

BINDER FOR OUTCOME "5"

“an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives”

**COLLEGE OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT
PRAIRIE VIEW A&M UNIVERSITY**

**BINDER CONTAINING REPRESENTATIVE
ASSIGNMENTS FROM ALL COURSES USED TO
ASSESS OUTCOME “5”**

Academic Years 2019-2020, 2020-2021, 2021-2022

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- 3. List of courses used to assess this outcome**
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 - CVEG 3053/3302 Transportation Engineering**
 - CVEG 4053/4302 Transportation Engineering Design**
 - CVEG 4472/4200 Sr. Design & Professionalism I**

2. Description of Outcome "5" and its Performance Criteria

Outcome 5:

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Sub-Outcomes and Performance Criteria

- 5.1: Function effectively on a team to provide group leadership
- 5.2: Create a collaborative and inclusive environment
- 5.3: Establish goals, plan tasks and meet project objectives

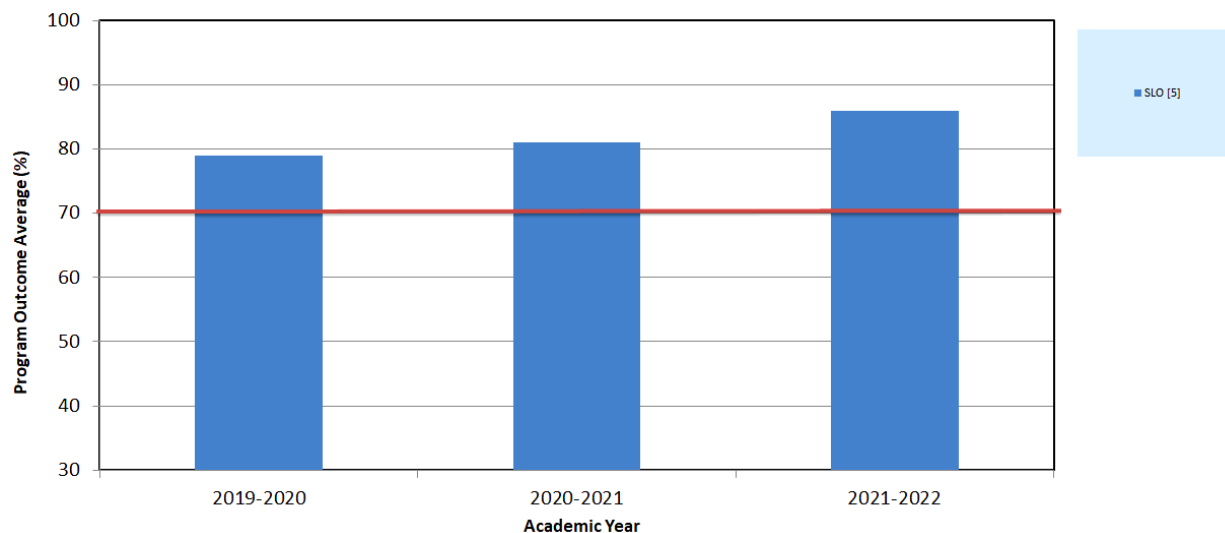
3. List of Courses Used to Assess the Outcome

Outcome 5 is assessed in the following courses:

CVEG 3053/3302 Transportation Engineering
CVEG 4053/4302 Transportation Engineering Design
CVEG 4472/4200 Sr. Design & Professionalism I

4. Summary Assessment Results and Continuous Improvements for Outcome “5” over the Assessment Years.

The direct average performance for all students in the 3 courses used to assess outcome 5 for the past three academic years are shown below



5. Problems identified and recommended actions to be taken to address problems

1. At the course level

Problems Identified in the Various Courses	Recommended Actions Taken	Basis for Action
1. Over time, many students in CVEG 3053 did comply with working as a team. In addition, the students did ensure the appropriate requirement(s) was met in completing the various tasks. 2. Some of the problem areas in CVEG 4053 were the establishment of milestones, tracking progress on Gantt chart, and time management. 3. No visible problems were noted in CVEG 4472 in Fall 2020. The students exhibited excellent understanding in CVEG 4472 how to work as a team. Produced list of tasks and responsibilities for each member of the group and collaborated well.	(1) In the future, the CVEG 3053 faculty will continue to give a few lectures at the beginning of the semester on team building so that students will approach working in groups differently. (2) The faculty will continue to give a few lectures in CVEG 4053 at the beginning of the semester on team building so that students will approach working in groups differently. (3) Student performance will be enhanced in CVEG 4472 if continued discussion by the instructor on details relating to project components and how to divide work among group members.	To support continuous improvement and meet the Departmental target direct average of 70%

2. At Department Level

- (1) Faculty steered the students into working in groups and planning and scheduling tasks using Gantt charts.
- (2) Faculty offered lectures on team building to enhance students' effort in group building.
- (3) Faculty supports continued discussions on details of design project components to help students assign group tasks more efficiently to promote improvement in this outcome from year to year.

