	00			4
						(With	Apartme	ents)			<u>1</u> ††				
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame	Sc2A	_Int 1 &	2_PN	/l.xus					* * * * *	* (*
Project Description Redwood Home Rd TIS															
Demand Inform	nation			EB				W	/B		NB			SB	
Approach Move	ment			L	Т	R	L	7	Г R	L	Т	R	L	Т	R
Demand ( v ), veh/h					399	186	177	38	37 10	) 328	511	258	153	471	64
Signal Information					2	8									
Cycle s	120.0	Reference Phase	2		20	- 2	₹ <u></u> 1		24	243	a 🕨		2	<b>N</b>	$\Phi$
Offset s	0	Reference Point	Begin							iir 🗋		1	2	3	4
	No	Simult Gap E/W	On	Green	7.3	2.9	44.0	8.9	9 5.9	20.3	3	_	ð-	l L	
Force Mode	Fixed	Simult Gap N/S	On	Red	3.9 2.6	0.0	5.2	3.	9 3.8 2 2 2	4.8		5	6		Y
l'oroc mode	1 IXOU	onnaid oup hijo	on	Ttou	2.0	0.0	11.0			1.0					•
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SBI	_	SBT
Assigned Phase	Э			5		2	1		6	3		8	7		4
Case Number				1.1		4.0	1.1		3.0	1.1		4.0	1.1		3.0
Phase Duration	, S			13.8		50.2	16.7		53.1	53.1 27.0		38.1		)	26.1
Change Period,	(Y+R	c ), S		6.5		6.2	6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Head	dway(A	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearance Time ( $g s$ ), s				6.4			12.2	2		21.	2	29.3	10.9	)	18.7
Green Extension Time ( g e ), s				0.0		0.0	0.0		0.0	0.0		1.7	0.0		1.0
Phase Call Prob	oability			1.00			1.00	)		1.0	)	1.00	1.00		1.00
Max Out Probal	bility			1.00			1.00	)		1.0	)	1.00	1.00	)	1.00
Mayamant Cua	un Dee				ED			10/0	2					00	
Movement Gro	oup Res	suits				D			3			P		<u>5в</u> т	Р
Approach Nove	mont				ו ר	12		6	16	2	0 0	19	 	1	14
Adjusted Flow F	Rate ( v	) veh/h		107	636	12	230	504	1 130	357	443	393	166	- 512	70
Adjusted Flow F	ation Flo	w Rate (s) veh/h/l	In	1781	1769		1781	187	0 1585	1781	1870	1658	1781	1781	1585
Queue Service	Time ( d	a s ). s		4.4	42.6		10.2	23.0	6 5.4	19.2	27.2	27.3	8.9	16.7	4.2
Cycle Queue Cl	learance	e Time ( <i>q</i> c ), s		4.4	42.6		10.2	23.0	6 5.4	19.2	27.2	27.3	8.9	16.7	4.2
Green Ratio ( g	/C )			0.43	0.37		0.45	0.3	9 0.47	0.36	0.27	0.27	0.24	0.17	0.23
Capacity ( c ), v	eh/h			327	649		220	731	1 737	397	503	446	209	602	365
Volume-to-Capa	acity Ra	itio(X)		0.326	0.980		1.045	0.68	9 0.177	0.899	0.879	0.881	0.797	0.850	0.191
Back of Queue	( Q ), ft/	In ( 95 th percentile)	)	81.4	777.3		268.7	317.	.2 86.8	398.5	534.7	484.7	222.7	333.7	78.9
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	3.2	30.6		10.6	12.	5 3.4	15.7	21.1	19.4	8.8	13.1	3.1
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.22	0.00		0.54	0.0	0 0.29	0.66	0.00	0.00	0.45	0.00	0.00
Uniform Delay (	d 1 ), si	/veh		23.4	37.6		29.3	22.2	2 17.4	32.7	42.0	42.0	40.2	48.4	37.2
Incremental Del	lay ( <i>d</i> 2	), s/veh		0.6	30.8		59.5	3.2	2 0.3	22.7	19.2	21.4	19.1	14.0	1.2
Initial Queue De	elay (d	3 ), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	a), s/ve	en		23.9	68.4	<u> </u>	88.8	25.4	4 17.7	55.3	61.2	63.4	59.3	62.4	38.4
Level of Service	e (LOS)	/1.00			E			C		E			E		
Approach Delay	/, s/veh	100		62.0		E	41.1		D	60.2	<u> </u>	E	59.5		E
muersection Del	ay, s/ve	an / LUS 				55	0.0								
Multimodal Results				EB			WE	3		NB		SB			
Pedestrian LOS	Score	/LOS		2.8		С	2.9		С	2.4		В	2.3		В
Bicycle LOS Sc	ore / LC	)S		1.7		В	1.7		В	1.5		А	1.1		А

í.													1			
General Inforn	nation	1							Intersec	tion Info	ormatio	on	_	1 et 24 et 4	× L.	
Agency		American Structure	epoint						Duration	, h	0.25				R.	
Analyst		SBG		Analys	sis Date	Jul 8,	2019		Area Typ	е	Other	-			* 5	
Jurisdiction		Delaware County, (	ЭН	Time F	Period	PM P	eak		PHF		0.92		4	W 🖥 L	<b>∲</b> →	
Urban Street		Home Rd		Analys	sis Year	Sc2A	Sc2A - 2020 Build			Period	1> 7:	00	14		*	
						(With	Apartme	ents)						<u> </u>		
						- With	vement						<b>F</b>	141411	* (*	
Intersection		Home Rd & Sawmi		File Na	ame	Sc24				nrover		16	-			
Project Descrip	tion	Redwood Home R				002A		<u> </u>	- •••••••	ipioven		19	_			
Project Description Redwood Home Rd TIS																
Demand Information					EB		W				NB			SB		
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Demand ( v ), v	eh/h			98	399	186	177	38	7 100	328	511	258	153	471	64	
											1 -					
Signal Informa	tion				l	2		<u> </u>	50	- 20	,			_	L	
Cycle, s	120.0	Reference Phase	2		۲e	- è	7≝ ≀			12 54	<sub>12</sub> ∎		<b>A</b> –	י) רי	ф Т	
Offset, s	0	Reference Point	Begin	Green	73	2.9	44.0	8.0	59	20.3		1	<b>Y</b> <sup>2</sup>		4	
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	0.0	5.2	3.9	3.9	4.8	<u>́</u> ←	▶	$\rightarrow$		st2	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	0.0	1.0	2.2	2.2	1.0		5	6	7	8	
				4												
<b>Timer Results</b>				EBL	-	EBT	WB	L	WBT	NBL	-	NBT	SBI	-	SBT	
Assigned Phas	e			5		2	1		6	3		8	7		4	
Case Number				1.1		3.0	1.1		3.0	1.1		4.0	1.1		3.0	
Phase Duration	i, S			13.8	3	50.2	16.7		53.1	27.0	27.0		38.1 15.		0 26.1	
Change Period	, ( Y+R	c ), S		6.5		6.2	6.5		6.2	6.1		5.8	6.1	1 5.8		
Max Allow Hea	dway(/	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0	
Queue Clearan	ce Time	e ( g s ), s		6.4			12.2	2		21.2	21.2		10.9	)	18.7	
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.0	0.0		1.7	0.0		1.0	
Phase Call Pro	bability			1.00	)		1.00	)		1.00		1.00	1.00	)	1.00	
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	1.00	1.00	1.00		
Movement Gro	oup Res	sults			EB	1		WB			NB			SB		
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14	
Adjusted Flow I	Rate ( <i>v</i>	), veh/h		107	434	202	230	504	130	357	443	393	166	512	70	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/	In	1781	1870	1610	1781	1870	1585	1781	1870	1658	1781	1781	1585	
Queue Service	Time ( g	g s ), S		4.4	22.9	7.9	10.2	23.5	5.5	19.2	27.2	27.3	8.9	16.7	4.2	
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		4.4	22.9	7.9	10.2	23.5	5.5	19.2	27.2	27.3	8.9	16.7	4.2	
Green Ratio ( g	/C)			0.43	0.37	0.54	0.45	0.39	0.47	0.36	0.27	0.27	0.24	0.17	0.23	
Capacity ( c ), v	/eh/h			328	686	871	379	731	737	397	503	446	209	602	365	
Volume-to-Cap	acity Ra	itio(X)		0.325	0.632	0.232	0.608	0.68	9 0.177	0.899	0.879	0.881	0.797	0.850	0.191	
Back of Queue	( Q ), ft/	In (95 th percentile	)	81.4	405.5	126.6	157.8	314.0	88.8	398.5	534.7	484.7	222.7	333.7	78.9	
Back of Queue	( Q ), ve	eh/In ( 95 th percent	ile)	3.2	16.0	5.1	6.2	12.4	3.5	15.7	21.1	19.4	8.8	13.1	3.1	
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.22	0.00	0.00	0.32	0.00	0.30	0.66	0.00	0.00	0.45	0.00	0.00	
Uniform Delay	( d 1 ), s	/veh		23.3	31.3	14.5	22.1	21.9	17.8	32.7	42.0	42.0	40.2	48.4	37.2	
Incremental De	lay ( <i>d</i> 2	), s/veh		0.6	4.4	0.6	1.7	3.3	0.3	22.7	19.2	21.4	19.1	14.0	1.2	
Initial Queue Delay ( d 3 ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay ( d ), s/veh					35.7	15.1	23.9	25.2	18.1	55.3	61.2	63.4	59.3	62.4	38.4	
Level of Service (LOS)				С	D	В	С	С	В	E	E	E	E	E	D	
Approach Dela	y, s/veh	/ LOS		28.4		С	23.8	3	С	60.2	E		59.5	5	E	
Intersection De	lay, s/ve	h / LOS				44	4.5					D				
Multimodal Results					EB			WB			NB		SB			
Pedestrian LOS	Score	/ LOS		2.8		С	2.9		С	2.4		В	2.5		В	
Bicycle LOS So	ore / LC	DS		1.7		В	1.7		В	1.5		А	1.1		A	

General Inform	nation								Inte	ersect	ion Infe	ormatio	on		4241	bi lu		
Agency		American Structure	point						Dur	ration,	h	0.25			44	_		
Analyst		SBG		Analys	is Date	Jul 8,	2019		Are	ea Type	е	Other	-	- <u>-</u>		4		
Jurisdiction		Delaware County, C	ЭН	Time F	Period	PM P	eak		PH	IF		0.92			w	***		
Urban Street		Home Rd		Analys	is Yea	Sc2A	- 2020 E	Build	Analysis Period			1> 7:	00			÷ *		
						(With	Apartme	ents)							ጎዮ	· ·		
Intersection		Home Rd & Liberty	Rd N	File Na										1	* * * *			
Project Descrip	tion	Redwood Home Ro	i lis															
Demand Inform	nation				EB			W	/B			NB			SB			
Approach Move	ment			L	Т	R	L		Г	R	L	Т	R	L	Т	R		
Demand ( v ), veh/h				47	542	269	114	54	47	20	208	143	62	15	166	40		
Signal Information					1	5			l	1								
Cvcle, s	120.0	Reference Phase	2		2 6	- 2	╡╝┇	3	2	5.4				2	5	$\Phi$		
Offset, s	0	Reference Point	Begin				<b>1</b>		<u> </u>	<u> </u>	<u>r y</u>	<u> '</u>	1	2	3	4		
Uncoordinated	No	Simult, Gap F/W	On	Green	7.1	2.2	58.6	7.	5	2.2	18.0			$\mathbf{\tilde{\mathbf{A}}}$	l	-		
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	2.0	0 0	0.0	1.0	_	5	6	7			
			1	1														
Timer Results				EBL	-	EBT	WB	L	W	/BT	NBL	-	NBT	SBL	-	SBT		
Assigned Phase	e			5		2	1		6	6	3		8	7		4		
Case Number				1.1		4.0	1.1		4	.0	1.1		4.0	1.1		4.0		
Phase Duration	, s			12.8		64.8	15.0	)	67.0		16.0		26.4	26.4 13.8		3 24.2		
Change Period,	(Y+R)	c ), S		5.7		6.2	7.1	7.1 6.2		.2	5.8		6.2	6.3		6.2		
Max Allow Head	dway ( A	<i>ИАН</i> ), s		4.0		0.0	4.0	_	0.0		4.0		4.0	4.0		4.0		
Queue Clearance Time ( $g s$ ), s				3.5			6.0	$\rightarrow$			12.2		16.3	2.9		16.4		
Green Extension Time ( g e ), s				0.0		0.0	0.1	$\rightarrow$	0.	.0	0.0		0.6	0.0		0.3		
Phase Call Prot	bability			1.00			1.00	)			1.00		1.00	1.00	)	1.00		
Max Out Probal	oility			1.00			1.00	)			1.00		1.00	0.32	<u>'</u>	1.00		
Movement Gro	oup Res	ults	_		EB			WE	3			NB			SB			
Approach Move	ment			L	Т	R	L	Т		R	L	Т	R	L	Т	R		
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14		
Adjusted Flow F	Rate ( v	), veh/h		48	832		124	616	3		226	223		16	224			
Adjusted Satura	ation Flo	w Rate ( <i>s</i> ), veh/h/l	In	1781	1765		1781	185	9		1781	1774		1781	1807			
Queue Service	Time ( g	g s ), S		1.5	52.9		4.0	29.4	4		10.2	14.3		0.9	14.4			
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		1.5	52.9		4.0	29.4	4		10.2	14.3		0.9	14.4			
Green Ratio ( g	/C )			0.55	0.49		0.55	0.5	1		0.23	0.17		0.21	0.15			
Capacity ( <i>c</i> ), v	eh/h			363	862		209	942	2		246	299		209	271			
Volume-to-Capa	acity Ra	tio ( <i>X</i> )		0.133	0.966		0.593	0.65	54		0.920	0.746		0.078	0.826			
Back of Queue	( Q ), ft/	In (95 th percentile)	)	25.9	494.9		174.7	467	.4		113.8	285.1		17.3	310			
Back of Queue	(Q), ve	eh/In (95 th percent	ile)	1.0	19.5		6.9	18.4	4		4.5	11.2		0.7	12.2			
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.05	0.00		0.54	0.0	0		0.35	0.00		0.05	0.00			
Uniform Delay (	d 1), S/	/veh		16.5	18.7		26.4	21.	8	_	44.3	47.5		38.4	49.5			
Incremental De	ay ( a 2	), s/ven		0.0	10.1		4.4	3.5	<b>)</b>		36.4	9.8		0.2	18.5			
Control Dolor (	ay (d)	3 ), S/Ven		0.0	0.0		0.0	25	/		0.0	0.0		0.0	0.0			
Level of Sonvice	u), s/ve	511		10.5 R	20.0 C		30.8 C	20.4	4	_	60.7 E	57.3		30.0 D	00.0 E			
Approach Delay	r (LOO)	/1.05		28.2		C	26.3			C.	F 60 1		F	66 0		F		
Intersection Del		h/10S		20.2		30	20.0				09.1		L	D		-		
	ay, 3/00					0.												
Multimodal Results					EB			WE	3			NB		SB				
Pedestrian LOS	Score	/LOS		2.3		В	2.3		E	В	2.3		В	2.3		В		
Bicycle LOS Sc	ore / LC	)S		2.0		В	1.7		E	В	1.2		А	0.9		А		

Conorol Inform	ation						linte ve e cti e ve linte ve esti								ل العاميل الم ا	* L	
General Inform	ation	A							Int	tersect			on	-	41		
Agency		American Structure	point				0010		Du	iration,	n	0.25				K	
Analyst		SBG		Analys	sis Dat	e Jul 8,	2019		Are	ea Iyp	e	Other	-			***	
Jurisdiction		Delaware County, (	ЭН	Time F	Period	PM P	eak		PF	1F		0.92			w+L 5	*	
Urban Street		Home Rd		Analys	sis Yea	r Sc2A	SC2A - 2020 Build			Analysis Period			00	7		T T	
						- With	- With								<u> </u>		
						Impro	vement	s							I 4 1 4 1 1	* [*	
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc2A				With Im	prover	nents.xi	JS				
Project Description Redwood Home Rd TIS											- -						
Demand Inform	nation				EB		W			1		NB	10		SB		
Approach Move	ement			L	Т	R	L		Г	R	L	Т	R	L	Т	R	
Demand ( <i>v</i> ), v	eh/h			47	542	269	114	54	47	20	208	143	62	15	166	40	
				1	1	_				1		_					
Signal Informa	tion			÷	La.	_	∃,	H	2		- 205	a			κ.	$\mathbf{A}$	
Cycle, s	120.0	Reference Phase	2		Γ "	÷ ۱	° 🛱 '	<b>ا</b> م	s histr		7 S	12			<b>」)</b> 』	4	
Offset, s	0	Reference Point	Begin	Green	7.1	2.2	54.6	7.	5	2.2	22.0	)		<u> </u>	Ì		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	4.	3	0.0	5.2		<b>~</b>			$\nabla$	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	2.	0	0.0	1.0	_	5	6	7	8	
<b>T</b> ' <b>D K</b>			_	EDI		EDT					ND	1	NDT	0.01		ODT	
Timer Results				EBI	-	EBI	VVB		V\	VBI	NBL	-	NBI	SBI		SBI	
Assigned Phase	9			5		2	1			6	3	_	8			4	
Case Number				1.1		3.0	1.1		4	1.0	1.1		4.0	1.1		4.0	
Phase Duration	, S			12.8	3	60.8	15.0	)	6	3.0	16.0	)	30.4		3 2	28.2	
Change Period,	( Y+R	c ), S		5.7		6.2	7.1		6.2		5.8		6.2	6.3	3 6.2		
Max Allow Headway ( <i>MAH</i> ), s				4.0		0.0	4.0		C	0.0	4.0		4.0	4.0		4.0	
Queue Clearance Time ( $g_s$ ), s				3.6			6.3				12.2	2	15.8	2.8		15.9	
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		C	0.0	0.0	0.0		0.0		0.8	
Phase Call Prol	bability			1.00	)		1.0	)			1.00	)	1.00	1.00	)	1.00	
Max Out Proba	bility			1.00			1.0	)			1.00	)	0.13	0.30	)	0.37	
Movement Cre	un Dec		_		FD			۱۸/۲	۰ ۲			ND			<b>CD</b>	_	
Annere och Mayre	oup Res	suits			ED		<u> </u>		-	Р			D		<u>эр</u>	D	
Approach Move	ment			L E	1	10 K			+	R 16	L 2	0	R 10		1	R 14	
Adjusted Flow		· )		5	2	12	104	0	2	10	3 220	0	10	1	4	14	
Adjusted Flow F	kale ( V	), ven/n	lu.	48	000	270	124	405	<b>0</b>		220	223		10	224		
Adjusted Satura		ow Rate (s), ven/n/	in	1781	1870	1610	1781	185	9		1781	1//4		1781	1807		
Queue Service	Time ( 🤅	g s ), S T ( ) )		1.6	24.6	14.0	4.3	31.	4		10.2	13.8		0.8	13.9		
Cycle Queue C		e Time ( <i>g c</i> ), s		1.6	24.6	14.0	4.3	31.	4		10.2	13.8		0.8	13.9		
Green Ratio (g	/C)			0.51	0.45	0.54	0.52	0.4	/		0.27	0.20		0.25	0.18		
Capacity ( c ), v	en/n			323	851	869	391	880	J		290	358	<u> </u>	253	331		
Volume-to-Capa		$\frac{1}{10} \left( X \right)$	、 、	0.149	0.654	0.317	0.317	0.70	<u>, 1</u>		0.780	0.623		0.065	0.676		
Back of Queue	(Q), π/	/in (95 th percentile	)	28.9	329	268.4	76.4	505	.8 0		110.8	259.3		16.4	270.6		
Back of Queue	(Q), Ve	en/in (95 th percent	lie)	1.1	13.0	10.7	3.0	19.	9		4.4	10.2		0.6	10.7		
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.05	0.00	0.00	0.24	0.0	0		0.34	0.00		0.05	0.00		
Uniform Delay (	(d1), s	/veh		19.1	19.5	21.0	17.7	24.	9		40.4	43.7		35.2	45.7		
Incremental De	lay ( d 2	), s/veh		0.1	2.3	0.6	0.5	4.6	5		12.8	3.3		0.1	5.4		
Initial Queue Delay ( <i>d</i> <sub>3</sub> ), s/veh				0.0	0.0	0.0	0.0	0.0	ر ح		0.0	0.0		0.0	0.0		
Control Delay (	d), s/ve	en		19.2	21.8	21.6	18.2	29.	5		53.2	47.1		35.3	51.0		
Level of Service	e (LOS)	11.00		В		C C	B			-	D			D			
Approach Delay, s/veh / LOS				21.6	j	C	27.0	5		С	50.2		D	50.0 D			
Intersection Delay, s/veh / LOS						3	2.0							C			
Multimodel Depute								1.4.15	2					CD			
Dedestriar LCC	Suits	/1.08		0.0	EB	P	0.0	VVE	5	D	0.0	NB		2.5		D	
Peuestrian LOS	o score			2.3		D	2.3			D	2.3			2.5			
BICYCIE LOS SC	ore / LC	15		2.0		В	1.7			В	1.2		A	0.9		A	
### $7 T_{MO} \ (1)$ $C_{\alpha}$ atral D

