CHURCH OF THE WOODS
EARTHWORK ANALYSIS REPORT

JUNE 12, 2017

Prepared by:

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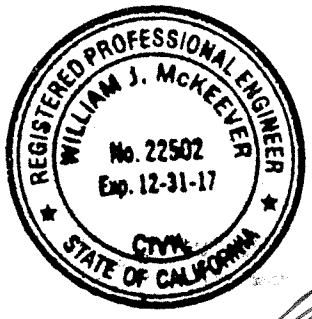

6/28/17

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JUNE 12, 2017

Site Description

The site consists of 36.7 acres on the north side of State Hwy 18 in the northwest ¼ of Section 29 T 2 N, R 3 W. The site is located on the easterly edge of the area known as Rim Forest in the Lake Arrowhead area of San Bernardino County.

The site is bounded on the south by State Highway 18; on the west by an existing subdivision known as the Arrowview Tract (Tract No. 2015) consisting of 4,000 ± S. F. residential lots; on the north and east by vacant land owned by the U. S. Forest Service. State Highway 18 on the south boundary is a paved, two lane highway. Daley Canyon Road, an existing two-lane road, cuts across the northeast corner of the site.

The site itself is a typical wooded mountain site. Since the original developed plan was prepared, dead tree removal has occurred primarily in the area of the site proposed for development. There is an existing natural drainage course running diagonally through the site from the southwest corner to the northeast corner. There is an existing 8" sewer main located in the natural drainage course. This sewer is part of the Lake Arrowhead Community Services District's Wastewater Collection System.

There are no existing drainage or storm drain improvements located on the site.

Proposed Project

The proposed project consists of a church, athletic field, and appurtenant facilities. A proposed site plan is included as Exhibit "A" of this report. The proposed facilities are located generally in the south area of the site.

The total site consists of approximately 36.9 acres. Approximately 6.5 acres will be impervious area, buildings, parking lots, sidewalk and paved assembly areas. Approximately 7.1 acres will be landscaped areas, sodded recreation areas, water quality basin and landscaped slopes. Approximately 23.3 acres will not be developed as part of this project.

The proposed project will require a fill in the natural drainage course in the southwest corner of the site. This fill will require the construction of approximately 750' of storm drain. This storm drain is shown on the site plan. See attached Site Plan included in Exhibit "A" of this report.

Soils Report

A Soils Report titled "Engineering Geology and Soils Engineering Investigation Church of the Woods, Rimforest Area, San Bernardino County" was prepared by LOR Geotechnical Group Inc. dated 11/27/01 and an update letter dated 3/31/17, which states that the site is suitable for intended use provided the recommendations in previous reports are adhered to. A copy of pages 18 through 20, inclusive, of the 11/27/01 report are contained in Exhibit "B" of this report. A copy of the 3/31/17 update letter is included in Exhibit "C" of this report.

Earthwork Calculations

Earthwork calculations were prepared using the "Church of the Woods Conditional Use Permit Site Plan & Preliminary Grading Plan", prepared by W.J. McKeever Inc. dated 4/24/17 and AutoCad Civil 3D Version 2016 software.

A preliminary structural section of 4" of asphalt concrete over 6" of Class II aggregate base was used for the onsite drive aisles and parking spaces. This criteria was incorporated into the raw earthwork cut and fill quantities.

The raw cut and fill quantities are shown on the results of the calculations and is contained in Exhibit "F" of this report. A graphic printout showing the areas and depths of the cuts and fills is contained in Exhibit "G" of this report.

Earthwork Analysis

The Earthwork Analysis consists of adjustments made to the raw cut and fill numbers to account for clearing losses, unsuitable material, over excavation quantities, subsidence of natural ground and shrinkage of material when compacted. These factors are all considered in the determination of final quantities in relation to the balance of the site design. Balance determines if import or export of material is necessary to accomplish final grading of the site.

Clearing losses refer to that volume that is occupied by tree roots, chafe and other vegetation that cannot be included in engineered fill onsite. As mentioned in the Soils Report, the highly organic portions of the top soil, 1 to 2 feet in depth, are not suitable for engineered fill. This material will be exported from the site to a suitable disposal area. Subsidence of natural ground occurs when the surfaces of area to receive fills are scarified to a depth of 6" and recompacted to 90 percent.

Shrinkage occurs when existing in place material which, on this particular site, has a relative density ranging from 64 to 79% of maximum is removed, has water introduced as a lubricant, and is recompacted as fill to 90% of maximum density to support the loads imposed by the

development. This compaction loss is also experienced by the required over excavation and recompaction.

The analysis of the earthwork quantities using the above mentioned data is included in Exhibit "H" of this report.

