

Appendix B

PRELIMINARY ENGINEERING
REPORT - GRADING AND
DRAINAGE

PRELIMINARY ENGINEERING REPORT GRADING & DRAINAGE

FOR
OSAGE NATION
LAKE OF THE OZARKS CASINO RESORT
LAKE OZARK, MISSOURI

PREPARED FOR
Osage Nation
819 Grandview Ave
Pawhuska, OK 74056

FEBRUARY 21TH, 2024

PREPARED BY:



CJW Transportation Consultants, L.L.C.
Providing Transportation and Engineering Solutions
5051 S. National, Suite 7A
Springfield, MO 65810
Phone: 417.889.3400 Fax: 417.889.3402

TABLE OF CONTENTS:

<i>Project Summary</i>	<i>p. 2</i>
<i>Preliminary Grading</i>	<i>p. 2</i>
<i>Preliminary Stormwater</i>	<i>p. 3</i>

ATTACHMENTS:

<i>Site Layout</i>
<i>Preliminary Grading Sheets</i>

PROJECT SUMMARY:

The project site is a 28.74-acres tract of land located just southwest of the intersection of Highway 242 and Osage Beach Parkway in Lake Ozark, Missouri. The Architect provided two options for the project. Option A involves the construction of multiple structures, parking, roads, and utility infrastructure which will result in a disturbed area of approximately 14.29 acres, while Option B involves the construction of a single structures, parking, roads and utility infrastructure which will result in a disturbed area of approximately 6.11 acres. Two conceptual site layouts developed by the project Architect were provided illustrating the programmatic components of the project, and their respective layout on the site. Further development of the concepts was coordinated with the architect to understand how components of the facility would work with the terrain. Site Layout documents can be viewed in Appendix A. The facility will consist of the following facilities with support functions at full build out.

Option A

- 150 Room Hotel
- 40,000 Square foot Gaming Center
- 9,000 Square foot Meeting Space

Option B

- 100 Room Hotel

The purpose of this report was to review the preliminary stormwater, and grading components of the project.

PRELIMINARY GRADING:

Mass grading of the site will need to take place in order to achieve full build out for both Option A and Option B. Existing grades on the site show steep grades from the east property line to the west across the property. In addition, existing grade also falls to the north. As much as 100 feet of fall exists from the east property line to the west. Development of the site will result in the need for site walls to address grade changes on the site. Final location and height of those walls will need to be determined once grading plans have been further developed. For the purposes of preliminary grading, walls are shown in locations where they would be anticipated. Preliminary grading also anticipated the incorporation of a detention basin for the project that would be constructed north of the proposed facility; final location and shape of the basin can be adjusted based upon site parameters.

Based upon preliminary review of the site, rock excavation should be anticipated with the project. Further geotechnical investigation would help in identifying rock depth, and thus possible rock quantities anticipated for the project.

A Storm Water Pollution Prevention Plan will need to be developed and permitted through the Environmental Protection Agency for the earthwork operation.

Based upon the preliminary grading Option A would require 262,500 CY of excavation and 180,000 CY of fill. 82,500 CY would need to be hauled off-site. Further geotechnical investigation would help in determining if this material could be sold as crushed stone.

Based upon the preliminary grading Option B would require 72,300 CY of excavation and 11,500 CY of fill. 60,800 CY would need to be hauled off-site. Further geotechnical investigation would help in determining if this material could be sold as crushed stone.

PRELIMINARY STORMWATER

The site consists of a mixture of type A, B, and D soils according to the NRCS Hydrologic Soil Group map located on the Cares website. A storm water quality and detention basin will be utilized to serve the full development. An outlet control structure will be installed to meter basin discharge into a pipe going through the basin where it will be discharged onto grade.

Existing topography is steep, densely vegetated trees with a small developed portion located in the south east corner of the site. The property has a ridge running along the east side of the property and a low point along the west side. All storm water currently leaves the site via an unnamed tributary that flows into the Lake of the Ozarks. All new pervious surface area stormwater will be collected through inlet boxes and piping routed into the proposed basin or as surface run off directed into the basin and released at a rate equal or less than current conditions.