Basis of Action:

To support continuous improvement and meet the Departmental target direct average of 70%

6. Sample Assignments and Justification of suitability of assignment for measuring the outcome in the following courses:

CVEG 3053 Transportation Engineering
CVEG 4053 Transportation Engineering Design
CVEG 4472 Sr. Design & Professionalism I

**OUTCOME “5” SPECIFIC ASSIGNMENTS
USED TO ASSESS THE OUTCOME IN**

**CVEG 3053
TRANSPORTATION ENGINEERING**

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

SPRING 2020

Instructor: Dr. Judy Perkins, P.E.

Title of Assignment

**Laboratory Assignment #4 – PVAMU Traffic Flow Options
Chapter 11 – The Transportation Planning Process Problem**

Outcome Measured Using this Assignment

Student Outcome 5

**An ability to function effectively on a team whose members together
provide leadership, create a collaborative and inclusive environment,
establish goals, plan tasks, and meet objectives**

Brief Description of the suitability of this assignment for the outcome

This assignment required the student to use the transportation planning process to analyze a grade-separated railroad grade crossing case study as well as use the transportation planning process to address a traffic flow problem currently confronted by Prairie View A&M University campus.

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 3053 – Transportation Engineering
Spring 2020**

**Laboratory Assignment #4 – PVAMU Traffic Flow Options
Chapter 11 – The Transportation Planning Process**

Given: 16 April 2020

Due: 21 April 2020 NLT 8:35am

Measuring Outcome - ABET 3 [5] - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Measuring Outcome - ABET 3 [3] - An ability to communicate effectively with a range of audiences.

Chapter 11 – The Transportation Planning Process - Point value is (35-points)

This is a group (three individuals) assignment. Your team must complete the problems described below. Ensure that your submission follows the following format:

- Laboratory report cover page:
 - Title of laboratory assignment
 - Course number, name, and section number
 - Name of each group member and respective roster number
 - Date Given
 - Date Due
- Submitting your response to the problems below is as follows:
 - Work Problem 11-2 on page 621. See required textbook.
 - Provide a typed (single-space within paragraphs and double-space between paragraphs) response to the discussion question. The problem number and problem must be above your response.
 - Referencing the transportation planning process, use the process to address a traffic flow problem currently confronted by Prairie View A&M University campus.
 - Your group should present three (3) alternatives as well as make a recommendation regarding the preferred alternative that will achieve a reduction of 80% of the traffic entering/departing University Drive during the peak-hour to 40%.
 - Eliminate steps 7 and 8 from the transportation planning process
 - Provide your response via a PowerPoint presentation. Your group will not be required to give the presentation.
 - Once the laboratory assignment is completed, please upload a single PDF of your results into your group's Dropbox folder. Please do not upload cell phone pictures of the laboratory assignment.
- If you have questions, do not hesitate to contact me.

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 3053 – Transportation Engineering
Spring 2020**

**Laboratory Assignment #4 – PVAMU Traffic Flow Options
Chapter 11 – The Transportation Planning Process - Solution
Given: 16 April 2020**

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1. Work Problem 11-2 on page 621. See required textbook.

Provide a typed (single-space within paragraphs and double-space between paragraphs) response to the discussion question. The problem number and problem must be above your response.

11-2

Describe the steps that an engineer must follow if asked to determine the need for a grade-separated railroad grade crossing that would replace an at-grade crossing of a two-lane highway with a rail line.

The first step the engineer will need to follow is to define the situation. The engineer must fully understand the reason why the grade-separated structure is said to be needed.

The next step is to define the problem in terms of the objectives to be accomplished by the project. The objectives for this project might be to improve safety by reducing or eliminating vehicle-train interaction. Another quantifiable objective might include the reduction in travel time to the motorists by eliminating delay due to crossing trains.

The third step for the engineer is to identify solutions to the perceived problem. Possible solutions to the problem might include the installation of active warning devices at the grade crossing, the diversion of motorists to other close-by grade crossings, or to construct a grade separated structure. A “no-build” or “do-nothing” alternative is typically considered as a possible solution.

The fourth step in the process is to analyze the expected performance of each of the alternatives under present and future conditions. This analysis should employ quantified measures of effectiveness such as travel time delay reductions and crash rate reductions. The analysis should also take into consideration costs such as the construction, maintenance, and operation costs of each alternative.

The fifth step in the process is to compare the alternatives against the objectives developed in step 2 of this process. The advantages and disadvantages of each must be studied.

The sixth step is to recommend one of the alternatives after considering all of the factors involved.

The final step in the process is to design the facility after one of the alternatives has been selected. This step also moves the project out of the planning process and into project development.

2. Referencing the transportation planning process, use the process to address a traffic flow problem currently confronted by Prairie View A&M University campus.

- Your group should present three (3) alternatives as well as make a recommendation regarding the preferred alternative that will achieve a reduction of 80% of the traffic entering/departing University Drive during the peak-hour to 40%.
- Eliminate steps 7 and 8 from the transportation planning process
- Provide your response via a PowerPoint presentation. Your group will not be required to give the presentation.