Conclusion

Preliminary analysis of the raw cut and fill quantities considering the losses, indicates that an excess of 14,553 cubic yards of material would remain after the grading operation was completed. This amount represents approximately 7.2% of the total material to be moved.

Given the variation that may be expected in the behavior of the different materials on site, this variance is within normally expected limits. These quantities will be refined during the final engineering phase of the project and adjustments will be made, if necessary to eliminate exporting of cut material from the site.

EXHIBIT "A"

SITE PLAN

CHURCH OF THE WOODS

CONDITIONAL USE PERMIT SITE PLAN & PRELIMINARY GRADING

Scale: 1" = 50'

0 25 50 100 150

NOTES:

1. RECORD OWNER: CHURCH OF THE WOODS, A CALIFORNIA CORPORATION; P.O. BOX 2000; LAKE ARROWHEAD, CA; 92352; 909-337-5483.
2. PUBLIC UTILITIES ARE AS FOLLOWS:
   A) WATER: CRESTLINE LAKE ARROWHEAD WATER AGENCY; P.O BOX 3880; CRESTLINE, CA. 92325; 909-338-1775
   B) SEWER: LAKE ARROWHEAD COMMUNITY SERVICES DIST; P. O. BOX 789; LAKE ARROWHEAD, CA 92352; 909-337-8555
   C) NATURAL GAS: SO. CAL. GAS CO.; P. O. BOX 6228; SAN BERNARDINO, CA; 909-889-9711
   D) ELECTRIC: SO. CAL. EDISON CO.; P. O. BOX 96; RIM FOREST, CA; 92378, 909-337-2564
   E) TELEPHONE: VERIZON; 1500 CRAFTON AVE.; MENTONE, CA; 92359; 909-793-7441
   F) CABLE TV: FALCON CABLE; P. O. BOX 9; RIM FOREST, CA; 92378, 909-336-2457
3. THE CURRENT AND PROPOSED GENERAL PLAN USE DISTRICT IS LA/IC.
4. ENTRY SIGNS WILL BE SUBMITTED FOR REVIEW AT A LATER DATE.
5. ALL PARKING AREAS WILL BE SURFACED WITH ASPHALT. THE MINIMUM PARKING SPACE WILL BE 9'x19' TYPICAL.
6. TREES TO BE REMOVED ARE DISCUSSED IN THE FORESTERS REPORT PREPARED BY JOHN HATCHER DATED 3-25-03.

PROJECT SUMMARY:

BUILDINGS

PHASE 1
YOUTH CENTER GYMATORIUM.