General Information		Site Information	
Analyst	SBG	Intersection	Home Rd & Access Rd
Agency/Co.	American Structurepoint	Jurisdiction	Delaware County
Date Performed	7/5/2019	East/West Street	Home Rd
Analysis Year	2020	North/South Street	Access Rd
Time Analyzed	Sc2A - PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Redwood Home Rd TIS		

## Lanes



Major Street: East-West

Vehicle Volumes and Ad	justmo	ents														
Approach		East	oound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	Т				LR					
Volume, V (veh/h)			851	26		11	617			14		7				
Percent Heavy Vehicles (%)						2				0		0				
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized		1	٩o			١	10			Ν	lo			٩	10	
Median Type/Storage		Left Only											1			
Critical and Follow-up H	eadwa	ways														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	Service	e												
Flow Rate, v (veh/h)						12					23					
Capacity, c (veh/h)						721					268					
v/c Ratio						0.02					0.09					
95% Queue Length, Q <sub>95</sub> (veh)						0.1					0.3					
Control Delay (s/veh)						10.1					19.7					
Level of Service, LOS						В					С					
Approach Delay (s/veh)						C	.2			19	9.7					
Approach LOS											С					

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HCS7<sup>™</sup> TWSC Version 7.2

Sc2A\_Int 3\_Home Rd & Acces Rd\_PM.xtw

		HUS	7 Sigi	nalize		ersec		kest	lits Su	mmar	y				
General Inforn	nation								Intersec	tion Infe	ormatio	on	_	474419	ba l <u>a</u>
Agency		American Structure	point						Duration	, h	0.25			2++4	R.
Analyst		SBG		Analys	sis Dat	e Jul 8,	2019		Area Typ	be	Other	-	<u></u> 4		<b>₹_</b> 5_
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM P	eak		PHF		0.92			W L	+ + -
Urban Street		Home Rd		Analys	sis Yea	r Sc2B	- 2020	Build	Analysis	Period	1> 7:	00			
						(With	out							5 + 6	*
						Apart	ments)							11 11 11 11 11	
Intersection		Home Rd & Sawmil	l Pkwy	File Na	ame	Sc2B	_Int 1 &	2_AN	/l.xus						
Project Descrip	tion	Redwood Home Rd	TIS												
							_								
Demand Inform	nation				EB			N	/B		NB	I		SB	1
Approach Move	ement			L	Т	R	L		r R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			130	311	106	157	3	14 142	220	711	131	115	448	68
				lir.	1.7		_	_							-
Signal Informa	tion	1			2			9	50	- 245	1		_	R. J	$\mathbf{A}$
Cycle, s	100.0	Reference Phase	2		<b>Г</b> "	R	8	<u>ا</u>	8 8	nzi sv	12		€,		4
Offset, s	90	Reference Point	Begin	Green	7.5	1.3	29.5	7.5	5 0.7	22.8			ĸ		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.9	9 3.9	4.8		↗   `			<b>N</b>
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.2	0.0	1.0	2.2	2 2.2	1.0		5	6	7	8
<b>Timer Results</b>				EBI	-	EBT	WB	L	WBT	NBL	-	NBT	SBL	-	SBT
Assigned Phas	е			5		2	1		6	3		8	7		4
Case Number				1.1		4.0	1.1		3.0	1.1		4.0	1.1		3.0
Phase Duration	i, s						14.0	)	35.7	20.4		35.4	13.6	; :	28.6
Change Period	, ( Y+R )	c ), S	, S				6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Hea	dwav ( A	MAH ). s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	$(a_s)$ , s		7.3			9.5			11.4		25.7	7.3	-	14.2
Green Extensio	n Time	$(q_e)$ s		0.1		0.0	0.0		0.0	0.2		22	0.0		39
Phase Call Pro	hability	(9, 9, 5		1.00		0.0	1.00		0.0	1.00		1.00	1.00	,	1.00
Max Out Broba	bility			1.00	, ,		1.00	, ,		1.00		1.00	1.00	, 	0.56
	Dinty			1.00	,		1.00	, <sub> </sub>		1.00		1.00	1.00		0.30
Movement Gro	oup Res	sults	_		EB			WE	3		NB			SB	
Approach Move	ement				Т	R		Т	R		Т	R		Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate ( v	) veh/h		141	453	12	191	383	173	239	470	445	125	487	74
Adjusted Flow	tion Ele	y, verim	n	1701	1780		1791	197	0 1585	1791	1970	1769	1791	1791	1595
				5.2	22.5		75	107		0.4	22.7	22.7	5.2	12.2	2.2
Queue Service		$J_{s}$ , $S$		5.5	23.5		7.5	15.		9.4	23.7	23.7	5.5	12.2	3.3
		e fille ( <i>g c )</i> , s		0.00	23.5		1.5	15.	0.0 0.0	9.4	23.7	23.7	0.00	12.2	3.3
Green Ralio (g	/C)			0.38	0.31		0.37	0.2	9 0.37	0.39	0.30	0.30	0.30	0.23	0.32
Capacity ( c ), V	/en/n			368	551		255	552	2 586	423	554	523	230	812	501
Volume-to-Cap	acity Ra			0.384	0.823		0.749	0.69	0.295	0.566	0.850	0.850	0.544	0.600	0.148
Back of Queue	(Q), ft/	In (95 th percentile)		96.8	429.8	; <b> </b>	143	223	.6 100.3	177.7	460	435.3	104.4	234.7	58.7
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	le)	3.8	16.9		5.6	8.8	3.9	7.0	18.1	17.4	4.1	9.2	2.3
Queue Storage	Ratio (	RQ) (95 th percent	ile)	0.26	0.00		0.29	0.0	0 0.33	0.30	0.00	0.00	0.21	0.00	0.00
Uniform Delay	( d 1 ), s	/veh		22.1	32.1		25.0	21.4	4 17.9	22.8	33.1	33.1	28.3	34.5	24.5
Incremental De	lay ( <i>d</i> 2	), s/veh	0.7	13.0		7.7	4.6	6 0.8	1.8	15.0	15.8	2.6	3.3	0.6	
Initial Queue De	elay ( <i>d</i>	з ), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	ontrol Delay ( <i>d</i> ), s/veh						32.6	26.	0 18.7	24.5	48.1	48.9	31.0	37.8	25.2
Level of Service	e (LOS)			С	D		С	С	В	С	D	D	С	D	С
Approach Dela	y, s/veh	/ LOS		39.8	3	D	26.0	)	С	43.5	5	D	35.2	>	D
Intersection De	ection Delay, s/veh / LOS					3	6.9						D		
	,														
Multimodal Re	sults			EB			W	3		NB			SB		
Pedestrian LOS	S Score	/LOS		2.8		С	3.0		С	2.4		В	2.3		В
Bicycle LOS Sc	ore / LC	)S		1.5		A	1.6		В	1.4		А	1.1		А
,															

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		пса	or sig	nalize	ea int	ersec		kesui	ts Sur	nmar	У				
i.								1					1		
General Inform	nation	1							ntersec	tion Inf	ormatic	on	_		
Agency		American Structure	epoint						Duration	, h	0.25				E
Analyst		SBG		Analys	sis Date	Jul 8,	2019		Area Typ	e	Other		 →		≱ 2
Jurisdiction		Delaware County, (	ЭН	Time F	Period	AM Pe	eak		PHF		0.92		*	W I L	\$
Urban Street		Home Rd		Analys	sis Year	Sc2B	- 2020 I	Build	Analysis	Period	1> 7:0	00			국 고
						(Witho	out mente) -							14 A 34	
						With	nems) -						*	****	
						Impro	vement	s							
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame	Sc2B	_Int 1 &	2_AM	- With In	nproven	nents.xu	ıs			
Project Descrip	tion	Redwood Home Ro	d TIS												
Demand Inform	nation			<u> </u>	EB			WE			NB			SB	
Approach Move	ement			L		R			R	L		R			R
Demand ( v ), v	eh/h			130	311	106	157	314	142	220	/11	131	115	448	68
Signal Informa	tion				2	2	•	. (		UE					1
Cycle, s	100.0	Reference Phase	2		120	₽	4				s ⊪21 ⊭		Δ_	<u>,</u> ,	<b>小</b>
Offset, s	90	Reference Point	Beain		7 -			<u> </u>	<u> </u>			1	2		4
Uncoordinated	No	Simult. Gap E/W	On	Green	1.5	1.3	29.5	7.5	0.7	22.8	╧┻┛		$\overline{\bullet}$	L	r†a
Force Mode	Fixed	Simult, Gap N/S	On	Red	2.2	0.0	1.0	2.2	2.2	1.0		5	6	7	
		<u>, - , .</u>		,											
Timer Results				EBI	-	EBT	WB	L	WBT	NBI	-	NBT	SBI	-	SBT
Assigned Phase	е			5		2	1		6	3		8	7		4
Case Number				1.1		3.0	1.1		3.0	1.1		4.0	1.1		3.0
Phase Duration	tion, s				3	37.0	14.(	)	35.7	20.4	+ i	35.4	13.6	<b>;</b>	28.6
Change Period	, ( <b>Y+</b> R	c ), S		6.5		6.2	6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Head	dway( <i>I</i>	MAH ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		7.3			9.5			11.4		25.7	7.3		14.2
Green Extensio	on Time	(ge), s		0.1		0.0	0.0		0.0	0.2		2.2	0.0		3.9
Phase Call Pro	bability			1.00	)		1.00	)		1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	1.00	1.00	) (	0.56
Movement Gra		sulte			ER			\//R			NR			S P	
Approach Move	ment	Suits		1	Т	R	1	Т	R	1		R	1	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	) veh/h		141	338	115	191	383	173	239	470	445	125	487	74
Adjusted Satura	ation Flo	ow Rate (s), veh/h/	In	1781	1870	1610	1781	1870	1585	1781	1870	1768	1781	1781	1585
Queue Service	Time (	$\alpha_s$ ), s		5.3	15.3	4.2	7.5	15.6	6.6	9.4	23.7	23.7	5.3	12.2	3.3
Cvcle Queue C	learanc	e Time ( <i>q</i> <sub>c</sub> ), s		5.3	15.3	4.2	7.5	15.6	6.6	9.4	23.7	23.7	5.3	12.2	3.3
Green Ratio ( g	/C )	- · · · · · · (3 - ), -		0.38	0.31	0.45	0.37	0.29	0.37	0.39	0.30	0.30	0.30	0.23	0.32
Capacity ( c ), v	/eh/h			368	576	726	347	552	586	423	554	523	230	812	501
Volume-to-Cap	acity Ra	atio(X)		0.384	0.587	0.159	0.552	0.693	0.295	0.566	0.850	0.850	0.544	0.600	0.148
Back of Queue	( Q ), ft	/In (95 th percentile	)	96.8	290.3	68	128	223.6	100.3	177.7	460	435.3	104.4	234.7	58.7
Back of Queue	(Q), v	eh/In ( 95 th percent	ile)	3.8	11.4	2.7	5.0	8.8	3.9	7.0	18.1	17.4	4.1	9.2	2.3
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.26	0.00	0.00	0.26	0.00	0.33	0.30	0.00	0.00	0.21	0.00	0.00
Uniform Delay (	( d 1 ), s	/veh		22.1	29.2	16.2	22.8	21.4	17.9	22.8	33.1	33.1	28.3	34.5	24.5
Incremental De	remental Delay ( <i>d</i> ₂ ), s/veh				4.3	0.5	1.2	4.6	0.8	1.8	15.0	15.8	2.6	3.3	0.6
Initial Queue De	nitial Queue Delay ( d ȝ ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	Control Delay ( <i>d</i> ), s/veh				33.6	16.7	24.0	26.0	18.7	24.5	48.1	48.9	31.0	37.8	25.2
Level of Service	evel of Service (LOS)				С	В	С	С	В	С	D	D	С	D	С
Approach Delay	pproach Delay, s/veh / LOS				7	С	23.8	3	С	43.5	5	D	35.2	2	D
Intersection De	ntersection Delay, s/veh / LOS					34	1.1						С		
Multimodal Re	sults	// 00			EB			WB	-		NB	_		SB	_
Pedestrian LOS	Score	/ LUS		2.8		C	3.0		C	2.4		в	2.4		в

Bicycle LOS Score / LOS	1.5	A	1.6	В	1.4	A	1.1	A
Copyright © 2019 University of Florida, All Rights Reserve	d.	HCS7™	Streets Vers	sion 7.2		Generate	ed: 7/12/2019	4:31:57 PM

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		HCS	7 Sig	nalize	aini	ersec	tion F	kesi	lits Sl	Imma	ry				
													1		
General Inform	nation								Interse	ction I	forma	tion		14 Y 40 1 1	ba La
Agency		American Structure	point						Duratic	n, h	0.2	5		44	K
Analyst		SBG		Analys	sis Dat	e Jul 8	2019		Area T	/pe	Oth	er	4		Å.
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM F	eak		PHF		0.9	2		wiji	,▲_* ← <sup>4</sup>
Urban Street		Home Rd		Analys	sis Yea	r Sc2B	- 2020	Build	Analys	s Perio	1 1>	7:00			*
						(With	out		-					ጉኑ	×
				<u> </u>		Apar	ments)							14147	1
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc2B	_Int 1 &	2_AN	1.xus						
Project Descrip	tion	Redwood Home Ro	TIS												
				_					-			-			
Demand Inform	nation				EB			W	′B		N	B		SB	1 _
Approach Move	ement			L	Т	R			R			R	L	Т	R
Demand ( <i>v</i> ), v	eh/h			42	404	117	78	44	15 17	7 19	4   10	01 59	23	152	48
Signal Informa	tion			1	1				1 1 1		-				
Signal morma		Deference Dhees	0	-		A 3	╡,	Ħ	2 121	<u>ia</u>			~	5	
Cycle, s	100.0	Reference Priase	Z			·   '	° 📑 '		۱ I	M2  -		1	<b>\$</b> 2	3	4
Olisel, s	90		Begin	Green	7.1	1.4	31.8	14	.2 21	.6 0.	)		<u> </u>		
	NO	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.9	5.2	<u>2</u> 0.	)				$\nabla$
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	1.9	9   1.(	)  0.	)	5	6	7	8
<b>T</b> . <b>D</b> . <b>K</b>			_	EDI		EDT			MDT	NI		NDT	0.00		ODT
Timer Results				EBL	-	EBI	VVB		WBI	N	3L	NBI	SB		SBT
Assigned Phase	e			5		2	1	$\rightarrow$	6		5	8	/	$\rightarrow$	4
Case Number							1.1		4.0	1	1	4.0	1.1		4.0
Phase Duration	I, S		, S				14.2	2	39.4	20	.0	27.8	20.0	)	27.8
Change Period	, ( Y+R (	c ), S	, S				7.1		6.2	5	8	6.2	6.3		6.2
Max Allow Head	dway(A	MAH ), s		4.0		0.0	4.0		0.0	4	0	4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		3.6			5.1			10	.6	10.6	2.9		12.8
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.0	0	2	1.0	0.0		0.9
Phase Call Pro	bability			1.00	)		1.00	כ		1.	00	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.	00	0.03	0.00	)	0.09
Movement Gro	oup Res	sults			FB			WF	3		NF	<u> </u>		SB	
Approach Move	ement				Т	R	1	Т	R		Т	R	1	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	) veh/h		45	560	12	85	502	,	211	17/		25	217	17
Adjusted Satur	ation Ele	), ven/n	n	1781	1708		1781	185	Q	178	175	1	1781	1703	
	Time ( (			16	30.7	+	3.1	24	7	86	8.6	·	0.0	10.8	
	learance	g(s), s		1.0	30.7		3.1	24.	7	8.6	8.6		0.9	10.0	
Green Ratio ( a		e fille ( <i>g c</i> ), s		0.30	0.32		0.30	0.3	2	0.0	0.0	2	0.3	0.22	
Canacity ( c ) y	/eh/h			256	572		20.39	617	,	10.50	270	-	//0	3.22	
Volume to Cap		ntio (X)		230	0.020		200	017	1	421	1 0 45	0	0.056	0.561	
Back of Quoup		(0, 7)	\	27.4	466.2	<u>,                                     </u>	56.8	452	4 2	159	162	9	16.7	207.7	
Back of Queue	$(\mathbf{Q}), \mathbf{n}$	hin (95 in percentile)	) ilo)	27.4	400.2		2.0	452	2	6.0	6.4	0	0.7	201.1	
Back of Queue	(Q), Ve	PO) ( 05 th percent	lie)	1.1	10.4		2.2	17.0		0.2	0.4	<u> </u>	0.7	0.2	
Queue Storage		RQ) (95 in percent	uie)	0.05	0.00		0.17	0.00	2	0.48	0.00	,	0.05	0.00	
Uniform Delay (	( a 1 ), si	/ven		21.8	27.6		24.6	30.0	2	24.4	34.		21.8	35.0	
Incremental De	iay ( a 2	2), s/ven		0.2	23.4		1.3	11.	3	0.9	0.9		0.1	1.8	
	elay (d	3), s/ven		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (	a), s/ve	en	21.9	51.0		25.9	41.8	5	25.3	35.0	,	21.9	36.8		
Level of Service	e (LOS)	11.00	C			C			C			C			
Approach Delay	y, s/veh	/LOS	48.8	5	D	39.5	o 📗	D	29	./	С	35.3	5	D	
Intersection De	lay, s/ve	eh / LOS			4	0.0						ט			
Multimodal Po	sulte			FR			\//F	3		NE			SB		
Pedestrian I OS	Score	/1.05		23		B	23		B	2	3	B	23		В
Bicycle I OS Sc	core / I C	)S		1.5		A	1 5		A	1	1	A	0.0		A
, 5.0 200 00				1.5			1.0				-		0.0		

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		1100	7 Sig	nanze	u m	ersec		vesu	113 00	iiiiiai	y				
General Inforn	nation								Interse	ction Inf	ormatic	on		1 4 2 4 4 1 1	a l <u>a</u>
Agency		American Structure	point						Duratio	n. h	0.25			44	
Analyst		SBG	P	Analys	sis Date	a Jul 8	2019		Area Tv	ne.	Other				₹_ &
Jurisdiction		Delaware County, (	ЭН	Time F	Period	AM P	eak		PHF		0.92			w Į L	
Urban Street		Home Rd		Analys	sis Yea	Sc2B	- 2020	Build	Analvsi	s Period	1> 7:0	)0			→ *
						(With	out		, <b>,</b>			-		5.1	E C
						Aparti	ments) -	-					*	   제 수 수 주 1	* (*
							vement	s							
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc2B	Int 1 &	2 AM	- With	mprover	nents xi	IS	-		
Project Descrip	tion	Redwood Home Ro	TIS			1							-		
		1													
Demand Inform	nation				EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	<u> </u>	Т	R
Demand ( v ), v	/eh/h			42	404	117	78	44	5 17	194	101	59	23	152	48
Signal Informa	ation				1	5		•							1
	100.0	Reference Phase	2			- 2	7.			<u>ل</u> ا			<u> </u>	<u> </u>	$\Phi$
Offset s	90	Reference Point	Begin				<b>1</b>			<u> </u>		1	<b>Y</b> 2	3	4
Uncoordinated	No	Simult, Gap E/W	On	Green	7.1	1.4	31.8	14.	2 21.	6 0.0	- 11	<b>x</b>	Ð-	ι	r <b>†</b> 1
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	1.9	1.0	0.0		5	6	7	
		· · ·													
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phase	е			5		2	1		6	3		8	7		4
Case Number	mber					3.0	1.1		4.0	1.1		4.0	1.1		4.0
Phase Duration	e Duration, s					38.0	14.2	2	39.4	20.	) :	27.8	20.0	) :	27.8
Change Period	, ( <b>Y+</b> R	c ), S		5.7		6.2	7.1		6.2	5.8		6.2	6.3		6.2
Max Allow Head	dway ( /	MAH ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ice Time	e (gs), s		3.5			5.1			10.0	3	10.6	2.9		12.8
Green Extensio		(ge), s		0.0		0.0	0.0		0.0	0.2		1.0	0.0	$\rightarrow$	0.9
Phase Call Pro	bability			1.00	)		1.00	)		1.00	)	1.00	1.00		1.00
Max Out Proba	DIIITY			1.00	)		1.00	)		1.00		0.03	0.00	) (	J.09
Movement Gro	oup Res	sults			EB			WB			NB			SB	_
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate( <i>v</i>	), veh/h		45	434	126	85	502		211	174		25	217	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1781	1870	1610	1781	1858	;	1781	1754		1781	1793	
Queue Service	Time ( g	g s ), S		1.5	20.5	5.1	3.1	24.7		8.6	8.6		0.9	10.8	
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		1.5	20.5	5.1	3.1	24.7		8.6	8.6		0.9	10.8	
Green Ratio (g	ŋ/C)			0.39	0.32	0.46	0.39	0.33		0.36	0.22		0.35	0.22	
Capacity ( c ), v	/eh/h			256	595	741	306	617		427	379		449	387	
Volume-to-Cap	acity Ra	atio ( X ) //= ( 05 the second section)	<u> </u>	0.176	0.730	0.170	0.277	0.814	1	0.494	0.459		0.056	0.561	
Back of Queue	(Q),π/	/In ( 95 th percentile	) ile)	27.4	347.5	84.7	55.3	452.2	2	158	162.8		16.7	207.7	
Ducuo Storago	(Q), V	PO(95  th percent)	tilo)	1.1	0.00	0.00	2.2	17.0		0.2	0.4		0.7	0.2	
Uniform Delay	$(d_1)$ s	/veh		21.6	29.9	18.3	21.9	30.6		24.4	34.1		21.8	35.0	
Incremental De	niform Delay ( d ː ), s/veh cremental Delay ( d ː ), s/veh				5.7	0.4	0.5	11.3	-	0.9	0.9		0.1	1.8	
Initial Queue De		0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0			
Control Delay (	Control Delay ( <i>d</i> ), s/veh					18.6	22.4	41.8		25.3	35.0		21.9	36.8	
Level of Service (LOS)				С	D	В	С	D		С	С		С	D	
Approach Delay, s/veh / LOS				31.0	)	С	39.0	5	D	29.	7	С	35.3	3	D
Intersection De				33	3.9						С				
Multimodal Re	sults				EB			WB			NB	_		SB	_
Pedestrian LOS	S Score	/ LOS		2.3		в	2.3		В	2.3		В	2.4		B