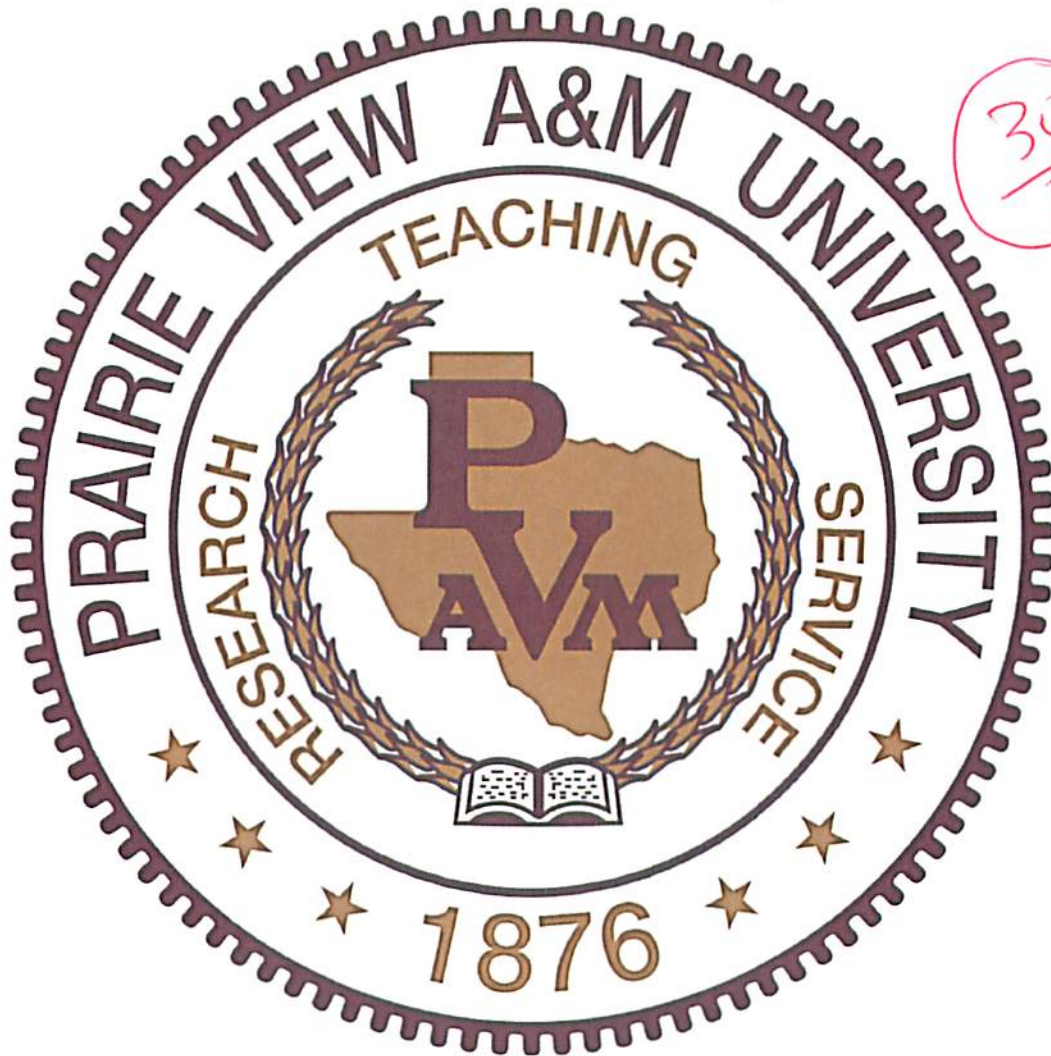
Chapter 11 - The Transportation Planning Process

11.1 Basic Elements of Transportation Planning Process

- See steps below:
 - Situation definition
 - Problem definition
 - Search for solutions
 - Analysis of performance
 - Evaluation of alternatives
 - Choice of project
 - Specification and construction
 - Provide/Seek Feedback

Source - Nicholas J. Garber and Lester A. Hoel, Traffic and Highway Engineering, 5th Edition, Cengage Learning, 2015

Prairie View A&M University



30
35

Laboratory assignment #4-PVAMU Traffic Flow Options ✓

CVEG 3053- Transportation Engineering P-01 ✓

Alex Martinez #8, Samuel Agyemang #1, Jaylen Williams #13 ✓

Given: 16 April, 2020 ✓

Due: 21 April, 2020 @8:35 ✓

+5

Problem 11-2

Describe the steps that an engineer must follow if asked to determine the need for a grade-separated railroad grade crossing that would replace an at-grade crossing of a two-lane highway with a rail line.