FIRST FLOOR	18,305 SF
SECOND FLOOR	8,579 SF
SNACK BAR	480 SF
TOTAL SF:	27,364 SF

PHASE 2
ASSEMBLY BUILDING - CHILDREN'S MINISTRY

FIRST FLOOR	27,254 SF
SECOND FLOOR	13,783 SF
TOTAL =	41,037 SF

MAINTENANCE BUILDING & CARETAKERS RESIDENCE

FIRST FLOOR	750 SF
SECOND FLOOR	750 SF
TOTAL SF=	1,500 SF
TOTAL PH 2=	42,537 SF

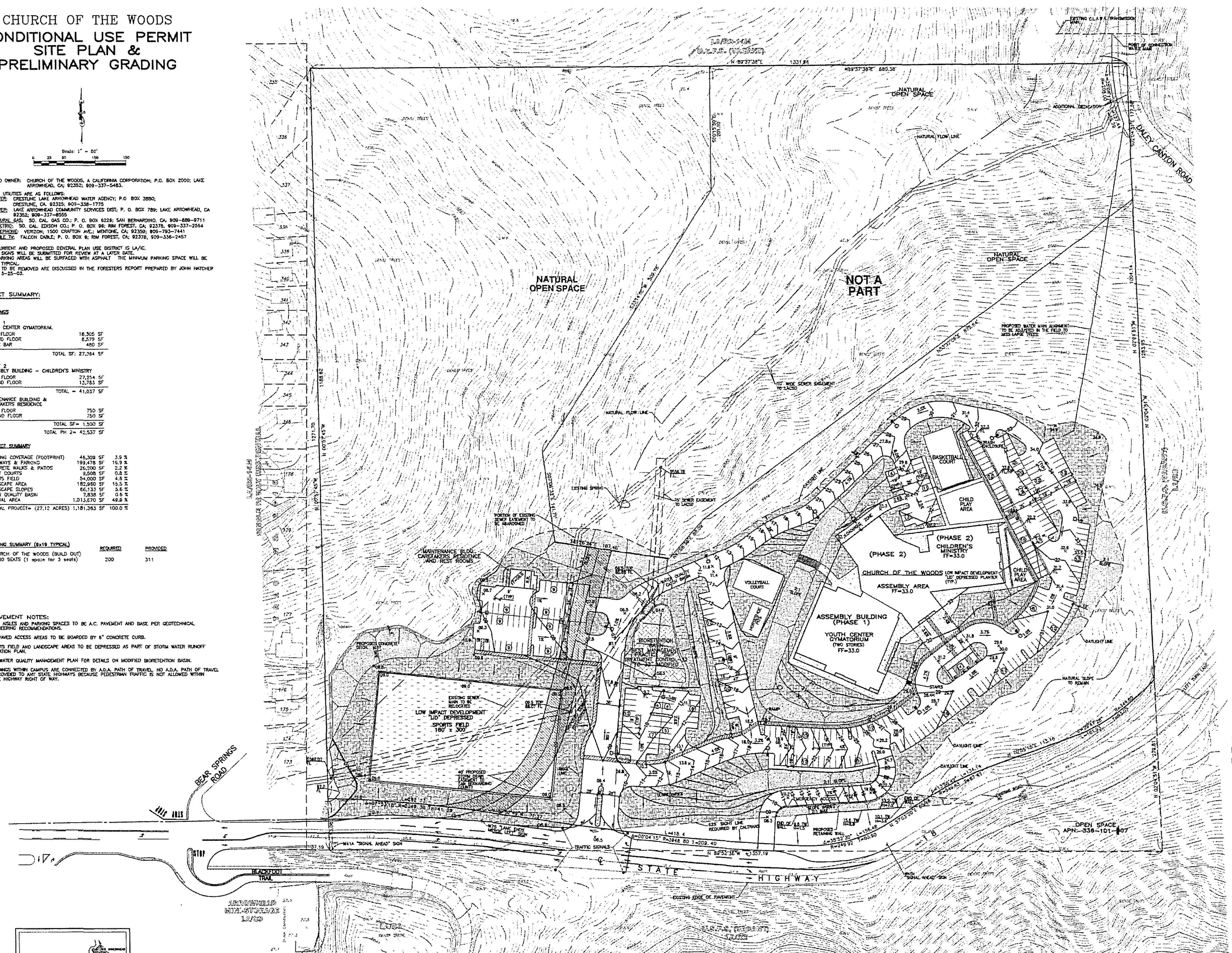
PROJECT SUMMARY

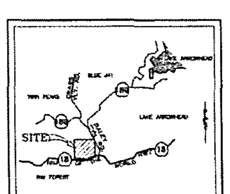
BUILDING COVERAGE (FOOTPRINT)	46,309 SF	3.9 %
DRIVEWAYS & PARKING	199,478 SF	16.9 %
CONCRETE WALKS & PATIOS	26,200 SF	2.2 %
SPORT COURTS	9,508 SF	0.8 %
SPORTS FIELD	54,000 SF	4.6 %
LANDSCAPE AREA	182,960 SF	15.5 %
LANDSCAPE SLOPES	66,133 SF	5.6 %
WATER QUALITY BASIN	7,838 SF	0.6 %
NATURAL AREA	1,013,670 SF	49.9 %
TOTAL PROJECT= (27.12 ACRES)	1,181,363 SF	100.0 %

PARKING SUMMARY (9x19 TYPICAL)	REQUIRED	PROVIDED
CHURCH OF THE WOODS (BUILD OUT) 600 SEATS (1 space for 3 seats)	200	311

IMPROVEMENT NOTES:

1. DRIVE AISLES AND PARKING SPACES TO BE A.C. PAVEMENT AND BASE PER GEOTECHNICAL ENGINEERING RECOMMENDATIONS.
2. ALL PAVED ACCESS AREAS TO BE BOARDED BY 6" CONCRETE CURB.
3. SPORTS FIELD AND LANDSCAPE AREAS TO BE DEPRESSED AS PART OF STORM WATER RUNOFF MITIGATION PLAN.
4. SEE WATER QUALITY MANAGEMENT PLAN FOR DETAILS ON MODIFIED BIORETENTION BASIN.
5. BUILDINGS WITHIN CAMPUS ARE CONNECTED BY A.D.A. PATH OF TRAVEL. NO A.D.A. PATH OF TRAVEL IS PROVIDED TO ANY STATE HIGHWAYS BECAUSE PEDESTRIAN TRAFFIC IS NOT ALLOWED WITHIN STATE HIGHWAY RIGHT OF WAY.





VICINITY MAP
N.T.S.

LEGAL DESCRIPTION:
THE SE 1/4; NW 1/4; SECTION 29 T2N; R3W; S.B.M. COUNTY OF SAN BERNARDINO STATE OF CALIFORNIA.