Bicycle LOS Score / LOS	1.5	A	1.5	A	1.1	A	0.9	A

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### $7 T_{MO} \ (1)$ $C_{\alpha}$ atral D

General Information		Site Information	
Analyst	SBG	Intersection	Home Rd & Access Rd
Agency/Co.	American Structurepoint	Jurisdiction	Delaware County
Date Performed	7/5/2019	East/West Street	Home Rd
Analysis Year	2020	North/South Street	Access Rd
Time Analyzed	Sc2B - AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Redwood Home Rd TIS		

## Lanes



Major Street: East-West

Vehicle Volumes and Ad	justmo	ents														
Approach		East	oound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	Т				LR					
Volume, V (veh/h)			551	8		3	652			25		12				
Percent Heavy Vehicles (%)						2				0		0				
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized		١	١o			Ν	10			Ν	lo			Ν	10	
Median Type/Storage		Left Only											1			
Critical and Follow-up H	eadwa	ways														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	Service	e												
Flow Rate, v (veh/h)						3					40					
Capacity, c (veh/h)						970					358					
v/c Ratio						0.00					0.11					
95% Queue Length, Q <sub>95</sub> (veh)						0.0					0.4					
Control Delay (s/veh)						8.7					16.3					
Level of Service, LOS						A					С					
Approach Delay (s/veh)		-	-	-		0	.0	-		10	5.3	-		-	-	
Approach LOS											С					

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HCS7<sup>™</sup> TWSC Version 7.2

Sc2B\_Int 3\_Home Rd & Acces Rd\_AM.xtw

		псэ	/ Sigi	nalize	a m	ersec		kest	iits St	Imma	ary					
									1							
General Inform	nation	Y.							Interse	ction	nfor	rmatio	on		4441	× L
Agency		American Structure	point						Duratio	n, h		0.25			2++4	Ł
Analyst		SBG		Analys	sis Dat	e Jul 8,	2019		Area T	/pe		Other		4		<b>₹_</b> <u></u>
Jurisdiction		Delaware County, C	ЭН	Time F	Period	PM P	eak		PHF			0.92			wĨL	↓ ↓ ↓
Urban Street		Home Rd		Analys	sis Yea	r Sc2B	- 2020	Build	Analys	s Peric	d	1> 7:0	00			*
						(With	out							-	5 ተ ቅ	-
						Apart	ments)								4 1 4 9 1	* 1*
Intersection		Home Rd & Sawmil	l Pkwy	File Na	ame	Sc2B	_Int 1 &	2_PN	/l.xus					_		
Project Descrip	tion	Redwood Home Rd	ITIS													
				1	==				(D						0.5	
Demand Inform	nation				EB		<u> </u>	V\	/B			NB	1 _	<u> </u>	SB	
Approach Move	ement			L	T	R	L		F F		-	Т	R	L	Т	R
Demand ( <i>v</i> ), v	eh/h			98	384	186	162	3	78 94	3	28	511	227	145	471	64
Signal Informa	tion			li -	2	12		•	T		E					
	120.0	Reference Dhase	2		Ŀ,	جلہ ا		Ħ	20	2	ψa			R	5	<u>ሉ</u>
Offect o	120.0	Reference Pridse	2 Degin		'	F	- <b>F</b> 4 -		י   ר	\$17L	۶ſ		1	2	3	4
Unset, s	100		Бедіп	Green	7.5	1.0	45.8	7.	9 6.9	) 2	0.2			<u> </u>	I L	•
Uncoordinated		Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	3.9	9 3.9	9 4	.8			Y		Ŷ
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.2	0.0	1.0	2.2	2 2.2	2  1	.0		5	6	7	8
Timer Deculto						EDT				N	וחו		NDT			ODT
Assigned Dhose				EBL	-	EBI	VVB		VVB1		DL				-	581
Assigned Phase	e			5		2		_	6		3		8	1	_	4
				1.1		4.0	1.1		3.0		.1		4.0	1.1		3.0
Phase Duration	i, S	)		15.0	)	53.0	14.0	)	52.0	2	7.0		39.0	14.0	)	26.0
Change Period,	, ( Y+R (	c ), S		6.5		6.2	6.5		6.2	ť	5.1		5.8	6.1		5.8
Max Allow Head	dway ( /	MAH ), s		4.0		0.0	4.0		0.0		.0		4.0	4.0	_	4.0
Queue Clearan	ce Time	e ( g s ), s		6.2			9.5			2	1.2		27.4	9.9		18.8
Green Extensio	n Time	(g <sub>e</sub> ), s		0.1		0.0	0.0		0.0	(	0.0		2.8	0.0		0.9
Phase Call Prol	bability			1.00	)		1.00	)		1	.00		1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1	.00	(	0.78	1.00	)	1.00
Movement Gro	oup Res	sults			EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L		Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3		8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h		107	620	1	214	500	) 124	35	7	423	380	158	512	70
Adjusted Satura	ation Flo	w Rate ( s ), veh/h/l	n	1781	1767		1781	187	0 158	5 178	1	1870	1674	1781	1781	1585
Queue Service	Time ( g	g s ), s		4.2	39.5	1	7.5	24.	8 5.0	19.	2	25.3	25.4	7.9	16.8	4.2
Cycle Queue C	learance	e Time ( g c ), s		4.2	39.5		7.5	24.	8 5.0	19.	2 3	25.3	25.4	7.9	16.8	4.2
Green Ratio ( g	/C)			0.45	0.39	1	0.44	0.3	8 0.45	0.3	3	0.28	0.28	0.23	0.17	0.24
Capacity ( c ), v	/eh/h			344	689		207	714	4 709	39	3	517	463	210	599	379
Volume-to-Cap	acity Ra	itio(X)		0.310	0.899	,	1.038	0.70	0.17	5 0.90	1 0	0.817	0.819	0.751	0.854	0.184
Back of Queue	(Q), ft/	/In (95 th percentile)	)	77	666.1		361.5	351	.8 80.2	400	.2 4	484.8	441.9	206.5	334.6	77.7
Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	3.0	26.2	<u> </u>	14.2	13.	9 3.2	15.	8	19.1	17.7	8.1	13.2	3.1
Queue Storage	Ratio (	RQ) (95 th percent	, tile)	0.21	0.00	1	0.72	0.0	0 0.27	0.6	7	0.00	0.00	0.41	0.00	0.00
Uniform Delay (	(d1).s	/veh	,	22.0	34.4		32.4	24.	8 17.2	32.	7	40.6	40.6	41.4	48.5	36.3
Incremental De	lay ( <i>d</i> 2	), s/veh		0.5	17.0		59.9	3.6	6 0.3	23.	2	13.3	14.9	14.0	14.4	1.1
Initial Queue De	elay ( d	з ), s/veh		0.0	0.0	1	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Control Delay (		22.5	51.4		92.3	28.	5 17.6	55.	B :	53.9	55.5	55.5	62.9	37.4		
Level of Service	evel of Service (LOS)						F	С	В	E		D	E	E	E	D
Approach Delay		47.1		D	43.2	2	D	5	5.0		D	58.9	)	E		
Intersection De				5	1.3							D				
Multimodal Re	sults				EB			W	3			NB			SB	
Pedestrian LOS	Score	/LOS		2.8		С	2.9		С	2	.4		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		1.7		В	1.6		В	1	.4		А	1.1		А

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		HUS	57 Sig	nalize	a int	ersec		kesui	ts Sur	nmar	у				
													1		
General Inform	nation	1						!	ntersec	tion Inf	ormatio	on	_		
Agency		American Structure	epoint					1	Duration	, h	0.25		_		R.
Analyst		SBG		Analys	sis Date	Jul 8,	2019	/	Area Typ	e	Other		 →		≱ 2
Jurisdiction		Delaware County, (	ЭН	Time F	Period	PM P	eak	I	PHF		0.92		*	W I L	\$
Urban Street		Home Rd		Analys	sis Year	Sc2B	- 2020	Build /	Analysis	Period	1> 7:0	00	<u>لا</u>		7 7
						(Witho	DUt mente) _							1. A. A.	
						With	nonto) -						<b>W</b>	4 1 4 1	7
						Impro	vement	s							
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame	Sc2B	_Int 1 &	2_PM	- With In	nproven	nents.xı	ıs			
Project Descrip	tion	Redwood Home Ro	d TIS												
Demand Inform	nation				EB			WE	3	<u> </u>	NB		<u> </u>	SB	
Approach Move	ement			L	T	R	L	T	R	L	T	R	L	T	R
Demand ( <i>v</i> ), v	eh/h			98	384	186	162	378	8 94	328	511	227	145	471	64
Signal Informa	tion				2	2		. [							1
Cycle, s	120.0	Reference Phase	2	1	120	-12	1				, 		<u> </u>	<u> </u>	$\Phi$
Offset, s	100	Reference Point	Begin		<u> </u>	Ň		2	<u> </u>		<u> ^</u>	1	2	3	4
Uncoordinated	No	Simult, Gap F/W	On	Green	7.5	1.0	45.8	7.9	6.9	20.2	<u>²</u> <b>↓</b>	<b>"</b>	$\rightarrow$	LL	-
Force Mode	Fixed	Simult Gap N/S	On	Red	4.3	0.0	1.0	2.2	2.2	4.0		5	6	7	
	1 Med			<u></u>	1	1									
Timer Results				EBI	-	EBT	WB	L	WBT	NB		NBT	SBI	-	SBT
Assigned Phase	e			5		2	1		6	3		8	7		4
Case Number			1.1		3.0	1.1		3.0	1.1		4.0	1.1		3.0	
Phase Duration	ation, s				)	53.0	14.0	)	52.0	27.0	)	39.0	14.0	) :	26.0
Change Period,	tion, s iod, ( Y+ <i>R c</i> ), s					6.2	6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Head	dway(/	MAH ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e (gs), s		6.2			9.5			21.2	2	27.4	9.9		18.8
Green Extensio	n Time	(g e ), s		0.1		0.0	0.0		0.0	0.0		2.8	0.0		0.9
Phase Call Prol	bability			1.00	)		1.00	)		1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	0.78	1.00	)	1.00
													_		
Movement Gro	oup Res	sults			EB		<u> </u>	WB			NB	_		SB	-
Approach Move	ement			L		R			R	L		R			R
Assigned Move	ment	<u> </u>		5	2	12	1	6	16	3	8	18	/	4	14
Adjusted Flow F		'), ven/n	1	107	417	202	214	500	124	357	423	380	158	512	70
Adjusted Satura			IN	1781	1870	1610	1/81	1870	1585	1781	1870	1674	1781	1781	1585
Queue Service	Time ( (	gs), s a Tima ( a ) a		4.2	21.0	7.5	7.5	24.8	5.0	19.2	25.3	25.4	7.9	16.8	4.2
		e Time ( <i>g</i> c), s		4.2	21.0	7.5	7.5	24.8	5.0	19.2	25.3	25.4	7.9	10.8	4.2
	/U)			0.45	0.39	0.50	0.44	0.38	U.45 700	0.30	0.20	0.20 162	0.23	0.17	0.24 370
Volume to Cap	acity Ra	atio (X)		0.310	0.572	900	0.500	0 701	0 175	0.001	0.817	0.810	0.751	0.854	0.18/
Back of Oueue	$(\Omega)$ ft	/In (95 th percentile	)	77	371 3	117.9	153.3	351.8	80.2	400.2	484.8	441 9	206.5	334.6	77 7
Back of Queue	$(\mathbf{Q}), \mathbf{u}$	ah/In ( 95 th percentie	) ile)	3.0	1/ 6	117.3	6.0	13.0	3.2	15.8	10 1	17 7	200.5	13.2	31
	Ratio (	RO (95 th percent	tilo)	0.21	0.00	4.7	0.0	0.00	0.27	0.67	0.00	0.00	0.1	0.00	0.00
Uniform Delay (				22.0	28.7	13.0	26.1	24.8	17.2	32.7	40.6	40.6	0.41 /1 /	48.5	36.3
Incremental De	niform Delay ( d 1 ), s/veh				3.2	0.6	1.6	3.6	0.3	23.0	13.3	1/ 0	14.0	14.4	1 1
	nitial Queue Delay ( <i>d z</i> ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	Control Delay ( $d$ ), s/veh				32.0	13.6	27.7	28.5	17.6	55.8	53.9	55.5	55.5	62.9	37.4
Level of Service	_evel of Service (LOS)				C	.0.0 R	<u> </u>	0.0	B	50.0	D	50.0 F	55.5 F	F	
Approach Delay	Approach Delay, s/veh / LOS					C C	26.6		C	55 (			58 0		F
Intersection Delay	ntersection Delay, s/veh / LOS					42	20.0		5	- 55.0			D		-
	nersection Delay, s/ven / LOS									II			_		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	Score	/LOS		2.8		С	2.9		С	2.4		В	2.5		В

Bicycle LOS Score / LOS	1.7	В	1.6	В	1.4	A	1.1	А

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									1					V		
General Inform	nation								Int	ersect	ion Infe	ormatic	on		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	a L <u>a</u>
Agency		American Structure	point						Du	iration,	h	0.25			4 4	K
Analyst		SBG		Analys	sis Dat	e Jul 8,	2019		Are	еа Тур	е	Other		4		4
Jurisdiction		Delaware County, C	ЭН	Time F	Period	PM P	eak		PH	łF		0.92			wiju	
Urban Street		Home Rd		Analys	sis Yea	r Sc2B	- 2020	Build	An	alysis	Period	1> 7:(	00			*
						(With	out			-				-	ን ነ	4
						Apart	ments)							1	41441	1
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc2B	_Int 1 &	2_PN	Л.xu	IS				_		
Project Descrip	tion	Redwood Home Ro	ITIS													
Damend Inform					50			10	/D			ND			00	
Demand Inform	nation				EB		<u> </u>		/B		<u> </u>			<u> </u>	<u>5</u> B	
Approach Move	ement			L	1 	R				R	L	1 10	R	L 45	1	R
Demand (V), V	en/n			46	532	265	114	53	32	20	202	143	62	15	166	38
Signal Informa	tion								T							
	120.0	Reference Phase	2						7		245			<b>Z</b>	<b>N</b>	<u>ሉ</u>
Offset s	110	Reference Point	Begin			- Fi			<u> </u>	<u> </u>	<u> </u>		1	<b>Y</b> 2	3	4
Uncoordinated	No	Simult Con E/W	On	Green	7.3	1.2	57.6	8.0	6	1.3	19.6	<u> </u>	_	<u>A</u>	l	
Earoo Mada	Eixed	Simult. Cap E/W	On	Pod	4.3	0.0	5.2	4.	3	0.0	5.2		<u> </u>	×.		Y
Force Mode	Fixed	Simult. Gap N/S	OII	Reu	1.4	0.0	1.0	2.0	0	0.0	1.0		5	0	1	•
Timor Posults			_	EBI		EBT	W/B	1	١٨	/BT	NBI		NRT	SBI		SBT
Assigned Phase	2			5	-	2	1			6		-		301	-	4
Coop Number				J 1 1		2	1 1		1		11		4.0	/	_	4
Case Number	-			1.1		4.0	1.1	_	4	+.U	1.1		4.0	1.1		4.0
Change Duration	, S			14.2	<u> </u>	6.0	5.0		6	3.0 2.0	10.2 E 0	<u> </u>	6.0	14.8	· ·	20.0
Change Period,	( Y+R )	c), S		7.1		0.2	5.7		0	).Z	5.8		0.2	0.3	_	0.2
Max Allow Head	away ( <i>n</i>	ИАН ), S		4.0		0.0	4.0		0	).0	4.0		4.0	4.0		4.0
		e (gs), s		3.4		0.0	6.1				12.4		16.2	2.8		16.0
Green Extensio	ension Time ( <i>g e</i> ), s Probability			0.0		0.0	0.0		0	).0	0.0		0.7	0.0		0.6
Phase Call Prot	Call Probability ut Probability			1.00	)		1.00	)			1.00	)	1.00	1.00		1.00
Max Out Probal	ut Probability			1.00	)		1.00	)			1.00	)	0.73	0.05	, ,	1.00
Movement Gro	ut Probability nent Group Results				EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h		45	777	1	124	600	)		220	223		16	222	
Adjusted Satura	ation Flo	w Rate ( <i>s</i> ), veh/h/l	n	1781	1765	1	1781	185	8		1781	1774		1781	1810	
Queue Service	Time ( g	g s ), S		1.4	46.3	1	4.1	29.	8		10.4	14.2		0.8	14.0	
Cycle Queue C	learance	e Time ( g c ), s		1.4	46.3		4.1	29.	8		10.4	14.2		0.8	14.0	
Green Ratio ( g	/C)			0.54	0.49	1	0.54	0.4	8		0.25	0.17		0.24	0.16	
Capacity ( c ), v	/eh/h			355	865		229	892	2		268	309		233	296	
Volume-to-Capa	acity Ra	tio(X)		0.126	0.898	-	0.541	0.67	'3		0.818	0.721		0.070	0.750	
Back of Queue	(Q), ft/	(In ( 95 th percentile)	)	24.9	544.1		77.7	480	.4		117.2	279.3		16.7	285.4	
Back of Queue	(Q), ve	eh/In ( 95 th percenti	ile)	1.0	21.4	1	3.1	18.	9		4.6	11.0		0.7	11.2	
Queue Storage	Ratio (	RQ) (95 th percent	, tile)	0.05	0.00	1	0.24	0.0	0		0.36	0.00		0.05	0.00	
Uniform Delay (	(d 1). s	/veh		17.2	22.6		24.9	24.	0	_	41.9	46.8		36.4	47.9	
Incremental De	lay ( d 2	), s/veh		0.1	6.7	1	2.6	4.0	,		17.8	8.0		0.1	10.2	
Initial Queue De	Queue Delay ( $d_2$ ), s/veh			0.0	0.0		0.0	0.0	)		0.0	0.0		0.0	0.0	
Control Delav (	ntrol Delay ( d ), s/veh			17.3	29.3		27.4	28.	0		59.6	54.8		36.5	58.1	
Level of Service	vel of Service (LOS)			В	C		C		-		E	D		D	E	
Approach Delay	()	/ LOS		28.7	,	С	27 9		(	С	57.2	2	E	56.6		E
Intersection Del	av. s/ve	h / LOS				.3	7.1			-			_	D		-
						Ū								-		
Multimodal Re	sults				EB			WE	3			NB			SB	
Pedestrian LOS	Score	/ LOS		2.3		В	2.3			В	2.3		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		2.0		В	1.7			В	1.2		А	0.9		Α