Response

- 1) Situation Definition is the first Step. The engineer needs to understand why there is a need for a grade-separated railroad grade crossing. The engineer must know the factors that gave rise to this need
- 2) The next step would be Problem definition. This step involves expounding on the actual problem at hand with regards to the objectives to be accomplished if a grade-separated railroad grade crossing replaces an at-grade crossing. The engineer must specify the benefits of this particular need, be it to improve safety or reduce travel time
- 3) The engineer now has to search for solutions. The engineer can have several alternatives alluding to the need at hand
- 4) Analyzing the performance of the alternatives that came up will be what the engineer has to do next. The engineer has to determine how well or effective these alternatives provided are, presently and in the future. The engineer should also bear in mind how much these alternatives are going to cost as well.
- 5) The engineer has to make comparisons now and figure out which of the alternatives will be more efficient in achieving the objective which was set prior.
- 6) After making those comparisons, the engineer can now make a decision on what alternative to recommend.
- 7) The next step would be to design the grade crossing preferred with specifications and made available to contractors.

+10.5

8 Feedback -1.5

Traffic Flow Problem on PVAMU campus

By: Alex Martinez, Jaylen Williams, Samuel
Agyemang

PVAMU

Prairie View A&M University prides itself in being one of the top HBCU's in the nation and producing productive people. Amidst these positive achievements, is a rather unfortunate Traffic flow problem confronted by the school.



Situation Definition



The population of the institution has been exponentially increasing with each added academic year. The population increase comes with more vehicles coming to and from campus. This has contributed to the traffic flow problem the school is facing

Also, there is only one road leading to the campus and so at peak hours there is traffic congestion

Faculty and staff start work and leave around the same time and so there is a traffic flow problem when most vehicles are entering or leaving the campus at the same hour.

Problem Definition



In addressing the traffic flow issue faced by PVAMU, the objective is to reduce traffic entering/departing University Drive during the peak-hour from 80% to 40%

A quantifiable criterion to measure how well these objectives are achieved could be road extension to accommodate more lanes.

Solutions

✓ (+3)

Knowing that the school has only one roadway leading to the campus, it will be imperative to create more roadways leading to the campus.

Creating more parking lots on campus will help reduce travel time which in turn controls the traffic flow problem on campus

Adding more lanesⁱⁿ each direction to the 2 lane roads across campus will also help with traffic flow and congestion.

Analysis of Performance

+2.5

Creating the roadways, more parking lots, and adding more lanes will be very costly although creating parking lots would be less expensive than roadways/lanes. It would require the involvement of the Texas Department of Transportation.

All three alternatives would require the acquisition of land somehow which may take some time depending on the location of the land.

- Is cost the only criterion?
- Mentioned in the problem definition section was the quantifiable criterion of measuring how well the objective of reducing traffic entering/departing Univ. during peak-hour from 80% to 40% could be road extension to accommodate more lanes.
- Why is this criterion missing from this section? - 0.5

Alternatives Evaluation

+1.5

Creating more roadways leading to campus will sure help in reduction of traffic on university drive. All cars do not have to use that route, there will be more options depending on where one is coming from. This could also help in reducing travel time if the new roadways created are more convenient for some individuals with respect to proximity.

located where? -0.5 what are the new roads & where are they located? -0.5

More parking lots will reduce travel time because people will no longer drive around in circles trying to find a parking lot which will help with traffic flow

The addition of lanes on the main on campus roads like university drive, FM Rd. 1098, and LW minor st. will decrease the amount of traffic congestion both leaving and entering the campus. This will allow more vehicles to travel on the same road side by side decreasing the traffic time.

Additional lanes encourages increase in volume, with maybe some decrease in travel time.

Your criterion is now reducing travel time, which is not listed the analysis of performance section -0.5

What assessment is being done here?

Choice of Project

+1.5

How so?

After considering all factors stated, the alternative preferred and selected is adding more lanes to the main entrance and exit roadways.

In order to achieve a reduction of 80% of the traffic entering/departing University Drive during the peak-hour to 40%, this is the best alternative to recommend and choose. It will be cheaper than adding entrance roadways from 290 and other main freeway/highways while being more efficient and relevant than a parking lot.

No assessment was truly performed as per the analysis & performance steps. why please? -1.5

U.S.

What other main freeway/highways are you considering?
How much traffic is displaced to other locations?

CIVIL ENGINEERING DEPARTMENT

PRAIRIE VIEW A&M UNIVERSITY



24
35

CVEG 3053 P01 TRANSPORTATION ENGINEERING

SPRING 2020

Laboratory Assignment #4 PVAMU Traffic Flow Options

Submitted by

Scott McGary - #9

Erik Smith - #12

Alan-Michal Youngblood - #14

Date Given:

April 16, 2020

Due

April 21, 2020

Question: 11-2:

Describe the steps that an engineer must follow if asked to determine the need for a grade-separated railroad grade crossing that would replace an at-grade crossing of a two-lane highway with a rail line.

The engineer has to define the situation. The engineer must fully understand the reason behind the necessity for the grade-separated structure to be placed. The grade separation is used to avoid the congestion of traffic and to prevent major accidents when traffic flow is high.