LEGEND:

- INDICATES PLAY FIELD
- INDICATES ORNAMENTAL LANDSCAPE
- INDICATES SLOPE
- INDICATES CONCRETE WALKWAY
- INDICATES A.D.A. PATH OF TRAVEL
- INDICATES DIRECTION OF FLOW
- FF INDICATES FINISH FLOOR
- 29.5 INDICATES FINISH GRADE
- INDICATES EXISTING CONTOURS
- 00 INDICATES PROPOSED CONTOURS
- INDICATES LIGHT POLE

APN: 336-101-06
CUP FOR 42,537 SF CHURCH FACILITIES

APPLICANT/ OWNERS: CHURCH OF THE WOODS
P.O. BOX 2000, LAKE ARROWHEAD CA. 92352.
PHONE: 909-337-5483.

PREPARED BY:
W.J. McKEEVER, INC.
CIVIL ENGINEERING
900 E. WASHINGTON STREET, SUITE 208
COLTON, CALIFORNIA 92324
PH.: (909) 825-8046
FAX: (909) 825-8639

W.J. McKEEVER, R.C.E. 22502 — 4/25/17 DATE

REGISTERED PROFESSIONAL ENGINEER — WILLIAM J. McKEEVER — No. 22502 — Exp. 12-31-17 — CIVIL — STATE OF CALIFORNIA

REVISIONS
4-23-13
3-14-17
3-28-17
4-14-17
4-24-17

PLOT DATE: 4/25/17

EXHIBIT "B"

SOILS REPORT
(Pages 18-20)

Foundation Support

Based upon our field investigation and test data, it is our opinion that the thin layers of topsoil, colluvium, and fill found across the site, will not, in the present condition, provide uniform and/or adequate support for the future structures.

Therefore, to provide adequate support for the proposed structures, we recommend that these materials be completely removed from all structural fill areas and a compacted fill mat be constructed beneath footings and slabs. This compacted fill mat will provide a dense, high strength, soil layer to uniformly distribute the anticipated foundation loads.

If the final grade of a particular building site includes deep cuts into the existing materials so as the entire building would be placed on competent bedrock materials, then the construction of a fill mat may not be required.

In addition, care should be exercised along any removals in the southwest portion of the site where the capped water well is believed to exist. If this structure is encountered it may need to be recapped.

Conventional spread foundations, either individual spread footings and/or continuous wall footings, will provide adequate support for the anticipated downward and lateral loads when utilized in conjunction with the recommended fill mat.

RECOMMENDATIONS

General Site Grading

It is imperative that no clearing and/or grading operations be performed without the presence of a certified geotechnical engineer and certified engineering geologist. An on-site, pre-job meeting with the owner, contractor, geotechnical engineer, and engineering geologist, should occur prior to all grading related operations.

Grading of the subject site should be performed in accordance with the following recommendations as well as applicable portions of Appendix Chapter 33 of the Uniform Building Code, and/or applicable local ordinances.

All excavations at the site should be inspected by the project engineering geologist and soils engineer to ensure that the encountered conditions are in conformance with anticipated conditions stated within this report. The soils engineer should provide sufficient observation during grading to ensure that the work is being conducted in accordance with the conditions of the report.

Initial Site Preparation

All previously existing topsoil, loose colluvial, and fills should be removed from all structural areas or areas to receive engineered compacted fill, cleaned of significant deleterious materials, and may be reused as compacted fill. However, the highly organic portions of the topsoil materials (1 to 2 feet) are not considered to be suitable for re-use as engineered fill. The data developed during this investigation indicates that moderate removals on the order of 3 to16 feet will be required within the anticipated structural areas. The actual depths of removal should be verified during the grading operation by observation and in-place density testing.

Preparation of Fill Areas

Cavities created by removal of subsurface obstructions should be thoroughly cleaned of loose soil, organic matter and other deleterious materials, shaped to provide access for construction equipment, and backfilled as recommended in the following Engineered Compacted Fill section of this report.

Prior to placing fill, the surfaces of all areas to receive fill should be scarified to a depth of at least 6 inches. The scarified soil should be brought to near optimum moisture content and recompacted to a relative compaction of at least 90 percent (ASTM D 1557).

Preparation of Foundation Areas

All footings should rest entirely upon competent bedrock materials or entirely upon at least 18 inches of properly compacted fill material. In areas where the required thickness is not accomplished by site rough grading, the footing areas should be further subexcavated to a depth of at least 18 inches below the proposed footing base grade, with the subexcavation extending at least 5-feet beyond the footing lines. The

bottom of this excavation should then be scarified to a depth of at least 6 inches, brought to near optimum moisture content, and recompacted to at least 90 percent relative compaction (ASTM D 1557) prior to refilling the excavation to grade as properly compacted fill.