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General Inforn	nation								Intersec	tion Inf	ormatio	on		424++	a l <u>a</u>
Agency		American Structure	point						Duration	. h	0.25			44	
Analyst		SBG		Analys	is Date	Jul 8.	2019		Area Tvr	e	Other		4		~ ☆
Jurisdiction		Delaware County (	ЭН	Time F	Period	PM P	eak		PHF	-	0.92			wļu	
Urban Street		Home Rd		Analys	is Year	Sc2B	- 2020 I	Build	Analvsis	Period	1> 7:(	00			+ + *
						(Witho Aparti With Impro	vements) -	S						<u><u></u> 1 † 11 4 7 1</u>	
Intersection		Home Rd & Libertv	Rd N	File Na	ame	Sc2B	Int 1 &	2 PM	- With In	nproven	nents.xu	IS	-		
Project Descrip	tion	Redwood Home Ro	TIS												
, , ,															
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R		Т	R
Demand (v), v	eh/h			46	532	265	114	533	2 20	202	143	62	15	166	38
Signal Informa	tion				1	-		•							
	120.0	Reference Phase	2			<u>-</u> la		8	× [ _	243	. – <b>K</b>		<u> </u>	<u> </u>	<u>ሉ</u>
Offset s	110	Reference Point	Begin			<u> </u>		20		r i	<u> </u>	1	2 2		4
Uncoordinated	No	Simult Gap F/W	On	Green	7.3	1.2	57.6	8.6	1.3	19.6	<u>}</u>		<b>↔</b>	l	-+-
Force Mode	Fixed	Simult, Gap N/S	On	Red	4.3	0.0	5.2	4.3	0.0	5.2		5	6		Y
T OFOC MODE	TIXCU	olinal. Cap N/C	OII	Ttou	1	0.0	1.0	2.0	0.0	1.0			-		
Timer Results				EBL	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phase	е			5		2	1		6	3		8	7		4
Case Number				1.1		3.0	1.1		4.0	1.1		4.0	1.1		4.0
Phase Duration	i, S			14.2	2	65.0	13.0	)	63.8	16.2	2	27.1	14.9	) 2	25.8
Change Period	, ( Y+R	c ), S		7.1		6.2	5.7		6.2	5.8		6.2	6.3		6.2
Max Allow Head	dway(/	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		3.5			6.1			12.4	1	16.2	2.8		16.0
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.0	0.0		0.7	0.0		0.6
Phase Call Pro	bability			1.00	)		1.00	)		1.00	)	1.00	1.00	) '	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	0.73	0.05	5 .	1.00
Movement Gr		ulte			EB			W/B			NB			SB	_
Approach Move	ment	Suits			T	R		Т	R			R		Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate ( v	) veh/h		45	519	258	124	600	10	220	223	10	16	222	
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/	In	1781	1870	1610	1781	1858	;	1781	1774		1781	1810	
Queue Service	Time ( d	a s ). S		1.5	22.5	13.0	4.1	29.8		10.4	14.2		0.8	14.0	
Cycle Queue C	learanc	e Time ( <i>q</i> c ), s		1.5	22.5	13.0	4.1	29.8		10.4	14.2		0.8	14.0	
Green Ratio ( g	/C)			0.54	0.49	0.58	0.54	0.48		0.25	0.17		0.24	0.16	
Capacity ( c ), v	/eh/h			355	916	929	420	892		268	309		233	296	
Volume-to-Cap	acity Ra	itio(X)		0.126	0.566	0.278	0.295	0.673	3	0.818	0.721		0.070	0.750	
Back of Queue	( Q ), ft/	In (95 th percentile	)	25.5	336.7	280.4	72.2	480.4	1	117.2	279.3		16.7	285.4	
Back of Queue	( Q ), ve	eh/In ( 95 th percent	ile)	1.0	13.3	11.2	2.8	18.9		4.6	11.0		0.7	11.2	
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.05	0.00	0.00	0.22	0.00		0.36	0.00		0.05	0.00	
Uniform Delay	(d1), s	/veh		17.5	20.0	19.8	16.2	24.0		41.9	46.8		36.4	47.9	
Incremental De	lay ( <i>d</i> 2	), s/veh		0.1	1.7	0.5	0.4	4.0	_	17.8	8.0		0.1	10.2	
Initial Queue De	elay ( d	3), s/veh		0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (	a), s/ve	en		17.6	21.7	20.3	16.6	28.0		59.6	54.8		36.5	58.1	
Level of Service	vel of Service (LOS)			В	C		B			E			D		
Approach Dela	y, s/veh	100		21.0		0	26.1		C	57.2	<u> </u>	E	56.6		E
Intersection De	ntersection Delay, s/veh / LOS					33	D. <i>1</i>								
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	S Score	/ LOS		2.3		В	2.3		В	2.3		В	2.5		В

Bicycle LOS Score / LOS	2.0	В	1.7	В	1.2	A	0.9	A

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### 7 1.40 May Sta $C_{\alpha}$ stral D

General Information		Site Information	
Analyst	SBG	Intersection	Home Rd & Access Rd
Agency/Co.	American Structurepoint	Jurisdiction	Delaware County
Date Performed	7/5/2019	East/West Street	Home Rd
Analysis Year	2020	North/South Street	Access Rd
Time Analyzed	Sc2B - PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Redwood Home Rd TIS		

## Lanes



Major Street: East-West

Vehicle Volumes and Ad	justmo	ents														
Approach		East	bound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	Т				LR					
Volume, V (veh/h)			836	26		11	594			14		7				
Percent Heavy Vehicles (%)						2				0		0				
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized		١	١o			١	10			Ν	lo			Ν	10	
Median Type/Storage				Left	Only								1			
Critical and Follow-up H	eadwa	ays														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	Service	e												
Flow Rate, v (veh/h)						12					23					
Capacity, c (veh/h)						731					275					
v/c Ratio						0.02					0.08					
95% Queue Length, Q <sub>95</sub> (veh)						0.1					0.3					
Control Delay (s/veh)						10.0					19.3					
Level of Service, LOS						В					С					
Approach Delay (s/veh)						C	.2			19	9.3					
Approach LOS											С					

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HCS7<sup>™</sup> TWSC Version 7.2

Sc2B\_Int 3\_Home Rd & Acces Rd\_PM.xtw

		HCS	7 Sig	nalize	d In	tersed	ction F	Resi	ults S	Sur	nmar	У				
	c'													1 1		61
General Inform	nation								Inter	seci		ormat	on	- 1	Jļļļ	
Agency		American Structure	point						Durat	tion,	h	0.25		_		R.
Analyst		SBG		Analys	sis Da	te Jul 8	, 2019		Area	Тур	е	Othe	er	×		~_⊳
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM F	Peak		PHF			0.92			wit	<b>↓</b> ↓
Urban Street		Home Rd		Analys	sis Yea	ar Sc3 - build Apar	· 2040 N (With tments)	0-	Analy	ysis	Period	1> 7	:00		ן <b>ו</b> אַרָּר	국 고 1 1 년
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame	Sc3_	Int 1 & 2	2_AM.	xus							
Project Descrip	tion	Redwood Home Ro	ITIS													
Demand Infor	nation				EB	2		\A	/B			NE	1		SB	
Approach Move	ement				Т	R	1	-	г	R	1	Т	R		Т	R
Demand $(v)$	eh/h			168	483	2 166	249	48	- RG (2	208	345	103	3 199	175	683	102
	CII/II			100	402	2 100	243		55 2	200	040	100	0 100	175	000	102
Signal Informa	ation				2		2	<u>-</u>	50		- 20.	3	_		-	Υ.
Cycle, s	100.0	Reference Phase	2		r.	e -	28		2	-54	v s	12	<	<b>A</b>		ктя
Offset, s	79	Reference Point	Begin	Green	7.3	0.7	29.7	7	5 '	16	22 5	5	1	M 2		4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	0.0	5.2	3.9	9 3	3.9	4.8	<u> </u>		$\rightarrow$		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	0.0	1.0	2.2	2 2	2.2	1.0		5	6	7	8
				1											_	
Timer Results				EBL	-	EBT	WB	L	WB	Т	NBL	-	NBT	SB		SBT
Assigned Phas	e			5		2	1		6		3		8	7		4
Case Number				1.1		4.0	1.1		3.0		1.1		4.0	1.1		3.0
Phase Duration	1, S			13.8	3	35.9	14.	5	36.6	3	21.3	3	36.0	13.0	3	28.3
Change Period	, ( <b>Y+</b> R	c ), S		6.5		6.2	6.5	5	6.2		6.1		5.8	6.1		5.8
Max Allow Hea	dway( <i>I</i>	MAH ), s		4.0		0.0	4.0	)	0.0		4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		9.2			10.	0			17.2	2	32.2	9.5		22.4
Green Extensio	ension Time ( g e ), s			0.0		0.0	0.0	)	0.0		0.0		0.0	0.0		0.1
Phase Call Pro	e Call Probability			1.00	)		1.0	0			1.00	)	1.00	1.00	)	1.00
Max Out Proba	Out Probability			1.00	)		1.0	0			1.00	)	1.00	1.00	)	1.00
Movement Gro	c Out Probability				EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т	F	२	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	1	6	3	8	18	7	4	14
Adjusted Flow	Rate ( v	), veh/h		183	704		269	528	3 22	24	375	686	653	190	742	111
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/	n	1781	1788	3	1781	187	0 15	85	1781	1870	1765	1781	1781	1585
Queue Service	Time (	g s ), s		7.2	29.7	,	8.0	27.	8 11	1.7	15.2	30.2	30.2	7.5	20.4	5.3
Cycle Queue C	learanc	e Time ( <i>g</i> c ), s		7.2	29.7	,	8.0	27.	8 11	1.7	15.2	30.2	30.2	7.5	20.4	5.3
Green Ratio ( g	I/C )			0.37	0.30	)	0.38	0.3	0 0.3	38	0.40	0.30	0.30	0.30	0.22	0.30
Capacity ( c ), v	/eh/h			207	531		215	569	9 60	01	358	565	533	206	801	472
Volume-to-Cap	acity Ra	atio (X)		0.882	1.32	6	1.252	0.92	28 0.3	374	1.048	1.215	1.225	0.925	0.927	0.235
Back of Queue	( Q ), ft	/In ( 95 th percentile)	)	208.7	1342 5	2.	333.8	397	7 18	1.8	458.7	1124.	7 1078. 3	247.4	400.3	93.7
Back of Queue	(Q), V	eh/In ( 95 th percent	ile)	8.2	52.9	)	13.1	15.	6 7.	.2	18.1	44.3	43.1	9.7	15.8	3.7
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.56	0.00	)	0.67	0.0	0 0.	61	0.76	0.00	0.00	0.49	0.00	0.00
Uniform Delay	( d 1 ), s	/veh		26.5	35.2	2	28.0	41.	1 28	3.7	25.8	34.9	34.9	31.6	37.9	26.5
Incremental De	lay ( d 2	2), s/veh		32.8	159.	6	117.2	3.3	3 0.	.2	60.8	112.3	117.0	42.3	18.3	1.2
Initial Queue D	elay(d	з ), s/veh		0.0	0.0		0.0	0.0	) 0.	.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	d ), s/v	eh		59.3	194.	7	145.2	44.4	4 28	3.8	86.6	147.2	151.9	73.9	56.2	27.7
Level of Servic	e (LOS)			E	F		F	D	(	С	F	F	F	E	E	С
Approach Dela	y, s/veh	/LOS		166.	8	F	67.	5	Е		135.	7	F	56.4	1	Е
Intersection De	lay, s/ve	eh / LOS				1	0.00							F		
Multimodel De	oulto				ED			\ \ / [	2			ND			e P	
Pedestrian LOG	Score	/1.05		20	EB	C	20		, 	_	24		R	0.0	30	R
Bicycle I OS S				2.0		R	3.0	,			2.4		B	2.3		Δ
BICYCIE LOS SC	UIG / L(			2.0		D	Z.2	-	D		1.9		D	1.3		A

		псэ	a sig	nanze	a m	ersec		tesui	is Sur	nmar	у				
· · · ·															
General Inform	nation	1						I	ntersec	tion Inf	ormatio	on	_	424+4	24 L <u>a</u>
Agency		American Structure	point			Î		1	Duration	, h	0.25				R.
Analyst		SBG		Analys	is Date	e Jul 8,	2019	/	Area Typ	e	Other		<u></u> →		4
Jurisdiction		Delaware County, (	ЭН	Time F	Period	AM P	eak	F	PHF		0.92			w i t	¢ +
Urban Street		Home Rd		Analys	is Yea	r Sc3 -	2040 No	0- /	Analysis	Period	1> 7:0	00	7		न्य २
						Apart	(vviin ments) -	.						ala Ala	
						With	,							141471	× (*
				<u> </u>		Impro	vement	s							
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame	Sc3_I	nt 1 & 2	_AM -	With Imp	proveme	ents.xus	;			
Project Descrip	tion	Redwood Home Ro	TIS												
Demonstration					50						ND			00	
Demand Inform	nation				EB		<u> </u>			<u> </u>	NB		<u> </u>	SB	
Approach Move	ement			L	100	R 100	L	100	R 200	L	1022	R 100	L 475	1	R 100
Demand (V), V	en/n			108	482	100	249	489	208	345	1033	199	1/5	683	102
Signal Informa	tion				2	5									1
Cycle, s	100.0	Reference Phase	2		P 4		74		" \_ <u>_</u>		 1⊳21 ■	$\square$	4 -	-7 "	$\Phi$
Offset, s	90	Reference Point	Begin	Croop	70	1 2 0	10.2		40			1	<b>Y</b> 2	<b>↓</b> 3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	3.8	19.3	3.9	4.9	30.5 4 8	° <b>↓_</b>	~	$\rightarrow$	L	ta
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	0.0	1.0	2.2	0.0	1.0		5	6	7	8
			1												
Timer Results				EBL	-	EBT	WB	L	WBT	NBI		NBT	SB		SBT
Assigned Phase	e			5		2	1		6	3		8	7		4
Case Number				1.1		3.0	1.1		4.0	2.0		3.0	1.1		3.0
Phase Duration	, S			14.4		25.5	18.2	2	29.3	20.0	)	41.2	15.1	1 ;	36.3
Change Period	, ( Y+R	c ), S		6.5		6.2	6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Head	dway( <i>I</i>	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		9.9			13.7	7		12.5	5	31.7	9.2		20.3
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.0	0.2		2.8	0.0		6.6
Phase Call Pro	bability			1.00			1.00	)		1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	1.00	1.00	) (	0.67
Movement Cre					ГР						ND			C D	
Approach Move	mont	Suits			ED T	P			P			P	1		P
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7		14
Adjusted Flow F	Rate ( v	) veh/h		183	524	180	288	124	382	375	1123	216	190	7/2	111
Adjusted Satura	ation Flo	), ven/n w Rate ( s ) veh/h/	In	1781	1781	1610	1781	1870	1680	1730	1781	1610	1781	1781	1585
	Time ( )	$\sigma_{c}$ ) s		79	13.9	8.4	11 7	22.6	22.7	10.5	29.7	82	72	18.3	4.6
Cycle Queue C	learanc	e Time $(a_c)$ s		7.9	13.9	8.4	11.7	22.0	22.7	10.5	29.7	8.2	7.2	18.3	4.6
Green Ratio ( g	/C)	o milo (g o ), o		0.27	0.19	0.33	0.31	0.23	0.23	0.14	0.35	0.47	0.39	0.30	0.38
Capacity ( c ), y	/eh/h			213	687	535	328	432	388	481	1261	758	251	1086	609
Volume-to-Cap	acity Ra	atio(X)		0.858	0.762	0.338	0.879	0.982	0.985	0.780	0.891	0.285	0.759	0.684	0.182
Back of Queue	(Q), ft	/In ( 95 th percentile	)	219.5	270.2	146.5	259.3	460.5	445	213.8	496.1	133.9	169.1	317.7	78.9
Back of Queue	(Q), ve	eh/In ( 95 th percent	ile)	8.6	10.6	5.9	10.2	18.1	17.5	8.4	19.5	5.4	6.7	12.5	3.1
Queue Storage	Ratio (	RQ) (95 th percen	, tile)	0.59	0.00	0.98	0.52	0.00	0.00	0.36	0.00	0.00	0.34	0.00	0.00
Uniform Delay (	(d1), s	/veh	,	32.1	38.2	25.1	31.4	38.1	40.7	41.6	30.5	16.2	25.0	30.5	20.4
Incremental De	lay ( d 2	), s/veh		27.8	7.8	1.7	16.3	30.8	33.4	8.0	9.7	0.9	12.6	3.5	0.7
Initial Queue De	elay ( d	з ), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	d ), s/ve	eh		59.9	46.0	26.8	47.7	68.9	74.1	49.6	40.2	17.1	37.6	34.0	21.1
Level of Service	e (LOS)			E	D	С	D	E	E	D	D	В	D	С	С
Approach Delay	proach Delay, s/veh / LOS			45.0		D	65.1	1	E	39.3	3	D	33.3	3	С
Intersection De	tersection Delay, s/veh / LOS					4	5.0						D		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	Score	/LOS		3.1		С	3.0		С	2.8		С	3.0		C

Bicycle LOS Score / LOS	1.2	A	1.3	A	1.9	В	1.3	A

HCS7™ Streets Version 7.2

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		HCS	7 Sig	nalize	ain	ersec		kesi	lits	s Sun	nmar	У				
									14							
General Inform	nation								Inte	ersect	ion Infe	ormatic	on		4 7 4 1 9	a l <u>a</u>
Agency		American Structure	point						Du	ration,	h	0.25			4 5	K
Analyst		SBG		Analys	is Dat	e Jul 8,	2019		Are	еа Тур	е	Other		4		4
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM P	eak		PH	IF		0.92			wiji	
Urban Street		Home Rd		Analys	is Yea	r Sc3 -	2040 N	o-	Ana	alysis	Period	1> 7:0	00			*
						build Apart	(With ments)			-					ጎዮ	¥
Intersection		Home Rd & Libertv	Rd N	File Na	ame	Sc3	, Int 1 & 2	AM	xus						N T Y P	<u>r r</u>
Project Descrip	tion	Redwood Home Ro	TIS											-		
Troject Descrip	lion	ricawood Home ric	1110													
Demand Inform	nation				EB			V	/B	_		NB			SB	
Approach Move	ement			L	Т	R	L		τΙ	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			65	617	178	122	6	51	27	285	157	91	35	235	71
						1										
Signal Informa	tion					5		<u> </u>	ι,	125.						
Cycle, s	100.0	Reference Phase	2	1	P.		74	e 11	2	54	2			4	<b>`</b> \ <b>'</b>	$\Phi$
Offset, s	34	Reference Point	Begin		7.4				<u> </u>		ſ		1	2	3	4
Uncoordinated	No	Simult, Gap E/W	On	Green	1.1	1.4	5 2	9.	2 0	19.6	0.0	_	<b>X</b>	$\rightarrow$	L	<b>r</b> †3
Force Mode	Fixed	Simult, Gap N/S	On	Red	1.4	0.0	1.0	1.	9	1.0	0.0	_	5	6	7	
	1		0	<u></u>	1	1.1.1	1			1.1.4	10.0					
Timer Results				FBI		FBT	WB		W	/BT	NBI		NBT	SBI		SBT
Assigned Phase	<u>a</u>			5		2	1		6	6	3		8	7		4
Case Number				11		4.0	11	-	1	0	11		4.0	11		4.0
Dhose Duration	<u>^</u>			1.1		4.0	14 (	,	4	 a. 4	15.0		4.0 25.0	1.1		4.0
Change Duration	, 5 ( V+D			5.7	,	43.0	7.1	-	40	5. <del>4</del>	5.0	, .	2J.0 6.2	6.2		£3.0 6.2
Max Allew Lleas		c ), S		5.7		0.2	1.1		0	0.Z	5.0	_	0.2	0.3		0.2
	away ( /	иан), s		4.0		0.0	4.0	-+	0	.0	4.0		4.0	4.0		4.0
Queue Clearan		e (g s), s		3.8			6.4				11.2	-	16.6	3.6		20.3
Green Extensio	n lime	(ge), S		0.0		0.0	0.0	$\rightarrow$	0	.0	0.0		0.7	0.0		0.0
Phase Call Prol	Call Probability			1.00			1.00	)			1.00	)	1.00	1.00	· · · ·	1.00
Max Out Proba	bility			1.00			1.00	)			1.00	)	1.00	0.20	· · ·	1.00
Movement Gro	oup Res	ults			EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h		58	704		133	73	7		310	270		38	333	
Adjusted Satura	ation Flo	w Rate ( s ), veh/h/l	n	1781	1798		1781	185	57		1781	1754		1781	1795	
Queue Service	Time ( d	(), S		1.8	38.8	1	4.4	39.	3		9.2	14.6		1.6	18.3	
Cvcle Queue C	learance	e Time ( <code>q c</code> ), s		1.8	38.8	+	4.4	39.	3		9.2	14.6		1.6	18.3	
Green Ratio ( g	/C )			0.46	0.39	1	0.46	0.4	0		0.29	0.20		0.28	0.20	
Capacity ( c ), y	eh/h			198	698	1	198	74	7		236	344		260	352	
Volume-to-Cap	acity Ra	tio (X)		0.290	1.010	,	0.668	0.98	37		1.313	0.784		0.146	0.945	
Back of Queue	(Q), ft/	(In ( 95 th percentile)	)	47.1	559	1	164.9	751	.7		608.6	287.4		29.4	413.9	
Back of Queue	(Q) ve	eh/ln ( 95 th percenti	, ile)	19	22.0		6.5	29	6	_	24.0	11.3		12	16.3	
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.09	0.00		0.51	0.0	0		1.87	0.00		0.09	0.00	
Uniform Delay (	$(d_1)$ s	/veh		22.3	37.9	-	23.3	29	6	_	33.2	38.2		27.7	39.7	
Incremental De	lay ( d 2	), s/veh		0.1	12.6	-	8.3	30.	0		167.9	11.3		0.3	33.9	
Initial Queue De	elay ( d	3), s/veh		0.0	0.0	1	0.0	0.0	)		0.0	0.0		0.0	0.0	
Control Delay (	trol Delay ( $d$ ), s/veh			22.4	50.5		31.6	59	6		201.0	49.4		27.9	73.6	
Level of Service				С	F		C	F			F	D		С	F	
Approach Delay	()	/ LOS		48.4		D	55.3	3	F	E	130	5	F	68 9	,	E
Intersection De	av s/ve	h/LOS		10.1		7	2.1	_		-		-		F		-
						,								-		
Multimodal Re	sults				EB			W	В			NB			SB	
Pedestrian LOS	Score	/LOS		2.3		В	2.3		E	В	2.3		В	2.3		В
Bicycle LOS Sc	ore / LC	)S		2.0		В	1.9		E	В	1.4		А	1.1		А