The second step is defining the difficulty in terms of objectives for the project completion. The main purpose of this project must be to improve safety and precautions by removing the vehicle/train interface. Another goal must be the reduction in travel time by eliminating delays during the crossing of trains.

Now the engineer must identify possible solutions for the likely problem at hand. Possible solutions to the problem might call for the installation of active warning devices at the grade crossing, to construct a grade-separated structure, or decide on a "no-build" which is to do nothing.

The process to gage the expected performance of each of the alternatives under both present and future conditions. This analysis should include qualified measures of effectiveness such as travel time, delay reductions, and crash rate reductions. The analysis should also take into consideration costs such as the construction, operation costs, and maintenance of each alternative.

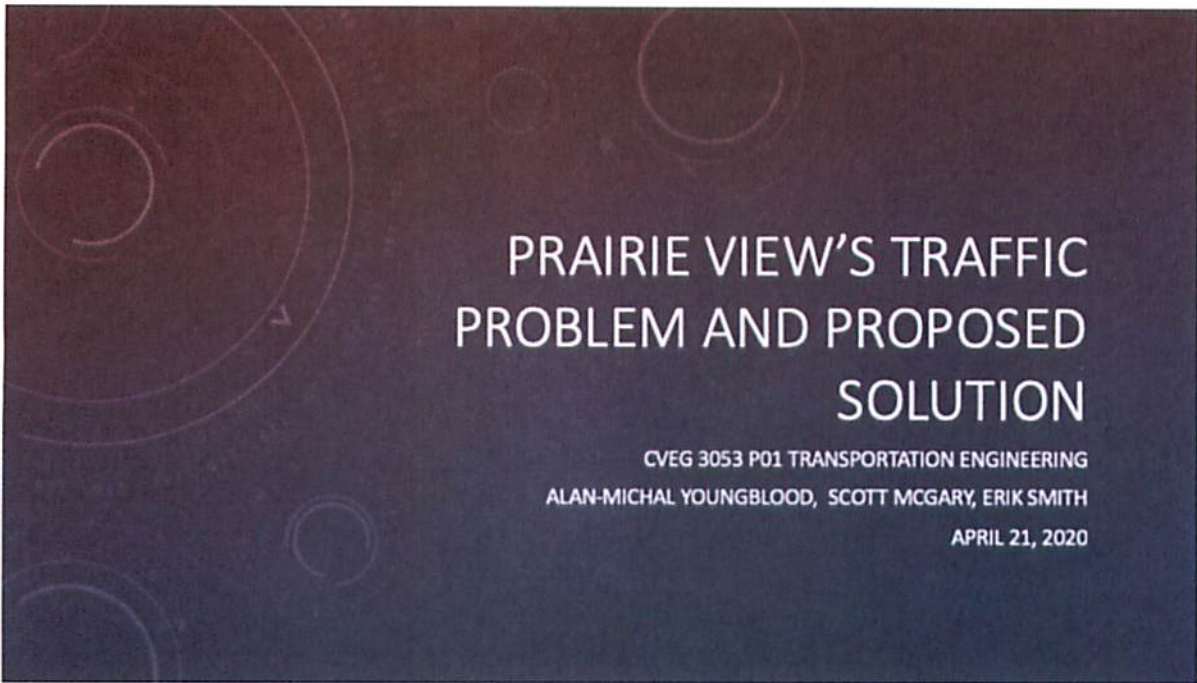
Now the engineer must compare the alternatives in place with the objectives developed in the 2nd step of the process to see which option is best. This includes doing benefits vs. cost calculations, determining profitability, and cost effectiveness. The pros and cons of each alternative must be studied to make the decision.

After taking into consideration revenue cost forecast, site location, and dealing with any political and legal processes that must be taken care of before building starts. Now the engineer must decide on what project that best fits the parameters of what is needed, the engineer must pick a project to start working on.

Once a project is chosen, the engineer must go in depth with the construction plans and specifications. These plans and specifications include designing piers, foundation, construction plans, as well as choosing a contractor. Once this is done, plans to complete the construction are finalized and then put to action to complete the project.

After the project is complete it would be best for those who are responsible for carrying out the project to seek feedback from the community that said project is in. The most common and effective way to get feedback on the project is holding a town hall meeting.