Engineered Compacted Fill

Except for the topsoil materials, the on-site soils should provide adequate quality fill material, provided they are free from trash, organic matter, and/or other deleterious materials. Unless approved by the geotechnical engineer, rock or similar irreducible material with a maximum dimension greater than 6-inches should not be buried or placed in fills.

Import fill is not anticipated at this time. However if any fills are imported they should be inorganic, non-expansive granular soils free from rocks or lumps greater than 6-inches in maximum dimension. Sources for import fill should be approved by the geotechnical engineer prior to their use.

Fill should be spread in maximum 8 inch loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557.

Based upon the relative compaction of the near surface soils determined during this investigation and the relative compaction anticipated for compacted fill soil, we estimate that the compaction shrinkage will vary widely, perhaps ranging from approximately 10 to 20 percent. Deeper excavations encountering competent bedrock should be expected to yield lesser shrinkage values on the order of 0 to 5 percent. In addition, we would anticipate subsidence of approximately 0.10 feet. These values are for estimating purposes only, and are exclusive of losses due to stripping or the removal of subsurface obstructions. These values may vary due to differing conditions within the project boundaries and the limitations of this investigation. Shrinkage should be monitored during construction. If percentages vary, provisions should be made to revise final grades or adjust quantities of borrow or export.

EXHIBIT "C"

SOILS UPDATE LETTER

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

March 31, 2017

ICON General Contractors
1814 Commercenter West, Suite A
San Bernardino, California 92408

Project No. 51497.16

Attention: Mr. Patrick Hopkins

Subject: Geotechnical Update, Church of the Woods, Rimforest Area, San Bernardino County, California.

At your request, we have prepared this letter report providing a geotechnical update for the subject proposed church development.

A representative from this firm visited the site on March 28, 2017 to observe the current condition of the property. At the time of our visit, the site area generally consisted of forested, gently rolling to steep hillside land in a relatively natural condition and essentially the same as described within our referenced geotechnical investigation report.

The property is considered suitable for use as intended provided the recommendations contained in our previous reports are adhered to.

Although a Conditional Use Permit Site Plan and Preliminary Grading plan were provided at this time, precise grading plans were not yet available for our review. Such plans should be reviewed by this firm prior to construction and additional recommendations can be provided at that time, as necessary.

Section 1613 of Chapter 16 of the 2016 California Building Code (CBC) contains the procedures and definitions for the calculations of the earthquake loads on structures and non structural components that are permanently attached to structures and their supports and attachments. The following earthquake design criteria have been formulated for the site. However, these values should be reviewed and the final design should be performed by a qualified structural engineer familiar with the region.

CBC 2016 SEISMIC DESIGN SUMMARY Site Location: (USGS WGS84) 34.2305, -117.2179, Occupancy Category II	
Site Class Definition (Table 1613.5.2)	D
S_s Mapped Spectral Response Acceleration at 0.2s Period, (Figure 1613.5(3))	2.942
S_1 Mapped Spectral Response Acceleration at 1s Period, (Figure 1613.5(4))	0.960
F_a Short Period Site Coefficient at 0.2s Period, (Table 1613.5.3(1))	1.0
F_v Long Period Site Coefficient at 1s Period,(Table 1613.5.3(2))	1.5
S_{MS} Adjusted Spectral Response Acceleration at 0.2s Period, (eq .16-36)	2.942
S_{M1} Adjusted Spectral Response Acceleration at 1s Period, (eq .16-37)	1.439
S_{DS} Design Spectral Response Acceleration at 0.2s Period,(eq .16-38)	1.961
S_{D1} Design Spectral Response Acceleration at 1s Period, (eq .16-39)	0.960
Seismic Design Category, Short Period (Table 1613.5.6(1))	E
Seismic Design Category, Long Period (Table 1613.5.6(2))	E

We trust this information is desired at this time, if you have any questions please contact this firm at your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.

John P. Leuer, GE 2030
President

RMM:JPL/ss

Distribution: Addressee (2) and via email: patrick@icongc.net

REFERENCES

1. California Building Standards Commission and International Conference of Building Officials, 2016, California Building Code, 2016 edition.