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General Inforn	nation								Intersec	tion Inf	ormatic	on	_		·
Agency		American Structure	point						Duration	, h	0.25				K.
Analyst		SBG		Analys	is Date	Jul 8,	2019		Area Typ	e	Other				<sup>4</sup>
Jurisdiction		Delaware County, C	ЭН	Time F	Period	AM P	eak		PHF		0.92			w i L B	+ ↓ ↓
Urban Street		Home Rd		Analys	is Year	Sc3 -	2040 N	0-	Analysis	Period	1> 7:(	00	1		7
						Aparti	nents) -	.						ጎሾ	
						With	,							N T Y Y	<u>r r</u>
						Impro	vement	s							
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc3_I	nt 1 & 2	_AM -	With Imp	proveme	ents.xus				
Project Descrip	tion	Redwood Home Ro	TIS												
					ED			\\\/	D		ND			CD.	
Demand Inform	nation				EB				B	<u> </u>			<u> </u>	<u>58</u>	
Approach Move	ement			L	617	170	L 100	65	1 07	205	157	R 01	25	1	R 71
Demand (V), V	en/n			00	617	1/8	122	60	1 27	285	157	91	35	235	11
Signal Informa	tion				1	8	. ,	ر ا	L.	DE					
Cycle, s	100.0	Reference Phase	2	1	120	- 2	74				× • 21 ►		4 -	<u>,</u> , , , , , , , , , , , , , , , , , ,	$\Phi$
Offset, s	80	Reference Point	Begin		7.4			<u> </u>				1	2.	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green	1.1	2.2	27.6	8.2	4.7	25.8	3	<b>X</b>	$\rightarrow$	L	r†a
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	2.0	0.0	1.0		5	6	7	
			1												
<b>Timer Results</b>				EBL	-	EBT	WB	L	WBT	NB	-	NBT	SBI	- 7	SBT
Assigned Phas	е			5		2	1		6	3		8	7		4
Case Number				1.1		3.0	1.1		4.0	1.1		4.0	1.1		4.0
Phase Duration	I, S			12.8	;	33.8	15.0	)	36.0	19.2	2	36.7	14.5	; ;	32.0
Change Period	, ( <b>Y+</b> R	c ), S		5.7		6.2	7.1		6.2	5.8		6.2	6.3		6.2
Max Allow Head	dway( <i>I</i>	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		4.5			7.2			14.6	3	14.6	3.4	-	18.9
Green Extensio	on Time	(ge), s		0.0		0.0	0.0		0.0	0.0		1.9	0.0		1.3
Phase Call Pro	bability			1.00			1.00	<u></u>		1.00	)	1.00	1.00	) -	1.00
Max Out Proba	bability			1.00			1.00	)		1.00	)	0.02	0.33	3 (	).35
Movement Gra		aulto	_		ED			\\/D			ND			S P	_
Approach Move	mont	Suits			T	R			R			R		Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7		14
Adjusted Flow I	Rate ( v	) veh/h		70	668	103	133	371	366	310	270	10	38	333	
Adjusted Satura	ation Flo	w Rate (s) veh/h/	n	1781	1781	1610	1781	1870	1844	1781	1754		1781	1795	
	Time ( (	$\alpha_{\rm s}$ ) s		25	16 1	82	52	17 4	17 4	12.6	12.6		14	16.9	
Cycle Queue C	learanc	e Time ( a c ), s		2.5	16.1	8.2	5.2	17.4	17.4	12.6	12.6		1.4	16.9	
Green Ratio ( o	/C)	- · · · · · (3 · ), -		0.35	0.28	0.41	0.35	0.30	0.30	0.40	0.31		0.34	0.26	
Capacity ( c ), v	/eh/h			274	983	660	302	557	549	404	535		394	463	
Volume-to-Cap	acity Ra	atio(X)		0.257	0.679	0.292	0.440	0.66	6 0.666	0.766	0.504		0.096	0.718	
Back of Queue	( Q ), ft	/In ( 95 th percentile)	)	40.8	249.3	135.5	96.3	328.0	6 320.6	246.7	221.8		26.3	306.7	
Back of Queue	(Q), ve	eh/In ( 95 th percent	ile)	1.6	9.8	5.4	3.8	12.9	12.8	9.7	8.7		1.0	12.1	
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.07	0.00	0.00	0.30	0.00	0.00	0.76	0.00		0.08	0.00	
Uniform Delay	(d1), s	/veh		19.7	29.1	20.4	24.0	30.7	30.7	24.0	28.5		22.8	33.8	
Incremental De	lay ( <i>d</i> 2	), s/veh		0.4	2.7	0.8	1.0	6.2	6.3	8.6	0.8		0.1	5.3	
Initial Queue D	elay(d	з ), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (	bl Delay ( <i>d</i> ), s/veh			20.1	31.8	21.2	25.0	36.9	37.0	32.5	29.3		22.9	39.1	
Level of Service	el of Service (LOS)			С	С	С	С	D	D	С	С		С	D	
Approach Dela	y, s/veh	/ LOS		28.7		С	35.1	1	D	31.0	)	С	37.4	ł	D
Intersection De	tersection Delay, s/veh / LOS					32	2.4						С		
Multimodal Re	sults	// 00			EB	<b>D</b>		WB	<b>_</b>		NB	0		SB	-
Pedestrian LOS	Score	/ LUS		2.3		в	∎ 2.3		В	2.8		C	∎ <u>3.0</u>		U I

Bicycle LOS Score / LOS	1.3	A	1.2	A	1.4	A	1.1	A

HCS7™ Streets Version 7.2

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		HCS	7 Sig	nalize	ed Ir	ntei	rsect	tion F	lesi	ults	s Sun	nmary	y				
																	b I
General Inforn	nation		• •							Int	tersect	tion Info	ormat	ion	_	JJJII	4ª 4
Agency		American Structure	point							Du	uration,	h	0.25				R.
Analyst		SBG		Analys	sis Da	ate	Jul 8, 2	2019		Are	еа Тур	e	Othe	er			~_4
Jurisdiction		Delaware County, (	ЭН	Time F	Period		PM Pe	eak		PH	HF		0.92			w t L	↓ ↓ ↓
Urban Street		Home Rd		Analys	sis Ye	ar	Sc3 - 2 build ( Apartn	2040 Ne With nents)	D-	An	nalysis	Period	1> 7	:00		ין <b>ר</b> אייאר א	작 고 1 4
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame		Sc3_Ir	nt 1 & 2	_PM.	xus	6						
Project Descrip	tion	Redwood Home Ro	I TIS														
Demand Inform	nation				EF	R			١A	/R			NF	2		SB	
Approach Move	ment				Т	·	R		-	г	R		Т	, R	1	Т	R
Demand ( v ) v	eh/h			136	60	3	291	244	5	71	142	513	76	3 358	202	675	79
	01i/11			100	00		201	211		, ,	112	010	10	000	202	010	10
Signal Informa	ation				2		2		<u> </u>	ζ,	~	20.				-	
Cycle, s	120.0	Reference Phase	2		P.	e	e de la composición de la composicinde la composición de la composición de la composición de la compos	12	۳ ,	2	- 54	2 54	12	< _	<b>A</b>	<u></u>	хtх
Offset, s	0	Reference Point	Begin	Green	73		2.9	44 0	8	9	59	20.3		1	<b>X</b> 2		4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9		0.0	5.2	3.9	9	3.9	4.8			↔		572
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6		0.0	1.0	2.2	2	2.2	1.0		5	6	7	8
			_														
Timer Results				EBI		E	BT	WB		N	VBT	NBL	-	NBT	SB	_	SBT
Assigned Phas	e			5		2	2	1	$\rightarrow$		6	3	$\rightarrow$	8	7	_	4
Case Number				1.1		4	.0	1.1	$\rightarrow$	3	3.0	1.1		4.0	1.1		3.0
Phase Duration	nase Duration, s nange Period. ( Y+R c ). s					50	0.2	16.7	7	5	3.1	27.0		38.1	15.0	)	26.1
Change Period	hange Period, (Y+R c), s					6	5.2	6.5	_	6	5.2	6.1		5.8	6.1		5.8
Max Allow Head	dway(/	MAH ), s		4.0	$\rightarrow$	0	0.0	4.0		C	0.0	4.0		4.0	4.0	_	4.0
Queue Clearan	ce Time	e (gs), s		8.2	$\rightarrow$		-	12.2	2			22.9	)	34.3	10.9	9	22.3
Green Extensio	on Time	(ge), s		0.0		0	0.0	0.0		C	0.0	0.0		0.0	0.0		0.0
Phase Call Pro	bability			1.00				1.00				1.00		1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)			1.00	)			1.00		1.00	1.00	)	1.00
Movement Gro	oup Res	sults			EE	3			WE	3			NB			SB	
Approach Move	ement			L	Т	Т	R	L	Т	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2		12	1	6		16	3	8	18	7	4	14
Adjusted Flow I	Rate ( <i>v</i>	), veh/h		148	972	2		291	681	1	169	558	642	576	220	734	86
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/	In	1781	176	7		1781	187	0	1585	1781	1870	1668	1781	1781	1585
Queue Service	Time ( g	g s ), s		6.2	44.0	0		10.2	40.	9	7.6	20.9	32.3	32.3	8.9	20.3	5.3
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		6.2	44.0	0		10.2	40.	9	7.6	20.9	32.3	32.3	8.9	20.3	5.3
Green Ratio ( g	ı/C)			0.43	0.3	7		0.45	0.3	9	0.47	0.36	0.27	0.27	0.24	0.17	0.23
Capacity ( c ), v	/eh/h			194	648	3		211	73′	1	737	370	503	449	192	602	365
Volume-to-Cap	acity Ra	atio (X)		0.762	1.50	00		1.376	0.93	31	0.230	1.506	1.27	5 1.284	1.143	1.218	0.236
Back of Queue	( Q ), ft	/In (95 th percentile	)	152.4	2302 5	2.		436.2	445	.1	86.5	1297	1258	1141.9	304.9	700.7	98.7
Back of Queue	(Q), ve	eh/In ( 95 th percent	ile)	6.0	90.0	6		17.2	17.	5	3.4	51.1	49.5	45.7	12.0	27.6	3.9
Queue Storage	tile)	0.41	0.0	0		0.87	0.0	0	0.29	2.16	0.00	0.00	0.61	0.00	0.00		
Uniform Delay		29.2	38.0	0		30.7	28.	4	18.9	35.4	43.9	43.9	43.0	49.9	37.6		
Incremental De	ncremental Delay ( <i>d</i> ₂ ), s/veh					.0		172.1	2.8	3	0.1	241.4	138.7	7 144.0	108.7	112.6	1.5
Initial Queue De	elay ( d	3), s/veh		0.0	0.0			0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	d ), s/ve	eh		45.4	271.	.0		202.7	31.	1	18.9	276.8	182.	o 187.8	151.6	162.4	39.1
Level of Service	evel of Service (LOS)							F	C		В	F	F	F	F	F	
Approach Delay	Approach Delay, s/veh / LOS						F	73.′			E	213.8	8	F	150.	0	F
Intersection De	lay, s/ve	en / LOS					17	5.2							F		
Multimodel Be	/ultimodal Results					2			\\\/	2			ND			QD	
Pedestrian I OG	Iultimodal Results					, (	C	20		,	C	21		R	23	00	B
Bicycle LOS Sc	core / I C	200		2.0		, I	B	2.9			B	2.4		B	2.3		A
510,010 200 00				2.0			-	2.2			-	2.0		5	1.0		~

		HUS	or sig	nalize	aint	ersec		tesui	ts Sur	nmar	У				
í.								1					1		
General Inforn	nation	1							ntersec	tion Inf	ormatio	on	_		
Agency		American Structure	epoint						Duration	, h	0.25				E.
Analyst		SBG		Analys	is Date	∋ Jul 8,	2019	/	Area Typ	е	Other				*
Jurisdiction		Delaware County, (	ЭН	Time F	Period	PM P	eak		PHF		0.92		+ -	WEL	<b>♦</b> +
Urban Street		Home Rd		Analys	is Yea	Sc3 -	2040 No	o-  /	Analysis	Period	1> 7:(	00	74		* ~
						Apart	(VVIII) ments) -							ala AlAli	
						With	nonto)							1414Y1	× (*
						Impro	vement	S							
Intersection		Home Rd & Sawmi	ll Pkwy	File Na	ame	Sc3_I	nt 1 & 2	_PM -	With Imp	proveme	ents.xus				
Project Descrip	tion	Redwood Home Ro	d TIS												
				_						1					
Demand Inform	nation			<u> </u>	EB		<u> </u>	VVE T	5	<u> </u>	NB		<u> </u>	SB	
Approach Move	ement			L	1	R	L		R	L	700	R	L		R
Demand (V), V	en/n			136	603	291	244	5/1	142	513	763	358	202	675	79
Signal Informa	tion				2	5		. (		DE					1
Cvcle, s	120.0	Reference Phase	2	1	1× 1	- 2					× 71		<u> </u>	<u>-</u> 5 "	$\Phi$
Offset, s	90	Reference Point	Beain		2	1 2		```)			<u> ″</u>	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green	9.1	1.9	26.8	16.2	2 5.7	29.2	╧─┥┛		$\overline{\bullet}$	ι	<b>†</b> ,
Force Mode	Fixed	Simult, Gap N/S	On	Red	2.6	2.2	1.0	2.2	0.0	1.0		5	6	7	8
Timer Results				EBL	-	EBT	WB	L	WBT	NB		NBT	SBI	-	SBT
Assigned Phase	signed Phase					2	1		6	3		8	7		4
Case Number	ise Number					3.0	1.1		4.0	2.0		3.0	1.1		3.0
Phase Duration	hase Duration, s					33.0	24.0	)	41.4	28.0	) .	40.7	22.3	3 ;	35.0
Change Period	, ( Y+R	c ), S		6.5		6.2	6.5		6.2	6.1		5.8	6.1		5.8
Max Allow Head	dway( <i>I</i>	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		9.6			18.3	3		20.9	)	27.8	12.5	5 1	25.6
Green Extensio	on Time	(g e ), s		0.0		0.0	0.0		0.0	0.3		4.7	0.2		2.7
Phase Call Pro	bability			1.00	)		1.00	)		1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	0.80	1.00	)	1.00
Movement Cre	un Dee				ГР						ND			<b>CD</b>	
Approach Move	mont	suits			ED T	D			D			D			D
Assigned Move	ment			5	2	12	1	6	16	3	8	18		1	14
Adjusted Flow	Pate ( v	x) veh/h		1/18	655	316	325	102	10	558	820	380	220	734	86
Adjusted Flow I	ation Flo	), ven/n ow Rate (s) veh/h/	In	1781	1781	1610	1781	1870	17/1	1730	1781	1610	1781	1781	1585
	Time ( /	$\sigma_{\alpha}$ ) s		7.6	21.0	17 /	16.3	30.8	31.0	18.0	25.8	21.5	10.5	23.6	4 7
	learanc	e Time $(a_c)$ s		7.6	21.0	17.4	16.3	30.8	31.0	18.9	25.8	21.5	10.5	23.6	4.7
Green Ratio ( o	V/C	c mile ( g t ), 3		0.30	0.22	0.41	0.39	0.29	0.29	0.18	0.29	0.44	0.38	0.24	0.32
Capacity ( c ), y	/eh/h			206	795	653	357	549	511	631	1036	703	339	867	506
Volume-to-Cap	acity Ra	atio (X)		0.718	0.824	0.484	0.911	0.897	0.898	0.883	0.801	0.553	0.647	0.847	0.170
Back of Queue	(Q), ft	/In ( 95 th percentile	)	173.6	383.5	276	304.7	538.1	519.1	356.7	442.8	329.3	209	424.3	83.9
Back of Queue	Back of Queue ( $Q$ ), ft/in (95 th percentile) Back of Queue ( $Q$ ), veh/in (95 th percentile)					11.0	12.0	21.2	20.4	14.0	17.4	13.2	8.2	16.7	3.3
Queue Storage	tile)	0.46	0.00	0.00	0.61	0.00	0.00	0.59	0.00	0.00	0.42	0.00	0.00		
Uniform Delay	,	35.0	44.4	26.4	31.7	46.6	48.7	47.8	39.3	25.1	29.4	43.3	29.4		
Incremental De		11.4	9.5	2.6	16.6	12.1	12.8	13.9	6.5	3.1	4.2	10.0	0.7		
Initial Queue De	elay ( d	з ), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	d ), s/ve	eh		46.4	53.8	28.9	48.3	58.7	61.6	61.7	45.8	28.2	33.6	53.3	30.1
Level of Service	Level of Service (LOS)					С	D	E	E	E	D	С	С	D	С
Approach Dela	Approach Delay, s/veh / LOS					D	57.1	1	E	47.0	)	D	47.2	2	D
Intersection De	Intersection Delay, s/veh / LOS					49	9.2						D		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	S Score	/LOS		3.1		С	3.0		С	2.8		C	3.0	1	C

Bicycle LOS Score / LOS	1.4	A	1.3	A	2.0	В	1.3	A

HCS7™ Streets Version 7.2

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		HCS	7 Sig	nalize	ain	tersed	ction F	kesi	lits	s Sun	nmar	У				
									v							
General Inform	nation								Int	tersect	ion Infe	ormatio	on	2	4 7 4 t t	× (L)
Agency		American Structure	point						Du	uration,	h	0.25			44	K
Analyst		SBG		Analys	sis Dat	e Jul 8	, 2019		Ar	еа Тур	е	Other		4		4
Jurisdiction		Delaware County, 0	ЭН	Time F	Period	PM F	Peak		PH	ΗF		0.92			w	
Urban Street		Home Rd		Analys	sis Yea	r Sc3 ·	2040 N	0-	Ar	nalysis	Period	1> 7:0	00			
						build	(With			•					<b>٦</b> ¥	*
						Apar	tments)								4 1 <del>4</del> 7 1	* (*
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc3_	Int 1 & 2	_PM	.xus	\$						
Project Descrip	tion	Redwood Home Ro	ITIS													
Damend Inform								14	/D			ND		1	00	
Demand Inform	nation				EB		<u> </u>	V\	vв т		<u> </u>	NB			SB	
Approach Move	ement			L		R K			1	R	L	1	R	L	1	R
Demand (V), V	en/n			68	111	390	177	8	10	30	307	221	96	24	257	57
Signal Informa	tion							2	T							
	120.0	Reference Phase	2			А	7.		21		245			~	<b>N</b>	$\Phi$
Offset s	0	Reference Point	Begin						<u> </u>	<u> </u>	<u>7                                    </u>	<u> </u>	1	<b>Y</b> 2	3	4
Uncoordinated	No	Simult Cap E/W	On	Green	7.1	2.2	58.6	7.	5	2.2	18.0	)	_	ð-	L	
Earoo Mada	Fixed	Simult Cop N/S	On	Pod	4.3	0.0	5.2	4.	3	0.0	5.2		_	×		Y
Force Mode	Fixed	Sinuit. Gap N/S	OII	Itteu	1.4	0.0	1.0	<u> </u>	0	0.0	1.0		3	0		0
Timer Results			_	EBI		FBT	WB	1	V	VBT	NBI		NBT	SBI		SBT
Assigned Phase	<u> </u>			5	-	2	1		•	6	3	-	8	7		4
Case Number	6			11		4.0	11	-+		10	11		4.0	11		4.0
Dhose Number				1.1	,	64.0	1.1		6	+.0	1.1	\	4.0	12 0	,	4.0
Change Duration	(V+D	-) c	5.7	,	6.2	7 1	,	0	6.2	5.8	,	20.4 6.2	6.2	,	24.Z	
	$\frac{1}{1}$	(), S		J.7	-	0.2	1.1		- (	0.2	1.0		4.0	0.3		0.2
	co Timo	$(\alpha, \beta) \in \mathcal{O}$		4.0	+	0.0	4.0	-		0.0	4.0	)	4.0	4.0	,	4.0
Croop Extensio		$(g_s), s$		3.0		0.0	9.9			0.0	12.2	<u>-</u>	22.2	3.4	_ <u></u>	20.0
Green Extensio		( <i>g</i> e), s		0.0		0.0	0.0			0.0	1.00	\	0.0	0.0		0.0
Phase Call Pro				1.00	,		1.00				1.00	)	1.00	1.00	<u>'</u>	1.00
Max Out Proba	DIIILY			1.00	,		1.00	)			1.00	)	1.00	0.83	,	1.00
Movement Gro	oup Res	sults			EB			W	B			NB			SB	
Approach Move	ement			L	Т	R	L	Т	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	+	16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	). veh/h		51	881	1	192	91	3		334	345		26	341	
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/	n	1781	1764		1781	185	58		1781	1774		1781	1811	
Queue Service	Time ( d	( s ). S		1.6	58.6		7.9	57.	2	_	10.2	20.2		1.4	18.0	
Cvcle Queue C	learance	e Time ( <i>q</i> c ). s		1.6	58.6	-	7.9	57.	2		10.2	20.2		1.4	18.0	
Green Ratio ( a	/C)			0.55	0.49		0.55	0.5	1		0.23	0.17		0.21	0.15	
Capacity ( c ), v	, veh/h			174	862		177	94	2		211	299		171	272	
Volume-to-Cap	acitv Ra	itio (X)		0.296	1.022	2	1.085	0.97	70		1.578	1.154		0.152	1.256	
Back of Queue	(Q). ft/	/In (95 th percentile)	)	52.2	546.2	2	389.2	952	.2		676	643.8		34.1	718.4	
Back of Queue	(Q), Vé	eh/ln ( 95 th percent	, ile)	2.1	21.5		15.3	37.	5		26.6	25.3		1.3	28.3	
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.09	0.00		1.20	0.0	0		2.08	0.00		0.10	0.00	
Uniform Delay (	Queue Storage Ratio( <i>R</i> Q)( 95 th percentile)					1	36.6	28	7		43.5	49.9		39.1	51.0	
Incremental De		0.1	15.6		92.2	22	9		281.8	100.5		0.4	141 7			
	3) s/veh		0.0	0.0		0.0	0.0	<u> </u>		0.0	0.0		0.0	0.0		
Control Delay (	Control Delay ( <i>d</i> ), s/veh						128.8	51	6		325.2	150.4		39.5	192.7	
Level of Service				<u> </u>	55.4 F		F		-		F	F		л П	-52.7	
Approach Delay		35.0	)	C.	65 (			F	236	4	F	181	9	F		
Intersection Delay		00.0		1	17.6			-	200.		1	F	-	-		
	ay, 3/ve			I		1								•		
Multimodal Re	Multimodal Results							W	В			NB			SB	
Pedestrian LOS	edestrian LOS Score / LOS					В	2.3			В	2.3		В	2.3		В
Bicycle LOS Sc	ore / LC	DS		2.7		С	2.3			В	1.6		В	1.1		А