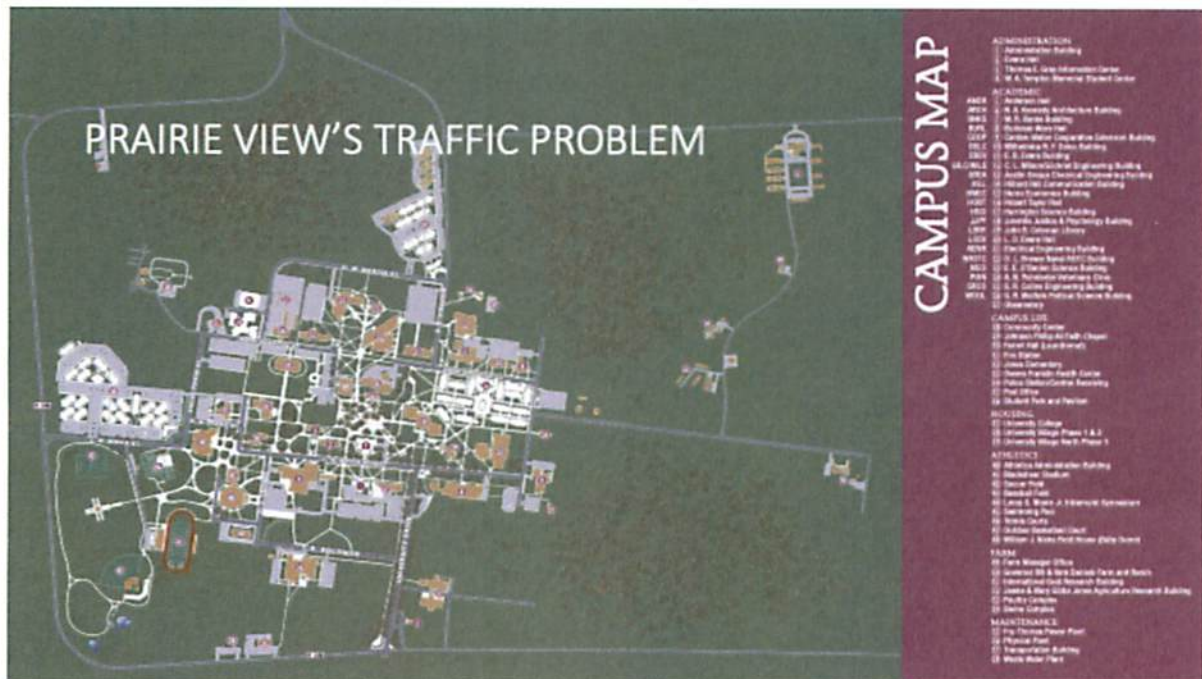
+12



PRAIRIE VIEW'S TRAFFIC PROBLEM AND PROPOSED SOLUTION

CVEG 3053 P01 TRANSPORTATION ENGINEERING
ALAN-MICHAL YOUNGBLOOD, SCOTT MCGARY, ERIK SMITH
APRIL 21, 2020

APRIL 21, 2020



YOUR GROUP SHOULD PRESENT THREE (3) ALTERNATIVES AS WELL AS MAKE A RECOMMENDATION REGARDING THE PREFERRED ALTERNATIVE THAT WILL ACHIEVE A REDUCTION OF 80% OF THE TRAFFIC ON UNIVERSITY DRIVE DURING THE PEAK-HOURS TO 40%

- Problem Solving
- Define the problem
- Gather in analyze problem
- Identify potential solutions
- Assess potential solutions determine which is best
- Analyze and evaluate the results

DEFINING THE PROBLEM

- What are the University's peak hours?
- How much traffic is 80%?
- How to reduce traffic?
- Where is traffic coming from?
- How much traffic is 40%?

Transportation
Planning process
should be used.
situation definition
is missing

-3

+15

GATHERING INFORMATION; ANALYZE PROBLEM

- Most commuters arrive on campus around 8:00 am and leave campus around 5:00 pm.
- Also 12:00 is a popular lunch time.
- Commuters are coming from the west, area like Houston and Cypress.
- Total enrollment at PVAMU is 9,500
- There is around 3,000 students, and 850 faculty and staff that commute to campus Monday through Friday
- 80% of 3,850 is 3,050
- 40% of 3,050 is 1,220

✓
good
job

POTENTIAL SOLUTIONS

- Option 1
- Have the lights at University Drive and FM 1098 on a longer timer so that traffic exiting 290 will the privilege of not waiting at the light.
- Traffic on Owens road will be encouraged to enter campus near the bowling alley.
- Traffic on 1098 will be encouraged to enter via L.W. Minor St
- Exiting commuters will be encouraged to exit through University DR or L.W. Minor.

✓

Step on
Search
for solutions

By what
means will
traffic be encouraged?

what
length of
time should the
traffic signals be
programmed for?

+3
Step



POTENTIAL SOLUTIONS

- Option 3
- To alleviate traffic on University drive all traffic will be encouraged to enter campus via E.E. Obanion LW Minor or street near bowling alley.
- Exiting commuters will be encouraged to leave via LW Minor
- University DR will be closed until it can be widened

If widening of Univ. Dr occurs, would that encourage more traffic?