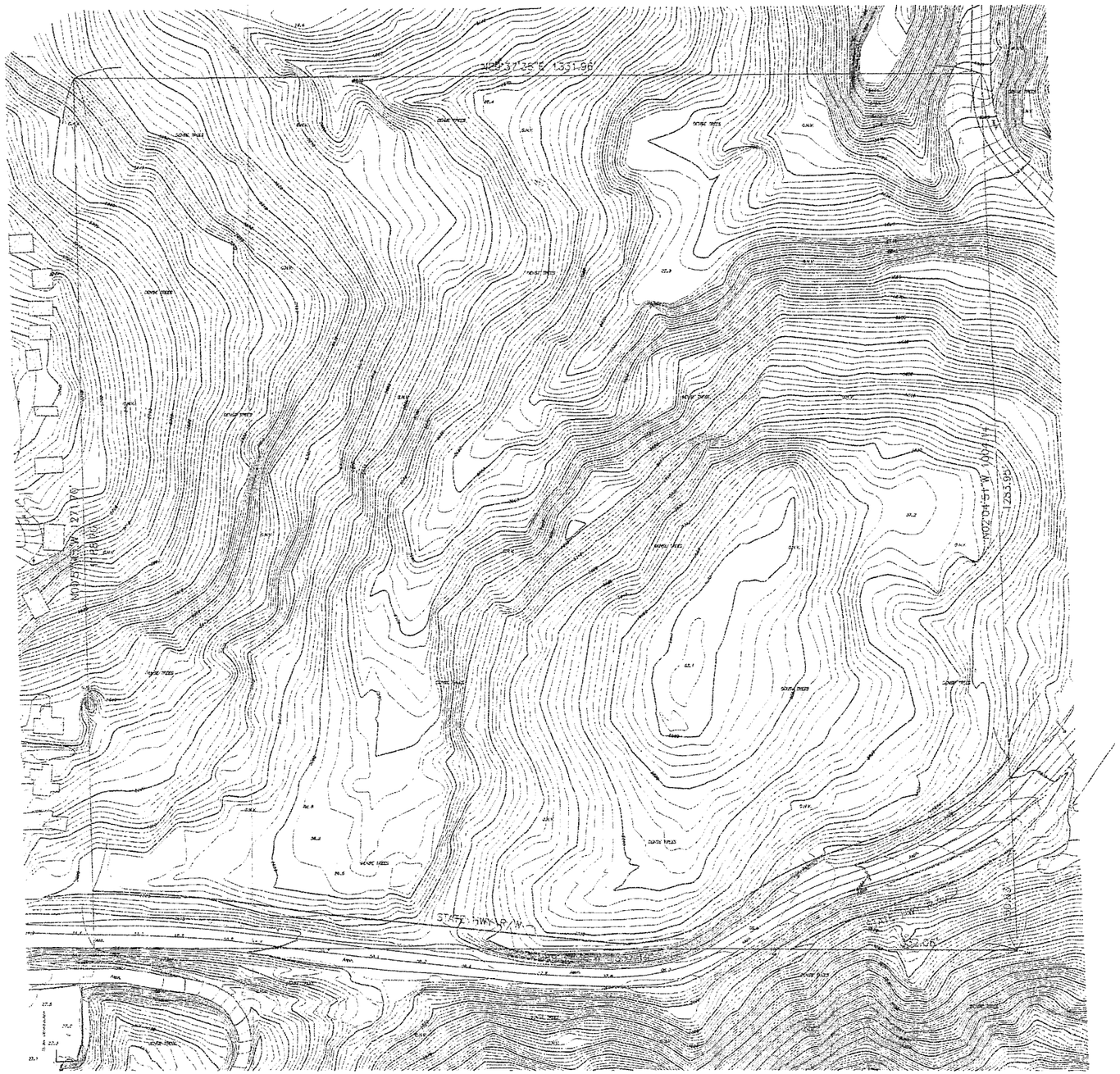
2. LOR Geotechical Group, Inc., 2001, Engineering Geology and Soils Engineering Investigation, Church of the Woods, Rimforest Area, San Bernardino County, California, Project No. 51497.1, Revision dated November 27, 2001.

3. San Bernardino County Land Use Services, Geologic Hazards Map FH23 C, Rimforest.

4. W. J. McKeever, Inc., 2017, Church of the Woods, Conditional Use Permit Site Plan & Preliminary Grading, 50-scale, dated March 14, 2017.

EXHIBIT "D"