The site is not within a FEMA designated floodplain, and there are no known or mapped sinkholes within the area of development.

HYDRAULIC CALCULATIONS:

OPTION A:

The proposed basin will collect runoff from about 12.50 acres of the developments property. Outflow from the basin continues flowing as per existing conditions to the west off the property. A study was conducted using a 100-yr storm event to compare existing and proposed conditions.

Existing Conditions:

Existing Drainage Area (12.50 acres)

Existing Impervious Area = 2.97 AC

CN98

Existing Grass/Field = 4.29 AC

CN84

Existing CN = 84

Existing Forest = 5.24 AC

CN77

Existing Impervious Area = 2.97 acres

Proposed Conditions:

Proposed Drainage Area (12.50 acres)

Proposed Impervious Area = 7.87 AC

CN98

Proposed CN = 92

Proposed Grass/Field = 4.63 AC

CN84

Proposed Impervious Area = 7.87 acres

Proposed conditions result in an increase of impervious surface area by 4.90 acres; because the existing site does not have any stormwater detention the proposed impervious area of 7.87 AC was utilized to calculate water quality. Water quality volume required was determined using the “short cut” method now used by the City of Springfield. The required water quality volume to be provided based on the formula is 20,000 CF. this storage is achieved at approximate elevation 757.5’ based on the preliminary basin as shown in the preliminary grading plans. The water quality volume would be metered out of the basin via a low flow plate located in the outlet control structure. This volume of water would be released in a 24 to 48 hour time frame at a rate of approximately 0.15 CF a second.

The existing 100 year event flow for the 12.50 acre drainage area is 74.38 CF per second. Based on current stormwater standards the proposed 100 year event flow will not exceed the existing 100 year event flow of 74.38 CF per second.

The approximate surface area of the stormwater basin at a 100 year event is 29,700 SF and would be at an elevation of 764.0’. The top of the stormwater basin berm would be 1 foot higher in elevation at 765.0’.

BASIN CALCULATIONS:

A drainage area to basin of 12.50 acres will require an approximate basin capacity of 162,500 CF or 3.7 AF.

OPTION B:

The proposed basin will collect runoff from about 6.05 acres of the developments property. Outflow from the basin continues flowing as per existing conditions to the west off the property. A study was conducted using a 100-yr storm event to compare existing and proposed conditions.

Existing Conditions:

Existing Drainage Area (6.05 acres)

Existing Impervious Area = 2.97 AC

CN98

Existing Grass/Field = 1.80 AC

CN84

Existing CN = 89

Existing Forest = 1.28 AC

CN77

Existing Impervious Area = 3.75 acres

Proposed Conditions:

Proposed Drainage Area (6.05 acres)

Proposed Impervious Area = 2.84 AC	CN98	Proposed CN = 91
Proposed Grass/Field = 3.21 AC	CN84	

Proposed Impervious Area = 2.84 acres

Proposed conditions result in a decrease of impervious surface area by 0.13 acres ; because the existing site did not have any stormwater detention the proposed impervious area of 2.84 AC was utilized to calculate water quality. Water quality volume required was determined using the “short cut” method now used by the City of Springfield. The required water quality volume to be provided based on the formula is 7,200 CF. this storage is achieved at approximate elevation 795.75’ based on the preliminary basin as shown in the preliminary grading plans. The water quality volume would be metered out of the basin via a low flow plate located in the outlet control structure. This volume of water would be released in a 24 to 48 hour time frame at a rate of approximately 0.08 CF per second.

The existing 100 year event flow for the 6.05 acre drainage area is 38.68 CF per second. Based on current stormwater standards the proposed 100 year event flow will not exceed the existing 100 year event flow of 38.68 CF per second.

The approximate surface area of the stormwater basin at a 100 year event is 14,900 SF and would be at an elevation of 799.0’. The top of the stormwater basin berm would be 1 foot higher in elevation at 800.0’.

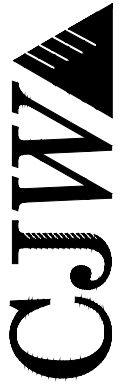
BASIN CALCULATIONS:

A drainage area to basin of 6.05 acres will require an approximate basin capacity of 78,000 CF or 1.8 AF.