Should this be
Evaluation of A Hermative



ASSESS POTENTIAL SOLUTIONS DETERMINE WHICH IS BEST

- Option 1: Best option, no added expenses
- Option 2: Good option, however many commuters will not be prone to exit James R Muse
- Option 3: Is not practical, will increase traffic drastically before it is able to decrease it.

what
assessment
is being
done here?
+1.5

Analysis of
Performance step
is missing
what is the criteria
used to perform
your analysis?
-3

ANALYZE AND EVALUATE THE RESULTS

- Based on the potential solutions, option 1 is the best solution.
- It will not only alleviate traffic on University DR by 40%, but also it will make traffic flow smoother.
- There will be no traffic jams on University DR once commuters get use to the change.
- Commuters will be able to enter campus will have the options to exit via E.E Obanion, L.W. Minor, University DR, and the route by the bowling alley.

How
so?

Should this
step be "choice
of project"? -0.5

How much traffic
will be displaced to
other locations?

No
assessment
was truly
performed. why so?
-1.5

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

SPRING 2020

Instructor: Dr. Judy Perkins, P.E.

Title of Assignment

**Lecture Assignment #2
Chapter 3 Stopping Sight Distance Computer Exercise**

Outcome Measured Using this Assignment

Student Outcome 5
**An ability to function effectively on a team whose members together
provide leadership, create a collaborative and inclusive environment,
establish goals, plan tasks, and meet objectives**

Brief Description of the suitability of this assignment for the outcome

This assignment requires the student to use a computer spreadsheet software to analyze the stopping distance for design speeds ranging from 30 km/hour to 120 km/hour in increments of 10 km/hour and grades ranging from -6% to +6% in 2% increments.

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 3053 – Transportation Engineering
Spring 2020**

Lecture Assignment #2

Given: 6 February 2020

Due: 11 February 2020 NLT 8:35am

Measuring Outcome ABET 3 (5) - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Chapter 3 Stopping Sight Distance Computer Exercise - Point value is (10-points)

This is a group (three individuals) assignment. Your team must complete the computer exercise described below. Ensure that your submission follows the following format:

- Lecture report cover page:
 - Title of lecture assignment
 - Course number, name, and section number
 - Name of each group member and respective roster number
 - Date
 - Spreadsheet
 - Heading with course number and name centered
 - Heading with title of laboratory assignment centered
 - Footer with due date – left aligned
1. Use a spreadsheet to construct a table of stopping distance for design speeds ranging from 30 km/hour to 120 km/hour in increments of 10 km/hour and grades ranging from -6% to +6% in 2% increments.

Standards and Practices

AASHTO Recommended Friction Coefficients

<u>(km/hr)</u>	<u>Coefficient of Skidding Friction (f)</u>
30	0.40
40	0.38
50	0.35
60	0.33
70	0.31
80	0.30
90	0.30
100	0.29
110	0.28
120	0.28

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 3053 – Transportation Engineering
Spring 2020**

Lecture Assignment #2 - Solution

Given: 6 February 2020

Due: 11 February 2020 NLT 8:35am

Measuring Outcome ABET 3 (5) - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

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90	0.30
100	0.29
110	0.28
120	0.28

Worksheet

km/h -> m/s factor =
 Acceleration of gravity =
 Reaction time =

0.277778
9.8
2.5

Speed, km/h	f	Grade						
		-0.06	-0.04	-0.02	0.00	0.02	0.04	0.06
30.00	0.40	31.25	30.68	30.16	29.69	29.27	28.89	28.54
40.00	0.38	47.46	46.30	45.27	44.35	43.52	42.77	42.09
50.00	0.35	68.66	66.47	64.55	62.84	61.32	59.96	58.73
60.00	0.33	94.16	90.54	87.38	84.61	82.16	79.97	78.01
70.00	0.31	125.77	120.06	115.13	110.84	107.07	103.73	100.75
80.00	0.30	160.54	152.46	145.54	139.54	134.29	129.66	125.54
90.00	0.30	195.37	185.15	176.38	168.79	162.15	156.29	151.08
100.00	0.29	240.81	226.91	215.25	205.19	196.44	188.74	181.92
110.00	0.28	292.91	274.87	259.60	246.51	235.17	225.25	216.49
120.00	0.28	341.01	319.54	301.37	285.80	272.30	260.49	250.07