NATURAL GROUND MODEL



0 40 80 120 160 200

SCALE: 1 INCH = 80 FEET

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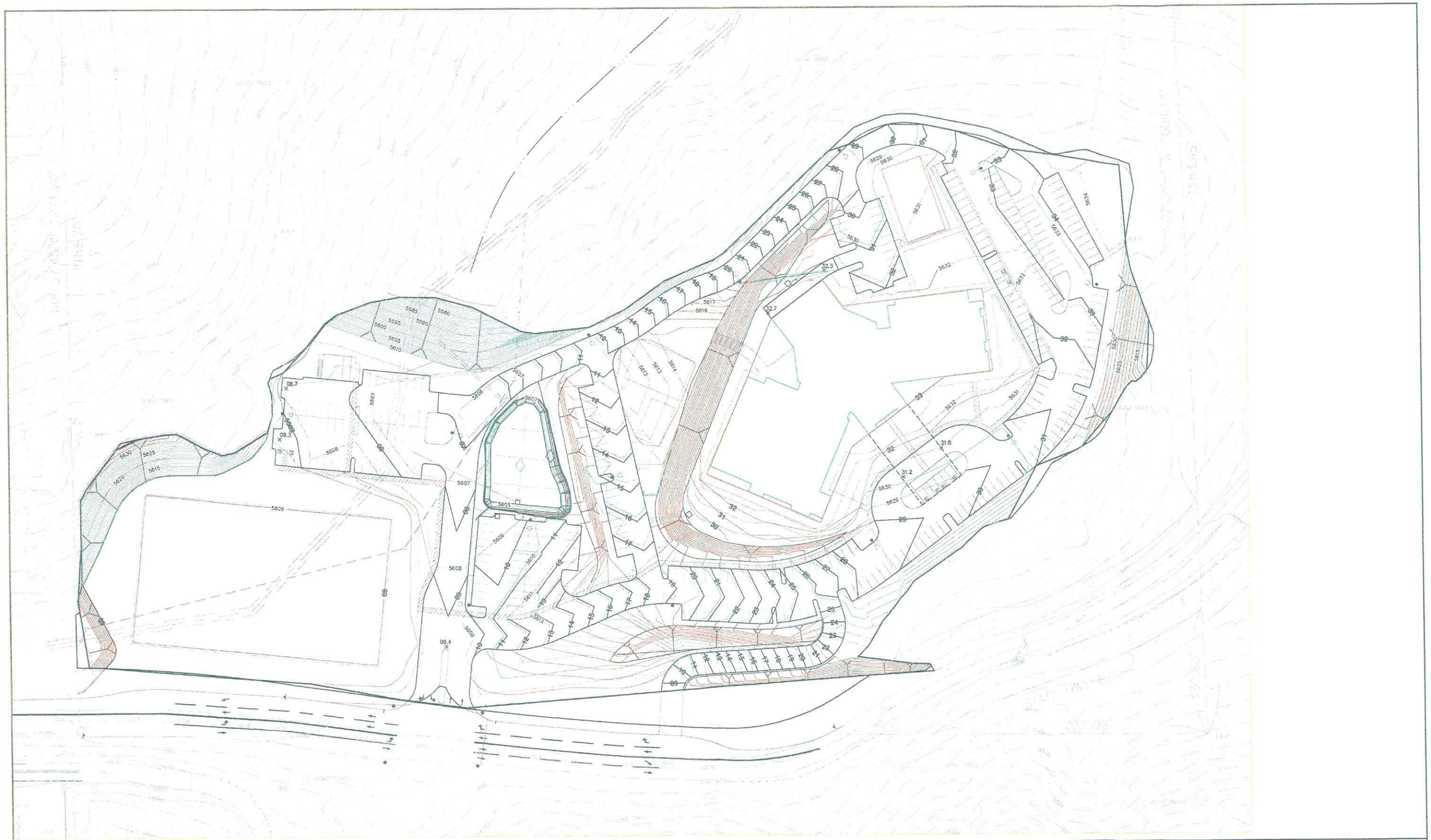
CHURCH OF THE WOODS
EARTH WORK
NATURAL GROUND MODEL
6/22/17

PLOT DATE: 6/22/17

EXHIBIT "E"

DESIGN MODEL



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CHURCH OF THE WOODS
EARTH WORK DESIGN MODEL
6/22/17

PLOT DATE: 6/22/17

EXHIBIT "F"

EARTHWORK CALCULATIONS

Cut/Fill Report

Generated: 2017-06-21 08:03:51

By user: admin

Drawing: G:\ACADDWGS\C-241 Church of the Woods\C241_Earthwork\G:\ACADDWGS\C-241 Church of the Woods\C241_Earthwork\C241_Surface_Earthwork_6-21-17.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
C241_Earthwork_Edits	full	1.000	1.000	556978.14	195296.68	119312.98	75983.70<Cut>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	556978.14	195296.68	119312.98	75983.70<Cut>

* Value adjusted by cut or fill factor other than 1.0

EXHIBIT "G"

EARTHWORK GRAPHIC

SCALE: 1"=100'

ELEVATIONS TABLE				
NUMBER	MIN. ELEVATION	MAXI. ELEVATION	AREA	COLOR
1	−33.00	−0.05	339814.61 SF	
2	−0.05	0.05	1532.73 SF	
3	0.05	38.04	215630.80 SF	