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General Inforn	nation	1							Intersec	tion Inf	ormatic	on	_	▲☆☆↓ጶ ┛╹	4 L <u>.</u>
Agency		American Structure	point	1					Duration	, h	0.25				K_
Analyst		SBG		Analys	is Date	Jul 8,	2019		Area Typ	e	Other				Å <u>↓</u>
Jurisdiction		Delaware County, 0	ЭН	Time F	Period	PM P	eak		PHF		0.92			₩ŢL B	+ ↓
Urban Street		Home Rd		Analys	is Year	- Sc3 -	2040 No	o-	Analysis	Period	1> 7:0	00			*
						build (	(With ments) -							ጎዮ	
						With	nents) -							* 1 * * * *	
						Impro	vement	s							
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc3_I	nt 1 & 2	_PM ·	- With Im	proveme	ents.xus	;			
Project Descrip	tion	Redwood Home Ro	I TIS												
				1			l.								
Demand Inform	nation				EB			W	B		NB			SB	11
Approach Move	ement			L	T	R	L	Т	R	L	T	R	L	T	R
Demand (v), v	/eh/h			68	777	390	177	81	0 30	307	221	96	24	257	57
Signal Informa	ation					5		2		- DE	_				
Cycle, s	120.0	Reference Phase	2		20	- 2	7.	Π.	3 1843		, 		<u> </u>	<u> </u>	$\Phi$
Offset, s	90	Reference Point	Begin				<b>1</b>	20			<u> ^</u>	1	<b>Y</b> 2 .	3	4
Uncoordinated	No	Simult, Gap F/W	On	Green	7.1	0.7	30.8	11.	.2 2.3	36.9	)		$\rightarrow$	ι	-+-
Force Mode	Fixed	Simult Gap N/S	On	Red	4.5	2.8	1.0	1.9	0.0	1.0		5	6	7	Y
			•	<u></u>	1	1	1.1.2	н		1					•
<b>Timer Results</b>				EBL	-	EBT	WB	L	WBT	NBI	-	NBT	SBI	- 6	SBT
Assigned Phas	е			5		2	1		6	3		8	7		4
Case Number	e Number					3.0	1.1		4.0	1.1		4.0	1.1		4.0
Phase Duration	ase Duration, s					37.0	20.6	3	44.8	17.0	) .	43.1	19.3	3 4	45.4
Change Period	, ( Y+R )	c ), S		5.7		6.2	7.1		6.2	5.8		6.2	6.3		6.2
Max Allow Head	dway ( <i>I</i>	<i>MAH</i> ), s		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e (gs), s		5.4			10.9	)		13.2	2	22.0	3.0	1	20.8
Green Extensio	on Time	(ge), s		0.0		0.0	0.1		0.0	0.0		2.1	0.0		2.3
Phase Call Pro	bability			1.00	)		1.00	)		1.00	)	1.00	1.00	) '	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	0.03	0.00	) (	0.01
Manager 4 Ore									<u>,</u>					OD	_
Movement Gro	bup Res	Suits			EB				5			Р		SB	D
Approach Nove	mont				1 2	12			16		0	10			<u>к</u>
Adjusted Flow		) yeb/b		70	Z 705	200	102	450	10	224	245	10	7	4	14
Adjusted Flow I	nale (V	), ven/n	In	1791	1795	1610	1721	409	0 1946	1791	1774		20	1911	
				2.4	25.3	25.0	80	26.6	5 26 5	11.2	20.0		1.0	1011	
	learance	g(s), s		3.4	25.3	25.9	8.0	20.0	5 26.5	11.2	20.0		1.0	18.8	
Green Ratio (		e fille ( <i>g c</i> ), s		0.32	0.26	0.35	0.9	0.32	20.3	0.40	0.31		0.42	0.33	
Capacity ( c )	/o/) /eh/h			217	914	564	292	602	594	386	545		399	592	
Volume-to-Cap	acitv Ra	atio (X)		0.321	0.870	0.708	0.659	0.76	4 0.764	0.865	0.632		0.065	0.577	
Back of Queue	(Q), ft/	/In ( 95 th percentile	)	65	386.7	422.3	213.4	478.	5 466.4	247.2	341.2		19.3	323.3	
Back of Queue	(Q), Ve	eh/In (95 th percent	, ile)	2.6	15.2	16.9	8.4	18.8	3 18.7	9.7	13.4		0.8	12.7	
Queue Storage	Queue Storage Ratio ( $RQ$ ) (95 th percentile)					0.00	0.66	0.00	0.00	0.76	0.00		0.06	0.00	
Uniform Delay	Jniform Delay ( $d_1$ ), s/veh					39.8	29.4	36.6	36.6	34.4	35.7		22.5	33.5	
Incremental De		0.5	7.4	4.8	5.4	8.9	9.0	18.1	2.4		0.1	1.4			
Initial Queue De	elay ( d	з ), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (	d ), s/ve	eh		32.1	46.6	44.6	34.8	45.5	5 45.6	52.5	38.1		22.6	34.9	
Level of Service	e (LOS)			С	D	D	С	D	D	D	D		С	С	
Approach Dela	y, s/veh	/ LOS		45.2	2	D	43.7	7	D	45.2	2	D	34.0	)	С
Intersection De	Intersection Delay, s/veh / LOS					43	3.5						D		
Multimodal Re	sults				EB			WE	3		NB			SB	
Pedestrian LOS	S Score	/LOS		2.3		В	2.3		В	2.8		С	3.0		С

Bicycle LOS Score / LOS	1.6	В	1.4	A	1.6	В	1.1	A

HCS7™ Streets Version 7.2

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General Inform	nation	Y.							Inte	ersect	ion Info	ormatio	on		****	× ( <u>.</u>
Agency		American Structure	point						Dur	ration,	h	0.25				R_
Analyst		SBG		Analys	is Date	Jul 8,	2019		Are	а Тур	e	Other		 →		<u>لم</u>
Jurisdiction		Delaware County, (	ЭН	Time F	Period	AM Pe	eak		PHF	F		0.92		4	₩ĴĽ	\$
Urban Street		Home Rd		Analys	is Year	Sc4 -	2040 Bi	uild	Ana	alysis	Period	1> 7:(	00	4		¥ K
						(With	Apartme	ents)							18. 18. A.A.S.	
						- With	vement	e							* 1 * * 1	* (*
Intersection		Home Rd & Sawmi		Eilo Ní	mo	Sc4 1	rt 1 & 2		_ \//it	th Imn	roveme	nte vue		-		
Project Descrip	tion	Podwood Homo Po				304_1			- ••••	urimp	loveme	nis.xus	•	-		
Floject Descrip	lion	Redwood Home Rd	1113													
Demand Inform	nation				EB			W	′B			NB			SB	
Approach Move	ement			L	Т	R	L	1	г	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			168	489	166	287	5	11	225	345	1033	213	179	683	102
Signal Informa	tion				le l	2	_	<u> </u>	50		- 21.				_	<b>L</b>
Cycle, s	100.0	Reference Phase	2		۲e	- 2	- <b></b>	<u>ا</u> ر	2	5 84	2 1	<sub>27</sub>   ⊻	┢┙┥	4 –	יך י	ф Т
Offset, s	90	Reference Point	Begin	Green	79	38	10 3	9 (	<u>ן</u>	- 1 Q	30.5		1	<b>Y</b> <sup>2</sup> .		4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	0.0	5.2	3.9	, Э	0.0	4.8	_	, , , , , , , , , , , , , , , , , , ,	$\rightarrow$	L	tz.
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.6	0.0	1.0	2.2	2	0.0	1.0		5	6	7	8
		л	л													
Timer Results				EBL	-	EBT	WB	L	WE	BT	NBL	-	NBT	SBL	-	SBT
Assigned Phase	e			5		2	1		6	3	3		8	7		4
Case Number				1.1		3.0	1.1		4.	.0	2.0		3.0	1.1		3.0
Phase Duration	i, S			14.4		25.5	18.2	2	29	9.3	20.0		41.2	15.1		36.3
Change Period	, ( Y+R	c ), S		6.5		6.2	6.5		6.	.2	6.1		5.8	6.1		5.8
Max Allow Head	dway ( /	MAH ), s		4.0		0.0	4.0		0.	.0	4.0		4.0	4.0		4.0
Queue Clearan	ce Time	e (gs), s		9.9			13.7	7			12.5		31.7	9.4		20.3
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.	.0	0.2		2.9	0.0		6.7
Phase Call Pro	bability			1.00	)		1.00	5			1.00		1.00	1.00	, .	1.00
Max Out Proba	bility			1.00	)		1.00	)			1.00		1.00	1.00	) (	0.68
	, j															
Movement Gro	oup Res	sults			EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6		16	3	8	18	7	4	14
Adjusted Flow I	Rate( <i>v</i>	), veh/h		183	532	180	310	419	) (	377	375	1123	232	195	742	111
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/	In	1781	1781	1610	1781	187	0 1	1676	1730	1781	1610	1781	1781	1585
Queue Service	Time ( g	g s ), s		7.9	14.2	8.4	11.7	22.2	2 2	22.4	10.5	29.7	8.9	7.4	18.3	4.6
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		7.9	14.2	8.4	11.7	22.2	2 2	22.4	10.5	29.7	8.9	7.4	18.3	4.6
Green Ratio ( g	/C )			0.27	0.19	0.33	0.31	0.23	3 (	0.23	0.14	0.35	0.47	0.39	0.30	0.38
Capacity ( c ), v	/eh/h			213	687	535	325	432	2 (	387	481	1261	758	251	1086	609
Volume-to-Cap	acity Ra	itio(X)		0.858	0.773	0.338	0.954	0.97	0 0	.974	0.780	0.891	0.305	0.776	0.684	0.182
Back of Queue	(Q), ft	/In ( 95 th percentile	)	219.5	274.9	146.5	177.3	441.	.3 4	428	213.8	496.1	145.3	177.3	317.7	78.9
Back of Queue	(Q), ve	eh/In ( 95 th percent	ile)	8.6	10.8	5.9	7.0	17.4	4 1	16.9	8.4	19.5	5.8	7.0	12.5	3.1
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.59	0.00	0.98	0.35	0.0	) (	0.00	0.36	0.00	0.00	0.35	0.00	0.00
Uniform Delay (	orm Delay ( $d_1$ ), s/veh					25.1	32.8	37.3	3 4	40.1	41.6	30.5	16.3	25.0	30.5	20.4
Incremental De	lay ( d 2	), s/veh		27.8	8.3	1.7	28.8	28.2	2 3	30.7	8.0	9.7	1.0	14.2	3.5	0.7
Initial Queue De	elay ( <i>d</i>	з ), s/veh		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (	d ), s/ve	eh		59.9	46.5	26.8	61.6	65.	57	70.9	49.6	40.2	17.4	39.2	34.0	21.1
Level of Service	e (LOS)			E	D	С	E	E		E	D	D	В	D	С	С
Approach Delay		45.3	;	D	66.2	2	E	Ξ	39.2		D	33.6	;	С		
Intersection De	Intersection Delay, s/veh / LOS					45	5.4							D		
	-															
Multimodal Re			EB			WE	3			NB			SB			
Pedestrian LOS	Score	/LOS		3.1		С	3.0		С	2	2.8		С	3.0		С
Bicycle LOS Sc	ore / LC	DS		1.2		А	1.4		A	A	1.9		В	1.4		А

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General Inform	nation								Interse	ction In	ormati	on		14244	bi Li
Agency		American Structure	point						Duratio	n. h	0.25			44	
Analyst		SBG		Analys	sis Date	e Jul 8.	2019		Area T	vpe	Othe	r	×		<u>₹</u>
Jurisdiction		Delaware County (	ЭН	Time F	Period	AM P	eak		PHF	<u>-</u>	0.92	-		w‡L	
Urban Street		Home Rd		Analys	sis Yea	r Sc4 -	2040 Bi	Jild	Analys	s Period	1> 7	:00			↓ ↓
						(With	Apartme	ents)	, anaryo					ጎዮ	E C
						Impro	vement	s						141471	1
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc4_I	nt 1 & 2	_AM ·	- With Ir	nprovem	ents.xu	s	1		
Project Descrip	tion	Redwood Home Ro	d TIS												
Demand Inform	nation				FB			W	B		NB			SB	
Approach Move	ement				Т	R		Т	· R		Т	R	1	Т	R
Demand (v), v	eh/h			67	642	188	122	65	8 27	288	157	· 91	35	235	72
															-
Signal Informa	tion	1	1 -	-	2		╘╷,		5	- 20	9		_	ĸ.	$\mathbf{k}$
Cycle, s	100.0	Reference Phase	2		Γ "			10	5 10	SAZ 5	12	1	€ ₂ -	1)³	4
Offset, s	80	Reference Point	Begin	Green	7.1	2.2	27.6	8.2	2 4.7	25.	8		ĸ	Ĭ	
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	0.0	5.2	4.3	3 0.0	) 5.2		<b>&gt;</b>	7		$\mathbf{\nabla}$
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	0.0	1.0	2.0	)  0.0	)  1.0		5	6	7	8
Timer Results				EBI	_	EBT	WB	L	WBT	NE	L	NBT	SB		SBT
Assigned Phase	e			5		2	1	_	6	3	_	8	7		4
Case Number	-			1.1		3.0	1.1		4.0	1.1		4.0	1.1		4.0
Phase Duration	. S		12.8	3	33.8	15.0	)	36.0	19.	2	36.7	14.5	5	32.0	
Change Period	( Y+R	c) S		57		62	7 1	-	6.2	58	3	62	6.3		62
Max Allow Head	, ( / / / / dwav ( /	о), с ИАН ). s		4.0		0.0	4.0		0.0	4.0	)	4.0	4.0		4.0
Queue Clearan	ce Time	e ( g s ), s		4.5		0.0	7.2		0.0	14.	8	14.6	3.4		18.9
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.0	0.0	)	1.9	0.0		1.3
Phase Call Pro	bability			1.00	)		1.00	)		1.0	0	1.00	1.00	J	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.0	0	0.02	0.33	3	0.36
Mayamant Cre									1		ND			CD.	
Approach Move	mont	Suits				D				<u> </u>		P			D
Approach Move	mont				1 2	<u>К</u>			16		0	10			<u>к</u>
Adjusted Flow	nieni Poto ( v	) vob/b		- 5 - 70	695	12	122	275	270	212	0 270	10	7	4	14
Adjusted Flow I		), ven/n w Roto ( $\mathbf{a}$ ) voh/h/	In	1701	1701	1610	1701	107		1701	1754		1701	1705	
	Time ( (	$\sigma_{s}$ ) s		25	16.6	8.6	52	17 6	3 17 F	12.8	12.6		14	16.9	
Cvcle Queue C	learanc	e Time ( <i>q</i> c ). s		2.5	16.6	8.6	5.2	17.6	6 17.6	12.8	12.6		1.4	16.9	
Green Ratio ( g	/C)			0.35	0.28	0.41	0.35	0.30	0.30	0.40	0.31		0.34	0.26	
Capacity ( c ), v	/eh/h			271	983	660	296	557	550	403	535		394	463	
Volume-to-Cap	acity Ra	atio(X)		0.264	0.697	0.304	0.449	0.67	2 0.67	3 0.776	0.504		0.096	0.721	
Back of Queue	( Q ), ft	/In ( 95 th percentile	)	41.5	256.2	144.5	96.5	332.	6 324.	3 251.1	221.8	,	26.3	307.9	
Back of Queue	( Q ), ve	eh/In ( 95 th percent	ile)	1.6	10.1	5.8	3.8	13.1	13.0	9.9	8.7		1.0	12.1	
Queue Storage	e Storage Ratio ( <i>RQ</i> ) (95 th percentile)					0.00	0.30	0.00	0.00	0.77	0.00		0.08	0.00	
Uniform Delay	niform Delay ( $d_1$ ), s/veh					20.6	24.2	30.8	3 30.8	24.0	28.5		22.8	33.8	
Incrementar De	ncremental Delay ( d 2 ), s/ven nitial Queue Delay ( d 3 ), s/veh					0.0	1.1	0.4	0.0	9.2	0.0		0.1	5.4	
Control Dolay (	d) chu	3 ), S/VEII		20.2	22.2	21.4	25.2	27 (	0.0	22.2	20.2		22.0	20.2	
Lovel of Service	$\frac{u}{100}$			20.2	32.3 C	21.4	25.2				29.3		22.9	<u> </u>	
Approach Dela	Approach Delay, s/veh / LOS					С С	35 /			31		C	37 4		
Intersection De		23.		3	2.7	•		51.	•	5	C 57.3		-		
Multimodal Re			EB			WE	3		NB			SB			
Pedestrian LOS	Score	/LOS		2.3		В	2.3		В	2.8	3	С	3.0		С
Bicycle LOS Sc	ore / LC	DS		1.3		А	1.2		А	1.4		А	1.1		А

# HCS7 Two-Way Ston-Control Repor

General Information		Site Information	
Analyst	SBG	Intersection	Home Rd & Access Rd
Agency/Co.	American Structurepoint	Jurisdiction	Delaware County
Date Performed	7/5/2019	East/West Street	Home Rd
Analysis Year	2040	North/South Street	Access Rd
Time Analyzed	Sc4 - AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Redwood Home Rd TIS		

## Lanes



Major Street: East-West

Vehicle Volumes and Ad	justme	ents														
Approach		Eastk	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	1	0	1	2	0		0	1	0		0	0	0
Configuration			Т	R		L	Т				LR					
Volume, V (veh/h)			860	25		11	964			77		37				
Percent Heavy Vehicles (%)						2				0		0				
Proportion Time Blocked																
Percent Grade (%)											C					
Right Turn Channelized		١	lo			Ν	10			Ν	lo			Ν	10	
Median Type/Storage				Left	Only								1			
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)						12					124					
Capacity, c (veh/h)						711					296					
v/c Ratio						0.02					0.42					
95% Queue Length, Q <sub>95</sub> (veh)						0.1					2.0					
Control Delay (s/veh)						10.1					25.7					
Level of Service, LOS						В					D					
Approach Delay (s/veh)						C	.1			25	5.7					
Approach LOS											)					