NOTES:

No.:	Description:	Date:

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Springfield, MO 65810
Tel: 417.889.3400
Fax: 417.889.3402
www.GocJW.com

PRELIMINARY
Not For Construction

OSAGE CASINO RESORT - LAKE OF THE OZARKS
OSAGE NATION
LAKE OZARK, MISSOURI

DATE	02/13/2024
SURVEY BY	OTHERS
DESIGN	CJW
DRAWN	CJW
CHECKED	CJW
SCALE HOR.	1" = 40'
SCALE VERT.	N/A

2024
OPTION A
GRADING
PLAN

SHEET NO.
01

CJW NO. 22085 OF XX



LEGEND

EXISTING BARBED WIRE FENCE

EXISTING BRICK FENCE

EXISTING CHAIN LINK FENCE

EXISTING VEGETATION / BRUSH LINE

EXISTING COMMUNICATION LINE

EXISTING FIBER OPTIC LINE

EXISTING GAS LINE

EXISTING OVERHEAD ELECTRIC LINE

EXISTING SANITARY SEWER LINE

EXISTING UNDERGROUND ELECTRIC LINE

EXISTING WATER LINE

EXISTING MAJOR CONTOUR LINE

EXISTING MINOR CONTOUR LINE

PROPOSED MAJOR CONTOUR LINE

PROPOSED MINOR CONTOUR LINE

PROPOSED GUARDRAIL

EASEMENT

LOT LINE

PROPERTY LINE

RANGE LINE

EXISTING RIGHT OF WAY

SECTION LINE

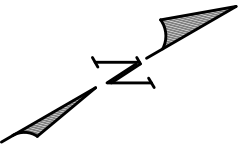
TOWNSHIP LINE

PROPOSED RIGHT OF WAY

LIMITS OF DISTURBANCE (PLAN)



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40' 0 40'
Scale: 1" = 40'

NOTES:

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SCALE VERT.	N/A

2024
OPTION A
GRADING
PLAN

SHEET NO.
02

CJW NO. 22085 OF XX

LEGEND	
	EXISTING BARBED WIRE FENCE
	EXISTING BRICK FENCE
	EXISTING CHAIN LINK FENCE
	EXISTING VEGETATION / BRUSH LINE
	EXISTING COMMUNICATION LINE
	EXISTING FIBER OPTIC LINE
	EXISTING GAS LINE
	EXISTING OVERHEAD ELECTRIC LINE
	EXISTING SANITARY SEWER LINE
	EXISTING UNDERGROUND ELECTRIC LINE
	EXISTING WATER LINE
	EXISTING MAJOR CONTOUR LINE
	EXISTING MINOR CONTOUR LINE
	PROPOSED MAJOR CONTOUR LINE
	PROPOSED MINOR CONTOUR LINE
	PROPOSED GUARDRAIL
	EASEMENT
	LOT LINE
	PROPERTY LINE
	RANGE LINE
	EXISTING RIGHT OF WAY
	SECTION LINE
	TOWNSHIP LINE
	PROPOSED RIGHT OF WAY
	LIMITS OF DISTURBANCE (PLAN)

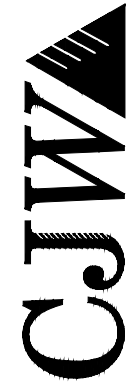


MATCH LINE A - SEE SHEET 01

NOTES:

No.:	Description:	Date:

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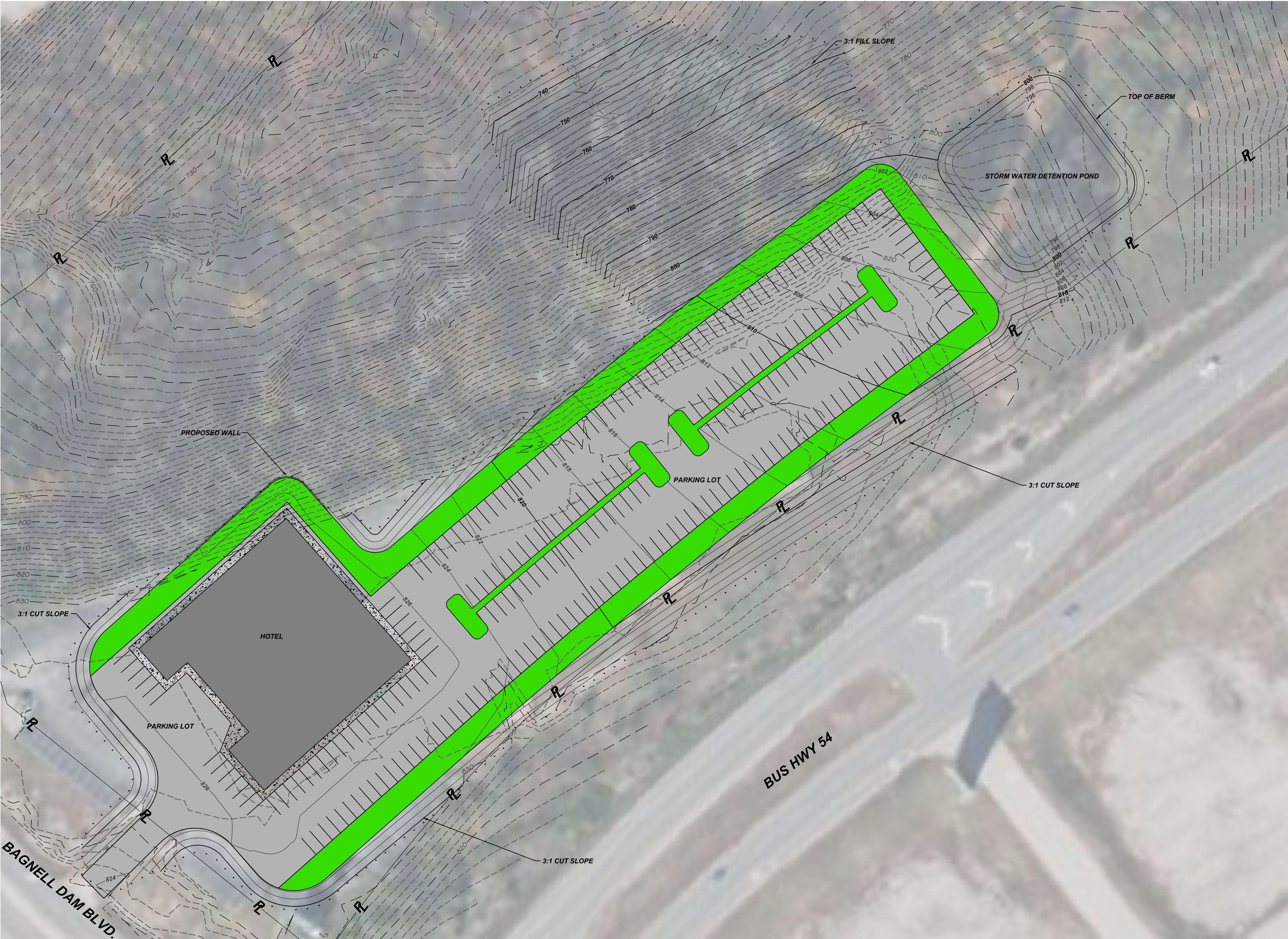
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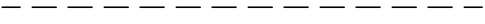
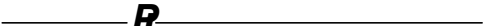
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CHECKED	CJW
SCALE HOR.	1" = 40'
SCALE VERT.	N/A

2024
OPTION B
GRADING
PLAN

SHEET NO.
01
CJW NO. 22085 OF XX



LEGEND	
	EXISTING BARBED WIRE FENCE
	EXISTING BRICK FENCE
	EXISTING CHAIN LINK FENCE
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	SECTION LINE
	TOWNSHIP LINE
	PROPOSED RIGHT OF WAY
	LIMITS OF DISTURBANCE (PLAN)
	GREEN SPACE



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Scale: 1" = 40'