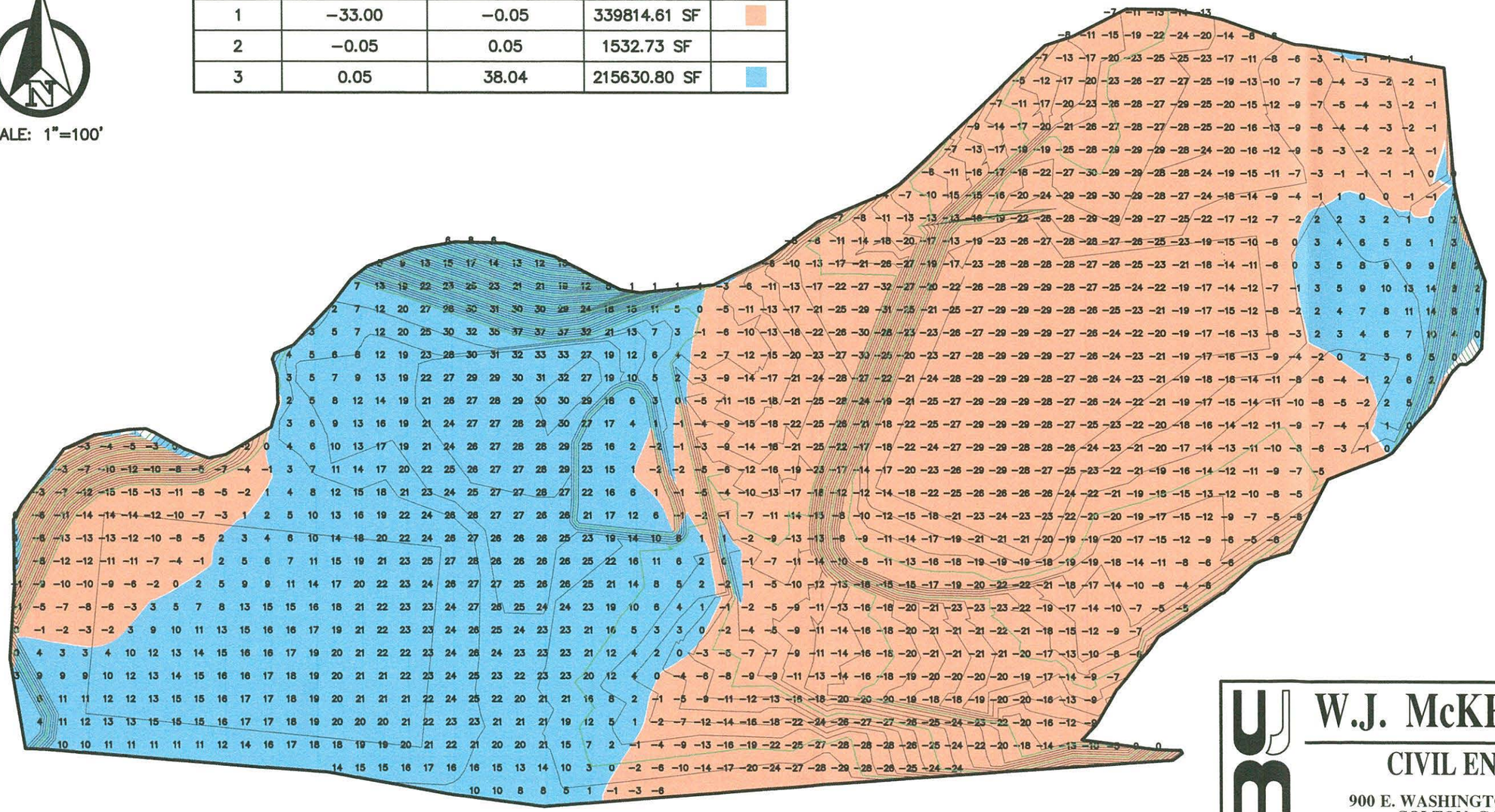

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EXHIBIT "H"

EARTHWORK ANALYSIS

CHURCH OF THE WOODS
EARTHWORK ANALYSIS
June 21, 2017

Raw cut & fill numbers per W.J. McKeever Inc. 6/21/17 (Attached).

Unsuitable material, subsidence and shrinkage information per LOR Geotechnical Group Inc., Engineering Geology and Soils Engineering Investigation, Church of the Woods, Rimforest Area, San Bernardino County, California dated 11/27/2001 and update letter dated 3/31/17 (Attached).

Cut	195,297 CY
Over Exc	- 5,655 CY
Unsuitable Material	-42,367 CY
Subsidence	- 1,270 CY
Subtotal	157,315 CY
Shrinkage	
50% of Subtotal @ 15% =	11,799 CY
50% of Subtotal @ 5% =	3,933 CY
	15,732 CY
Cut Available for Fill	141,583 CY
Fill =	119,313 CY
Over Exc	5,655
Subsidence	2,062 CY
Total Fill Required	127,030 CY
Net	14,553 CY - Excess