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Sc4\_Int 3\_Home Rd & Acces Rd\_AM.xtw

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·													1		
General Inform	nation	Y							Interse	ction Inf	ormatio	on		4	
Agency		American Structure	point	0					Duratio	ո, h	0.25				R_
Analyst		SBG		Analys	sis Date	Jul 8,	2019		Area Ty	ре	Other	•	4		<u>لم</u>
Jurisdiction		Delaware County, (	ЭН	Time F	Period	PM Pe	eak		PHF		0.92		\$	wĮĽ	\$
Urban Street		Home Rd		Analys	sis Year	Sc4 -	2040 Bi	uild	Analysi	Period	1> 7:	00			Ť
						(With	Apartme	ents)						a a constant	
						- With	vomont	~						1414Y1	
Intersection		Llama Dd & Caurmi				Se4 1			\A/ith In				-		
Draiset Deserin	4:				ame	504_1	nuaz			proverne	ents.xus	j	-		
Project Descrip	uon	Reawood Home Ro	115												
Domand Inform	nation				EB			۱۸.	/B		NR			SB	
Approach Move	mont			1		D						D	1 .	<u></u> т	D
Domand ( y ) y	oh/h			126	624	201	265	50			762	402	214	675	
Demand (V), V	en/n			130	024	291	205	50	55 15.	515	703	403	214	075	79
Signal Informa	tion				2	8									
Cycle s	120.0	Reference Phase	2	-	120	- 2	7	2	20		<b>_</b>		<u> </u>	<u> </u>	$\Phi$
Offset s	90	Reference Point	Begin		2	7	, 🔁		$\sum e$	<u>îr –</u>		1	<b>Y</b> 2 .	] 3	4
	No		On	Green	9.1	1.9	26.8	16	.2 5.7	29.2	<u>2</u>		<b>A</b>		
Force Mode	Fixed	Simult Cap N/S	On	Pod	3.9	4.3	5.2	3.9		4.8		5			<b>N</b>
	i ixeu		UI	i teu	∥ ∠.U	2.2	1.0	2.4	<u> </u>	1.0		5	0	1	•
Timer Results			_	EBI		FBT	WB	1	WBT	NB		NBT	SBI		SBT
Assigned Phase				5	-	2	1		6	3	-	8	7	-	1
Coop Number	5			11		20	1 1	$\rightarrow$	4.0	2.0		2.0	11		+
Dhase Number				1.1		3.0	1.1	$\rightarrow$	4.0	2.0		3.0	1.1	<u> </u>	3.0
Phase Duration	, S	\ -		15.0	) .	33.0	24.0	,	41.4	20.0	,	40.7	22.3		55.0
Change Period,	( Y+R)	c), S		6.5		6.2	6.5	-	6.2	6.1	_	5.8	6.1		5.8
Max Allow Head	dway(/	VIAH ), S		4.0		0.0	4.0		0.0	4.0		4.0	4.0		4.0
Queue Clearan		e (gs), s		9.6			19.5	>		20.9	•	27.8	13.2	2	25.6
Green Extensio	n Time	(ge), s		0.0		0.0	0.0		0.0	0.3		4.8	0.2		2.7
Phase Call Prol	bability			1.00	)		1.00	)		1.00	)	1.00	1.00	)	1.00
Max Out Proba	bility			1.00	)		1.00	)		1.00	)	0.81	1.00	)	1.00
Movement Cre	un Dee				ГР			۱۸/۲	2		ND			<b>CD</b>	
Annere och Mayre	oup Res	suits			ED	D	<u> </u>		, ,	<u> </u>		D		<u>эр</u>	D
Approach Move	ement			L		R			R	L		R			R
Assigned wove	meni	<u> </u>		5	2	12	1	0	10	3	8	18	7	4	14
Adjusted Flow I		), ven/n		148	6/8	316	347	500	) 464	558	829	438	233	734	86
Adjusted Satura	ation Flo	bw Rate ( $s$ ), veh/h/	In	1781	1/81	1610	1/81	187		1/30	1/81	1610	1/81	1/81	1585
Queue Service	lime (g	g s ), S		7.6	21.9	17.4	17.5	31.4	4 31.5	18.9	25.8	25.3	11.2	23.6	4.7
Cycle Queue C	learanc	e lime ( <i>g c</i> ), s		7.6	21.9	17.4	17.5	31.4	4 31.5	18.9	25.8	25.3	11.2	23.6	4.7
Green Ratio ( g	/C)			0.30	0.22	0.41	0.39	0.29	9 0.29	0.18	0.29	0.44	0.38	0.24	0.32
Capacity ( c ), v	eh/h			203	795	653	351	549	509	631	1036	703	339	867	506
Volume-to-Capa	acity Ra	atio (X)		0.728	0.853	0.484	0.991	0.91	1 0.911	0.883	0.801	0.623	0.685	0.847	0.170
Back of Queue	( Q ), ft/	/In (95 th percentile	)	175.6	401.6	276	360.3	544.	.4 523.9	356.7	442.8	378.3	223.8	424.3	83.9
Back of Queue	( Q ), ve	eh/In ( 95 th percent	ile)	6.9	15.8	11.0	14.2	21.4	4 20.6	14.0	17.4	15.1	8.8	16.7	3.3
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.47	0.00	0.00	0.72	0.0	0.00	0.59	0.00	0.00	0.45	0.00	0.00
Uniform Delay (	(d1), s	/veh		35.1	44.7	26.4	32.3	46.8	8 49.0	47.8	39.3	26.2	29.6	43.3	29.4
Incremental De	lay ( <i>d</i> 2	e), s/veh		12.3	11.2	2.6	31.4	12.0	6 13.4	13.9	6.5	4.1	5.6	10.0	0.7
Initial Queue De		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Control Delay (	d ), s/ve	eh		47.4	55.9	28.9	63.7	59.	5 62.4	61.7	45.8	30.3	35.3	53.3	30.1
Level of Service	e (LOS)			D	E	С	E	E	E	E	D	С	D	D	С
Approach Delay	Approach Delay, s/veh / LOS					D	61.6	3	Е	47.0	)	D	47.4	1	D
Intersection De	lay, s/ve	h / LOS				50	).7						D		
Multimodal Re	Multimodal Results							WE	3		NB			SB	
Pedestrian LOS	Score	/LOS		3.1		С	3.0		С	2.8		С	3.0		С
Bicycle LOS Sc	ore / LC	DS		1.4		А	1.4		A	2.0		В	1.4		A
# **HCS7 Signalized Intersection Results Summary**

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TICGT Signalized Intersection Results Summary																
Conoral Inform	nation								Int	torood	ion Infe	rmotic			14 人本 1 3	4 L.
Agonov	lation	Amoricon Structure	noint							urotion			DU		41	
Agency			point	Analys	ie Det		2010					0.25 Other				<u>ال</u>
Analyst		SDG	211	Analys			2019			геа тур	e	Other			,	
Jurisdiction		Delaware County, C	Л	Time F	Time Period						0.92					
Urban Street		Home Rd		Analys	sis rea	With	2040 Bi Apartme	ulla ents)	Ar	naiysis	Period	1>7:0	00			E F
						- With		,							া শ বা শক্ষপ শ	* (*
						Impro	vement	s								
Intersection		Home Rd & Liberty	Rd N	File Na	ame	Sc4_I	nt 1 & 2	_PM	- W	Vith Imp	roveme	nts.xus				
Project Descrip	tion	Redwood Home Ro	SITE													
Demand Inform	nation				EB			١٨	/R			NB			SB	
Approach Move	ment				Т	R		-	Т	R	1	Т	R		Т	R
Demand $(v)$ v	eh/h			69	791	396	177	8	31	30	316	221	96	24	257	59
	ON/IT			00	101	000	1111	0.	01	00	010		00	21	201	00
Signal Informa	tion					5		<u> </u>	ζ						_	
Cycle, s	120.0	Reference Phase	2		P ª	72	7#2 •	- L	2		54	127 ►		<b>4</b> –	<u>י</u> רי	ф (
Offset, s	90	Reference Point	Begin	Green	71	0.7	30.8	11	2	23	36.0		1	<u> </u>		4
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.3	4.3	5.2	3.9	. <u>~</u> 9	0.0	5.2		▶ .	$\rightarrow$	ι I	512
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	2.8	1.0	1.9	9	0.0	1.0		5	6	7	8
Timer Results				EBI	-	EBT	WB	L	V	VBT	NBL	-	NBT	SBI		SBT
Assigned Phase	e			5		2	1			6	3		8	7		4
Case Number				1.1		3.0	1.1		2	4.0	1.1		4.0	1.1		4.0
Phase Duration, s		12.8	3	37.0	20.6	3	4	14.8	17.0		43.1	19.3	; 4	45.4		
Change Period, (Y+R c), s		5.7		6.2	7.1		6	6.2	5.8		6.2	6.3		6.2		
Max Allow Headway ( <i>MAH</i> ), s		4.0		0.0	4.0		(	0.0	4.0		4.0	4.0		4.0		
Queue Clearance Time ( $g$ s ), s		5.6			10.9	9			13.2	2	22.0	3.0	2	20.9		
Green Extension Time ( $g_e$ ), s		0.0		0.0	0.1		(	0.0	0.0		2.2	0.0		2.3		
Phase Call Pro	bability			1.00	)		1.00	)			1.00		1.00	1.00		1.00
Max Out Probability		1.00	)		1.00	)			1.00		0.03	0.00	) (	0.01		
Movement Gra		sulte	_		EB			\٨/٢	D						SB	
Approach Move	mont	Suits		1	Т	R		T		R	1	T	R		Т	R
Assigned Move	ment			5	2	12	1	6	+	16	3	8	18	7	4	14
Adjusted Flow F	Rate ( v	) veh/h		74	850	425	192	<u>47</u>	1	465	343	345	10	26	343	17
Adjusted Satura	ation Flo	), ven/n w Rate ( s ) veh/h/	In	1781	1781	1610	1781	187	' '0	1847	1781	1774		1781	1810	
	Time ( (	$\sigma_{e}$ ) s		36	27.7	27.8	89	27	4	27.4	11.2	20.0		10	18.9	
	learanc	e Time $(a_c)$ s		3.6	27.7	27.8	8.9	27	4	27.4	11.2	20.0		1.0	18.9	
Green Ratio ( a	/C)	o milo ( g c ), o		0.32	0.26	0.35	0.39	0.3	2	0.32	0.40	0.31		0.42	0.33	
Capacity ( c )	/eh/h			211	914	564	277	602	2	594	384	545		399	591	
Volume-to-Cap	acity Ra	atio (X)		0.351	0.929	0.755	0.694	0.78	33	0.783	0.894	0.632		0.065	0.581	
Back of Queue	(Q). ft	/In ( 95 th percentile	)	69.3	422.8	447.8	256.1	495	.5	482.8	277.6	341.2		19.3	325.5	
Back of Queue	(Q), v	eh/ln ( 95 th percent	, ile)	2.7	16.6	17.9	10.1	19.	5	19.3	10.9	13.4		0.8	12.8	
Queue Storage	Ratio (	RQ) (95 th percen	tile)	0.13	0.00	0.00	0.79	0.0	0	0.00	0.85	0.00		0.06	0.00	
Uniform Delay ( $d_1$ ), s/veh		31.9	39.8	40.3	29.7	36.	9	36.9	35.2	35.7		22.5	33.6			
Incremental Delay ( $d_2$ ), s/veh		0.6	11.1	5.4	7.3	9.8	3	9.9	22.4	2.4		0.1	1.4			
Initial Queue Delay ( $d_3$ ), s/veh		0.0	0.0	0.0	0.0	0.0	)	0.0	0.0	0.0		0.0	0.0			
Control Delay ( d ). s/veh		32.4	50.9	45.8	37.0	46.	7	46.8	57.7	38.1		22.6	35.0			
Level of Service	e (LOS)			С	D	D	D	D	1	D	Е	D		С	D	
Approach Delay	, s/veh	/ LOS		48.3	3	D	45.1	1	[	D	47.9		D	34.1		С
Intersection De	lay, s/ve	eh / LOS				45	5.7							D		
Multimodal Re	sults				EB			W	В			NB			SB	
Pedestrian LOS	Score	/LOS		2.3		В	2.3			В	2.8		С	3.0		С
Bicycle LOS Sc	ore / LC	DS		1.6		В	1.4			А	1.6		В	1.1		А

# HCS7 Two-Way Ston-Control Repor

General Information		Site Information				
Analyst	SBG	Intersection	Home Rd & Access Rd			
Agency/Co.	American Structurepoint	Jurisdiction	Delaware County			
Date Performed	7/5/2019	East/West Street	Home Rd			
Analysis Year	2040	North/South Street	Access Rd			
Time Analyzed	Sc4 - PM Peak Hour	Peak Hour Factor	0.92			
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25			
Project Description	Project Description Redwood Home Rd TIS					

#### Lanes



Major Street: East-West

Vehicle Volumes and Ad	justme	ents														
Approach		East	oound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	1	0	1	2	0		0	1	0		0	0	0
Configuration			Т	R		L	Т				LR					
Volume, V (veh/h)			1235	78		32	924			43		21				
Percent Heavy Vehicles (%)						2				0		0				
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized	No			Ν	lo			No		No						
Median Type/Storage			Left Only							1						
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	Service	e												
Flow Rate, v (veh/h)						35					70					
Capacity, c (veh/h)						473					196					
v/c Ratio						0.07					0.36					
95% Queue Length, Q <sub>95</sub> (veh)						0.2					1.5					
Control Delay (s/veh)						13.2					33.3					
Level of Service, LOS						В					D					
Approach Delay (s/veh)						C	.4			33	3.3					
Approach LOS											D					

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Sc4\_Int 3\_Home Rd & Acces Rd\_PM.xtw



# **Appendix E – Turn Lane Warrant Analysis**



#### Left Turn Lane Warrant at Home Rd & Access Rd | Scenario 4

Project Name:	Redwood Home Rd TIS			Project Number:	2018.01836
Direction: Intersection:	WB Home Rd & Access Rd			Date:	7/5/2019
Major Street:	Home Rd			# of approach lanes:	2
Minor Street:	Access Rd			# of approach lanes:	2
		Scen	ario 4		
		AM	PM		
Opposing Traffic	c:	885	1313		
Left Turns		11	32		
Left Turn Lane V	Varranted?	NO	YES		

# 4-Lane Highway Left Turn Lane Warrant



Source: Figure 401-5c, Ohio DOT Location and Design Manual, January 2019



Defining the built environment.

#### Right Turn Lane Warrant - Home Rd & Access Rd | Scenario 4

Project Name:	Redwood Home Rd TIS				Project Number:	2018.01836
Direction: Intersection:	EB Home Rd & Access Rd				Date:	7/5/2019
Major Street: Minor Street:	Home Rd Access Rd				# of approach lanes: # of approach lanes:	2 2
		Scena	ario 4			
		AM	PM			
Advancing Traffi	c Volume (Including RTs):	885	1313			

160	11	Ĵ		1	
140					+
120			-		
100	-+-	-Right Turn	Lane	++	
80		Require	d	DRA Drah	1
60 I			1	Ригреак	
40 Rig	ht Turn Lan	e -			
20 N	ot Required	AM Peak			-1
	1	1	Ť	+ +	

\* data point for PM peak lies outside of the graph limits

Source: Figure 401-6d, Ohio DOT Location and Design Manual, January 2019

25

NO

78

YES



**Right Turns** 

Right Turn Lane Warranted?

Defining the built environment.



# **Appendix F – Queue Analysis Results**



Turn Long	Design		Turn La	ane Length (ft)	*				
rum Lane	Speed (mph)	Existing	Required	Required Proposed		W/O Taper			
Sawmill Pkwy & Home Rd									
Eastbound Right Turn Lane	55	0	550	550	50	500			



Intersection:	Sawm	ill Pkwy & Hom	e Rd		
Movement Analy	zed:	Eastbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2020
Design Speed:	55			Peak Hour	Sc2A - AM
Type of Traffic Co	ontrol:	SIGNALIZED			
<b>Turn Demand Vo</b>	lume Type:	HIGH			
Applicable Condi	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	100 second	S			
Average Vehicles	per Cycle:	3	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	150	200

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

#### **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	150	315

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:9 veh/cycMovement(Diverging Taper) (ft)Plus Storage Length (ft)EBT50350400

Accommodating Thru Blockage (ft) 400

Greater of Total Turn length and Blockage Length (ft): 400

Use Blockage Length	<u>400 ft</u>
	(Includes Taper)



Intersection: Sawmill		nill Pkwy & Hom	e Rd		
Movement Analy	zed:	Eastbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2020
Design Speed:	55			Peak Hour	Sc2A - PM
Type of Traffic Co	ontrol:	SIGNALIZED			
<b>Turn Demand Vo</b>	lume Type:	HIGH			
Applicable Condition(s):		CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	120 second	ls			
Average Vehicles	per Cycle:	7	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	275	325

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	275	440

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

14 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT	50	500	550

Accommodating Thru Blockage (ft) 550

Greater of Total Turn length and Blockage Length (ft): 550

Use Blockage Length	<u>550 ft</u>
	(Includes Taper)



Turn Lane	Design Speed	Turn Lane Length (ft)*				
	(mph)	Existing	Required	Proposed	Taper	W/O Taper
Liberty Rd N & Home Rd						
Eastbound Right Turn Lane	55	0	700	700	50	650



Intersection: Liberty		Liberty Ro	l N & Hon	ne Rd		
Movement Analyzed:		East	bound	Right Turr	n	
			EBR			
Speed Limit:	50				Design Year	2020
Design Speed:	55				Peak Hour	Sc2A - AM
Type of Traffic Co	ontrol:		SIGNALIZE	D		
<b>Turn Demand Vo</b>	lume T	ype:	HIGH			
Applicable Condition(s):		CONDITIO	N B or C	(Whichever is gr	eater)	
Cycle Length:	100 s	seconds				
Average Vehicles per Cycle:		cle:		4 veh/cyc		

# **CONDITION A STORAGE ONLY**

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	175	225

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

#### CONDITION C MODERATE SPEED DECELERATION AND STORAGE

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	175	340

Condition B is greater than Condition C

Conclusion: **Use Condition B** 

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

12 veh/cyc

Movement	(Diverging Taper) (ft)		(C		Plus Storage Length (ft)	Total Length (ft)	
EBT	50		450	500			
			(6.)				

Accommodating Thru Blockage (ft) 500

Greater of Total Turn length and Blockage Length (ft): 500

Use Blockage Length	<u>500 ft</u>
	(Includes Taper)



Intersection: Liberty Rd N & Home Rd							
Movement Analy	zed:	Eas	tbound	Ri	ght Turn		
			EBR				
Speed Limit:	50					Design Year	2020
Design Speed:	55					Peak Hour	Sc 2A - PM
Type of Traffic Co	ontrol:		SIGNALIZE	D			
Turn Demand Vo	lume T	ype:	HIGH				
Applicable Condi	ition(s)	:	CONDITIO	N B or	С	(Whichever is gr	reater)
Cycle Length:	120	seconds					
Average Vehicles	s per Cy	/cle:		9 ve	h/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	350	400

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

#### **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	350	515

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 515

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

19 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT	50	650	700

Accommodating Thru Blockage (ft) 700

Greater of Total Turn length and Blockage Length (ft): 700

Use Blockage Length	<u>700 ft</u>
	(Includes Taper)



	Design	Turn Lane Length (ft)*				
Turn Lane	Speed (mph)	Existing	Required	Proposed	Taper	W/O Taper
Sawmill Pkwy & Home Rd						
Eastbound Right Turn Lane	55	0	525	525	50	475



Intersection: Sawmill Pkwy & Home Rd					
Movement Analy	zed:	Eastbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2020
Design Speed:	55			Peak Hour	Sc2B - AM
Type of Traffic Co	ontrol:	SIGNALIZED			
Turn Demand Vo	lume Type:	HIGH			
Applicable Condi	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	100 seconds	S			
Average Vehicles	per Cycle:	3	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	150	200

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

#### **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	150	315

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:9 veh/cycMovement(Diverging Taper) (ft)Plus Storage Length (ft)EBT50350Accommodating Thrue Plackage (ft)400

Accommodating Thru Blockage (ft) 400

Greater of Total Turn length and Blockage Length (ft): 400

Use Blockage Length	<u>400 ft</u>
	(Includes Taper)



Intersection:	Sawmi	ll Pkwy & Home	e Rd		
Movement Analyz	zed:	astbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2020
Design Speed:	55			Peak Hour	ScB - PM
Type of Traffic Co	ntrol:	SIGNALIZED			
Turn Demand Vol	ume Type:	HIGH			
Applicable Condit	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	120 seconds				
<b>Average Vehicles</b>	per Cycle:	7	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	275	325

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	275	440

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

13 veh/cyc

Movement		(Diverging Taper) (ft)				Plus Storage Length (ft)	Total Length (ft)	
EBT	50		475	525				
				(6.)				

Accommodating Thru Blockage (ft) 525

Greater of Total Turn length and Blockage Length (ft): 525

Use Blockage Length	<u>525 ft</u>
	(Includes Taper)



Turn Lane	Design Speed	Turn Lane Length (ft)*					
	(mph)	Existing	Required	Proposed	Taper	W/O Taper	
Liberty Rd N & Home Rd							
Eastbound Right Turn Lane	55	0	675	675	50	625	



Intersection	Liberty Ro	d N & Hor	me Ro	d			
Movement Analyzed:		Eas	tbound	R	light Turn		
			EBR				
Speed Limit:	50					Design Year	2020
Design Speed:	55					Peak Hour	Sc 2B - AM
Type of Traffic Co	ontrol:		SIGNALIZE	ED			
Turn Demand Vo	olume T	ype:	HIGH				
Applicable Condition(s):		CONDITIC	ON B o	r C	(Whichever is gr	eater)	
Cycle Length:	100	seconds					
Average Vehicles per Cycle:		/cle:		4 v	eh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	175	225

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	175	340

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

12 veh/cyc

Movement	(Dive	erging Ta	per) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT		50		450	500
	 	(6.)			

Accommodating Thru Blockage (ft) 500

Greater of Total Turn length and Blockage Length (ft): 500

Use Blockage Length	<u>500 ft</u>
	(Includes Taper)



Intersection	ł	Liberty R	d N & Ho	me R	d		
Movement Analy	zed:	Eas	tbound		Right Turn		
			EBR				
Speed Limit:	50					Design Year	2020
Design Speed:	55					Peak Hour	Sc 2B - PM
Type of Traffic Co	ontrol:		SIGNALIZ	ED			
Turn Demand Vo	lume 1	Type:	HIGH				
Applicable Condi	tion(s)	:	CONDITIC	ON B d	or C	(Whichever is gr	eater)
Cycle Length:	120	seconds					
Average Vehicles	s per Cy	vcle:		9	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	350	400

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	350	515

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 515

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

18 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT	50	625	675

Accommodating Thru Blockage (ft) 675

Greater of Total Turn length and Blockage Length (ft): 675

Use Blockage Length	<u>675</u> <u>ft</u>
	(Includes Taper)



Turn Long	Design Speed	Turn Lane Length (ft)*				
Turn Lane	(mph)	Existing	Required	Proposed	Taper	W/O Taper
Sawmill Pkwy & Home Rd						
Northtbound Right Turn Lane	50	0	595	595	145	450
Sawmill Pkwy & Home Rd						
Eastbound Right Turn Lane	55	0	540	540	165	375



Intersection:	Sawı	mill Pkwy & Hom	e Rd		
Movement Analy	zed:	Northbound	<b>Right Turn</b>	l	
		NBR			
Speed Limit:	45			Design Year	2040
Design Speed:	50			Peak Hour	Sc3 - AM
Type of Traffic Co	ontrol:	SIGNALIZED			
<b>Turn Demand Vo</b>	lume Type:	HIGH			
Applicable Condi	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	100 secor	nds			
<b>Average Vehicles</b>	per Cycle:	6	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	50	250	300

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
NBR	225

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	145	250	395

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 395

# **Check for Blockage:**

Direction Analyzed: NBT

Average Vehicles per Cycle:

15 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBT	50	525	575

Accommodating Thru Blockage (ft) 575

Greater of Total Turn length and Blockage Length (ft): 575

Use Blockage Length	<u>575 ft</u>
	(Includes Taper)



Intersection	: Sav	vmill Pkwy & Ho	me Rd		
Movement Analy	vzed:	Northbound	Right Turr	n	
		NBR			
Speed Limit:	45			Design Year	2040
Design Speed:	50			Peak Hour	Sc3 - PM
Type of Traffic Co	ontrol:	SIGNALIZED			
Turn Demand Vo	olume Type	: HIGH			
Applicable Condi	ition(s):	CONDITION	B or C	(Whichever is gr	reater)
Cycle Length:	120 sec	onds			
<b>Average Vehicles</b>	s per Cycle		12 veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	50	450	500

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
NBR	225

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	145	450	595

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 595

# **Check for Blockage:**

Direction Analyzed: NBT

Average Vehicles per Cycle:

13 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBT	50	475	525

Accommodating Thru Blockage (ft) 525

Greater of Total Turn length and Blockage Length (ft): 595

Use Condition C	<u>595</u> <u>ft</u>
	(Includes Taper)



Intersection:	Sawmi	ll Pkwy & Home	e Rd		
Movement Analy	zed:	Eastbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc3 - AM
Type of Traffic Co	ontrol:	SIGNALIZED			
Turn Demand Vo	lume Type:	HIGH			
Applicable Condi	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	100 seconds				
Average Vehicles	per Cycle:	5	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	200	250

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	200	365

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:			veh/cyc	
Movement	(Diverging Taper) (ft)		Plus Storage Length (ft)	Total Length (ft)
EBT	50		275	325
	a Thru: Dlaskaas (ft) 225			

Accommodating Thru Blockage (ft) 325

Greater of Total Turn length and Blockage Length (ft): 325

Use Blockage Length	<u>325 ft</u>
	(Includes Taper)



Intersection:	Sawm	ill Pkwy & Hom	e Rd		
Movement Analy	zed:	Eastbound	<b>Right Turn</b>	1	
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc3 - PM
Type of Traffic Co	ontrol:	SIGNALIZED			
Turn Demand Vo	lume Type:	HIGH			
Applicable Condi	tion(s):	CONDITION I	3 or C	(Whichever is gr	eater)
Cycle Length:	120 second	S			
<b>Average Vehicles</b>	per Cycle:	10	) veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	375	425

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	375	540

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 540

# **Check for Blockage:**

Direction Analyzed: **EBT** 

Average Vehicles per Cycle:

11 veh/cyc

Movement	(Div	'ergir	ng Tape	r) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT			50		400	450
	 		( )			

Accommodating Thru Blockage (ft) 450

Greater of Total Turn length and Blockage Length (ft): 540

Use Condition C	<u>540</u> <u>ft</u>
	(Includes Taper)



Turn Long	Design Speed	Turn Lane Length (ft)*					
Turn Lane	(mph)	Existing	Required	Proposed	Taper	W/O Taper	
	Liberty	Rd N & Ho	me Rd				
Eastbound Right Turn Lane	55	0	640	640	165	475	



Intersection:	Liberty	Rd N & Home I	Rd		
Movement Analyz	zed: E	astbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc3 - AM
Type of Traffic Co	ntrol:	SIGNALIZED			
<b>Turn Demand Vol</b>	ume Type:	HIGH			
Applicable Condit	ion(s):	<b>CONDITION B</b>	or C	(Whichever is gr	eater)
Cycle Length:	100 seconds				
<b>Average Vehicles</b>	per Cycle:	5	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	200	250

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	200	365

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: **EBT** 

Average Vehicles per Cycle:		veh/cyc	
Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT	50	350	400
	a Thur Diadram (ft) 400		

Accommodating Thru Blockage (ft) 400

Greater of Total Turn length and Blockage Length (ft): 400

Use Blockage Length	<u>400 ft</u>
	(Includes Taper)



Intersection:	Liberty	Rd N & Home	Rd		
Movement Analy	zed:	Eastbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc3 - PM
Type of Traffic Co	ontrol:	SIGNALIZED			
Turn Demand Vo	lume Type:	HIGH			
Applicable Condit	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	120 seconds				
<b>Average Vehicles</b>	per Cycle:	13	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	475	525

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	475	640

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 640

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

13 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT	50	475	525

Accommodating Thru Blockage (ft) 525

Greater of Total Turn length and Blockage Length (ft): 640

Use Condition C	<u>640</u> <u>ft</u>
	(Includes Taper)



Turn Lane	Design Speed	Turn Lane Length (ft)*				
	(mph)	Existing	Required	Proposed	Taper	W/O Taper
	Sawmill F	kwy & Ho	me Rd			
Northtbound Right Turn Lane	50	0	645	645	145	500
Sawmill Pkwy & Home Rd						
Eastbound Right Turn Lane	55	0	450	450	50	400



Intersection: Sawmill		mill Pkwy & Hom	e Rd		
Movement Analy	zed:	Northbound	<b>Right Turn</b>	l	
		NBR			
Speed Limit:	45			Design Year	2040
Design Speed:	50			Peak Hour	Sc4 - AM
Type of Traffic Co	ontrol:	SIGNALIZED			
<b>Turn Demand Vo</b>	lume Type:	HIGH			
Applicable Condi	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	100 secor	nds			
Average Vehicles per Cycle:		6	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	50	250	300

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)	
NBR	225	

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	145	250	395

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 395

# **Check for Blockage:**

Direction Analyzed: NBT

Average Vehicles per Cycle:

15 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBT	50	525	575

Accommodating Thru Blockage (ft) 575

Greater of Total Turn length and Blockage Length (ft): 575

Use Blockage Length	<u>575 ft</u>
	(Includes Taper)



Intersection:	Saw	mill Pkwy & Hom	e Rd		
Movement Analy	zed:	Northbound	<b>Right Turn</b>	l	
		NBR			
Speed Limit:	45			Design Year	2040
Design Speed:	50			Peak Hour	Sc4 - PM
Type of Traffic Co	ontrol:	SIGNALIZED			
Turn Demand Vo	lume Type:	HIGH			
Applicable Condi	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	120 seco	nds			
Average Vehicles	per Cycle:	14	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	50	500	550

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)	
NBR	225	

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBR	145	500	645

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 645

# **Check for Blockage:**

Direction Analyzed: NBT

Average Vehicles per Cycle:

13 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
NBT	50	475	525

Accommodating Thru Blockage (ft) 525

Greater of Total Turn length and Blockage Length (ft): 645

Use Condition C	<u>645</u> <u>ft</u>
	(Includes Taper)



Intersection:	Sawmil	l Pkwy & Home	e Rd		
Movement Analyz	zed: E	astbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc4 - AM
Type of Traffic Co	ntrol:	SIGNALIZED			
Turn Demand Vol	ume Type:	HIGH			
Applicable Condit	tion(s):	CONDITION B	or C	(Whichever is gr	eater)
Cycle Length:	100 seconds				
<b>Average Vehicles</b>	per Cycle:	5	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	200	250

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)	
EBR	285	

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	200	365

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:		7	7 veh/cyc			
Movement	(Diverging Taper) (ft)	Plus Storage Length (ft) Total L		Total Length (ft)		
EBT	50		275	325		
Accommodating Thru Diaglages (ft) 225						

Accommodating Thru Blockage (ft) 325

Greater of Total Turn length and Blockage Length (ft): 325

Use Blockage Length	<u>325 ft</u>				
	(Includes Taper)				



Intersection: Sawmill		ill Pkwy & Hom	ne Rd		
Movement Analy	zed:	Eastbound	Right Turr	1	
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc4 - PM
Type of Traffic Co	ontrol:	SIGNALIZED			
<b>Turn Demand Vo</b>	lume Type:	HIGH			
Applicable Condition(s):		CONDITION	B or C	(Whichever is gr	eater)
Cycle Length:	120 second	S			
Average Vehicles per Cycle:		1	0 veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	375	425

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)	
EBR	285	

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	375	540

Condition C is greater than Condition B

Conclusion: Use Condition B

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

11 veh/cyc

Movement (Diverging Taper) (ft)		Plus Storage Length (ft)	Total Length (ft)
EBT	50	400	450

Accommodating Thru Blockage (ft) 450

Greater of Total Turn length and Blockage Length (ft): 450

Use Blockage Length	<u>450 ft</u>			
	(Includes Taper)			



Turn Long	Design Speed	Turn Lane Length (ft)*					
Turn Lane	(mph)	Existing	Required	Proposed	Taper	W/O Taper	
Liberty Rd N & Home Rd							
Eastbound Right Turn Lane	55	0	665	665	165	500	



Intersection:	Liberty	Rd N & Home I	Rd		
Movement Analyz	zed: E	astbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc4 - AM
Type of Traffic Co	ntrol:	SIGNALIZED			
<b>Turn Demand Vol</b>	ume Type:	HIGH			
Applicable Condit	ion(s):	<b>CONDITION B</b>	or C	(Whichever is gro	eater)
Cycle Length:	100 seconds				
<b>Average Vehicles</b>	per Cycle:	6	veh/cyc		

# **CONDITION A STORAGE ONLY**

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	250	300

#### CONDITION B HIGH SPEED DECELERATION ONLY

Movement	Turn Lane Length (ft)
EBR	285

#### CONDITION C MODERATE SPEED DECELERATION AND STORAGE

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	250	415

Condition B is greater than Condition C

**Use Condition B** Conclusion:

Total Turn Length (ft) 285

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle: 9 veh/cyc Movement (Diverging Taper) (ft) Plus Storage Length (ft) Total Length (ft) EBT 400 50 350

Accommodating Thru Blockage (ft) 400

Greater of Total Turn length and Blockage Length (ft): 400

Use Blockage Length	<u>400 ft</u>
	(Includes Taper)



Intersection:	Liberty	Rd N & Home	Rd		
Movement Analyz	zed: E	astbound	<b>Right Turn</b>		
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc4 - PM
Type of Traffic Co	ntrol:	SIGNALIZED			
Turn Demand Vol	ume Type:	HIGH			
Applicable Condit	tion(s):	<b>CONDITION B</b>	or C	(Whichever is gr	eater)
Cycle Length:	120 seconds				
<b>Average Vehicles</b>	per Cycle:	14	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	500	550

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

# **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	500	665

Condition C is greater than Condition B

Conclusion: Use Condition C

Total Turn Length (ft) 665

# **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

14 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT	50	500	550

Accommodating Thru Blockage (ft) 550

Greater of Total Turn length and Blockage Length (ft): 665

Use Condition C	<u>665</u> <u>ft</u>
	(Includes Taper)


	Design Speed	Turn l	ane Lengt	h (ft)*		
Turn Lane	(mph)	Existing	Required	Proposed	Taper	W/O Taper
	Access Rd & Home Rd					
Eastbound Right Turn Lane	55	0	450	450	50	400
Access Rd & Home Rd						
Westbound Left Turn Lane	55	0	400	400	50	350



Intersection:	Access	Rd & Home	Rd		
Movement Analy	zed:	Eastbound	<b>Right Tur</b>	n	
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc4 - AM
Type of Traffic Control:		UNSIGNALI	ZED THROUG	H ROAD	
Turn Demand Vo	lume Type:	LOW			
Applicable Condi	tion(s):	CONDITION	N B or C	(Whichever is g	reater)
Cycle Length:	60 seconds	5			
Average Vehicles	s per Cycle:		1 veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	50	100

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

#### **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	50	215

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

#### **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:		veh/cyc	
Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT	50	325	375
Accommodatio	g Thru Blockago (ft) 275		

Accommodating Thru Blockage (ft) 375

Greater of Total Turn length and Blockage Length (ft): 375

Use Blockage Length	<u>375</u> <u>ft</u>
	(Includes Taper)



Intersection	: Access	Rd & Home	Rd		
Movement Analy	/zed:	Eastbound	<b>Right Tur</b>	n	
		EBR			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc4 - PM
Type of Traffic Control:		UNSIGNALI	ZED THROUG	H ROAD	
Turn Demand Vo	olume Type:	LOW			
Applicable Cond	ition(s):	CONDITIO	N B or C	(Whichever is g	reater)
Cycle Length:	60 seconds	;			
<b>Average Vehicles</b>	s per Cycle:		2 veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	50	100	150

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
EBR	285

#### **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBR	165	100	265

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

#### **Check for Blockage:**

Direction Analyzed: EBT

Average Vehicles per Cycle:

11 veh/cyc

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
EBT 50		400	450

Accommodating Thru Blockage (ft) 450

Greater of Total Turn length and Blockage Length (ft): 450

Use Blockage Length	<u>450 ft</u>
	(Includes Taper)



Intersection	•	Access Ro	l & Home F	Rd		
Movement Analy	yzed:	Wes	tbound	Left Turn		
			WBL			
Speed Limit:	50				Design Year	2040
Design Speed:	55				Peak Hour	Sc4 - AM
Type of Traffic C	ontrol:		UNSIGNALIZ	ZED THROUGH	I ROAD	
Turn Demand Vo	olume T	ype:	LOW			
Applicable Cond	ition(s):	1	CONDITION	B or C	(Whichever is gr	eater)
Cycle Length:	60 :	seconds				
<b>Average Vehicle</b>	s per Cy	cle:		1 veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
WBL	50	50	100

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
WBL	285

#### **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
WBL	165	50	215

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

### **Check for Blockage:**

Direction Analyzed: WBT

Average Vehicles per Cycle:9 veh/cycMovement(Diverging Taper) (ft)Plus Storage Length (ft)WBT50350400

Accommodating Thru Blockage (ft) 400

Greater of Total Turn length and Blockage Length (ft): 400

Use Blockage Length	<u>400 ft</u>
	(Includes Taper)



Intersection	: Acc	ess Rd & Home Ro	ł		
Movement Analy	/zed:	Westbound	Left Turn		
		WBL			
Speed Limit:	50			Design Year	2040
Design Speed:	55			Peak Hour	Sc4 - PM
Type of Traffic C	ontrol:	UNSIGNALIZE	D THROUGH	ROAD	
Turn Demand Vo	olume Type:	LOW			
Applicable Cond	ition(s):	CONDITION E	3 or C	(Whichever is gr	eater)
Cycle Length:	60 seco	nds			
<b>Average Vehicles</b>	s per Cycle:	1	veh/cyc		

Length = 50' (diverging taper) + Storage Length (Figure 401-10)

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
WBL	50	50	100

#### **CONDITION B HIGH SPEED DECELERATION ONLY**

Movement	Turn Lane Length (ft)
WBL	285

### **CONDITION C MODERATE SPEED DECELERATION AND STORAGE**

Movement	(Diverging Taper) (ft)	Plus Storage Length (ft)	Total Length (ft)
WBL	165	50	215

Condition B is greater than Condition C

Conclusion: Use Condition B

Total Turn Length (ft) 285

### **Check for Blockage:**

Direction Analyzed: WBT

Average Vehicles per Cycle:		8	veh/cyc	
Movement	(Diverging Taper) (ft)		Plus Storage Length (ft)	Total Length (ft)
WBT	50		325	375
Accommodating Thru Plackago (ft) 275				

Accommodating Thru Blockage (ft) 375

Greater of Total Turn length and Blockage Length (ft): 375

Use Blockage Length	<u>375 ft</u>
	(Includes Taper)



From:	Karen Mitchell
To:	Elise Schellin; Claudia Husak
Cc:	Pam Friend
Subject:	FW: Planning & Zoning Commission meeting on May 15th
Date:	Tuesday, May 4, 2021 1:49:53 PM
Attachments:	image001.png

Public Comments for next week's P&Z packet.

Warm regards,

Karen J. Mitchell, CMC, OSBA Certified Paralegal City Clerk 47 Hall Street, Powell, Ohio 43065 614.885.5380 www.cityofpowell.us



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#### Make Your Voice Heard on May 4.

Learn more about the income tax restructuring proposal here.

From: m3c1j5@gmail.com <m3c1j5@gmail.com> Sent: Tuesday, May 4, 2021 1:49 PM To: Karen Mitchell <KMitchell@cityofpowell.us> Subject: Planning & Zoning Commission meeting on May 15th

Karen:

I will be unable to attend the Commission's meeting on May 15<sup>th</sup> and would appreciate your submitting the following to the members for their consideration of the Redwood USA, LLC proposal.

Thanks.

Members of the Planning & Zoning Commission:

My wife and I have received a notice of your next meeting on May 15<sup>th</sup> with regard to the proposed Redwood USA, LLC proposal.

We reside on the west side of the CSX railroad tracks at the southern end of the +/- 70 acre tract that Redwood wishes to build on. Our concern is not about the construction

of the proposed residences but rather with the fact that the entire tract itself will only have one primary access road and the location of that road. As you are aware that road would permit access to Home Road at the bottom of the hill created by the construction of a bridge over the CSX tracks approximately 9 years ago. Based upon the intended

use of the Redwood site it appears that there may be a large amount of vehicle traffic entering and leaving the site on any given day. In our view this amount of traffic will

present a substantial safety hazard for those traveling on Home Road, particularly for those individuals who are turning left when exiting the Redwoods site. With the present

50 mile per hour speed limit and traffic traveling eastbound on Home Road topping the hill visibility and the chance to turn left and travel westbound will be extremely limited.

This safety hazard will only be increased by the fact that the Delaware County Engineer's Office has stated that there will be no traffic signal placed at the intersection of Home

Road and the Redwood property's access road. This being the case we strongly urge your requiring that Redwood USA, LLC be required to construct at least one more access road

to the property. Without this requirement the proposed development of the property is merely creating accidents waiting to happen.

Thank you for your consideration.

#### Michael and Randi Jones

3239 Winding Woods Drive Powell, Ohio 43065 Phone: 740-881-0018 Cell: 419-670-4606 Email: <u>m3c1j5@gmail.com</u>

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