CIVIL ENGINEERING DEPARTMENT
PRAIRIE VIEW A&M UNIVERSITY



9.5
10

CVEG 3053 TRANSPORTATION ENGINEERING
PO1

SPRING 2020

LECTURE ASSIGNMENT #2

Submitted by

Milton Cruz - #4

Scott McGary - #9

Samuel Agyemang - #1

Due

2/11/20

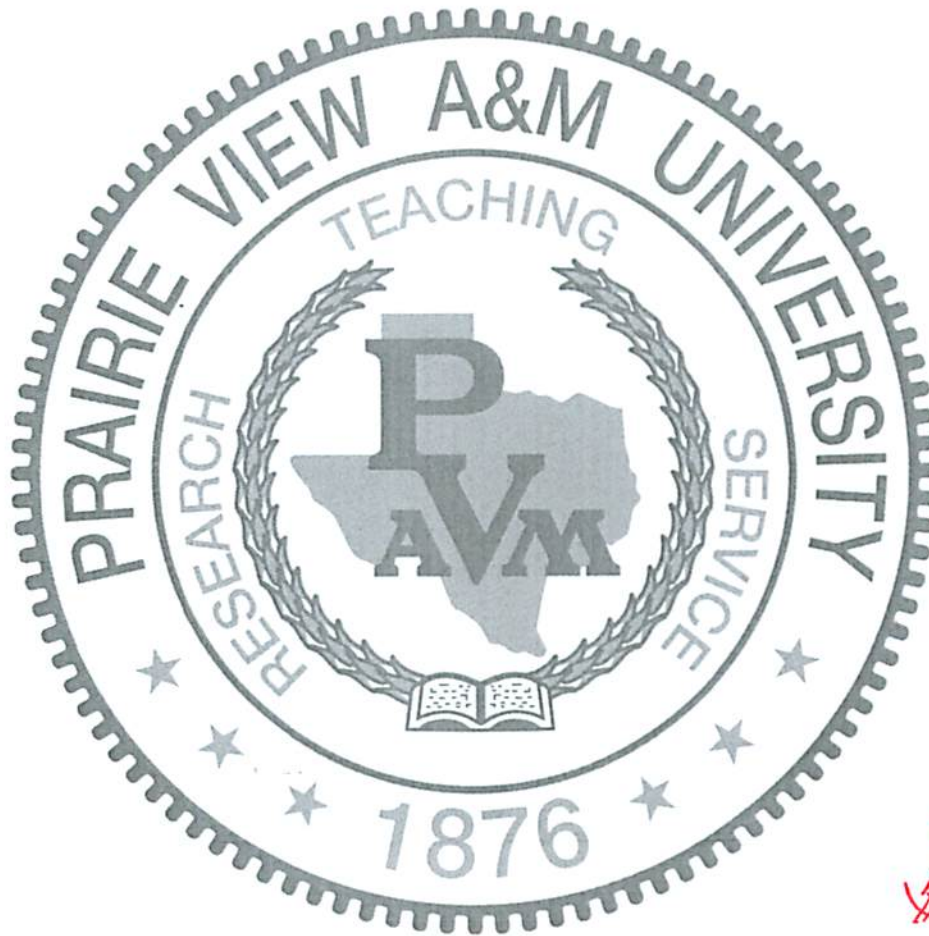
- 0.5
CVEG 3053 P01 - Transportation Engineering
Lecture Assignment #2 ~~Stopping Sight Distance~~

km/hr	mph	Coefficient of Skidding Friction (f)	Grade	Stopping Sight Distance (ft)	Stopping Sight Distance (m)
30	18.64	0.40	-6%	102.57	31.27
			-4%	100.68	30.70
			-2%	98.99	30.18
			0%	97.46	29.71
			2%	96.09	29.29
			4%	94.83	28.91
			6%	93.69	28.56
40	24.85	0.38	-6%	155.69	47.47
			-4%	151.91	46.31
			-2%	148.54	45.29
			0%	145.53	44.37
			2%	142.82	43.54
			4%	140.37	42.80
			6%	138.14	42.12
50	31.07	0.35	-6%	225.13	68.64
			-4%	217.97	66.45
			-2%	211.68	64.54
			0%	206.11	62.84
			2%	201.14	61.32
			4%	196.68	59.96
			6%	192.65	58.74
60	37.28	0.33	-6%	308.61	94.09
			-4%	296.78	90.48
			-2%	286.47	87.34
			0%	277.41	84.58
			2%	269.39	82.13
			4%	262.24	79.95
			6%	255.81	77.99
70	43.50	0.31	-6%	412.10	125.64
			-4%	393.42	119.94
			-2%	377.31	115.03
			0%	363.28	110.76
			2%	350.95	107.00
			4%	340.03	103.67
			6%	330.29	100.70
80	49.71	0.30	-6%	525.89	160.33
			-4%	499.49	152.28
			-2%	476.86	145.38
			0%	457.25	139.40
			2%	440.09	134.17
			4%	424.94	129.56
			6%	411.49	125.45

~~CVEG 3053 P01 - Transportation Engineering~~
~~Lecture Assignment #2 Stopping Sight Distance~~

90	55.92	0.30	-6%	639.89	195.09
			-4%	606.47	184.90
			-2%	577.83	176.17
			0%	553.01	168.60
			2%	531.29	161.98
			4%	512.13	156.14
			6%	495.10	150.94
100	62.14	0.29	-6%	787.93	240.22
			-4%	743.16	226.57
			-2%	705.03	214.95
			0%	672.15	204.92
			2%	643.52	196.20
			4%	618.36	188.52
			6%	596.07	181.73
110	68.35	0.28	-6%	959.05	292.39
			-4%	900.06	274.41
			-2%	850.15	259.19
			0%	807.36	246.15
			2%	770.29	234.84
			4%	737.84	224.95
			6%	709.22	216.22
120	74.56	0.28	-6%	1116.43	340.38
			-4%	1046.23	318.97
			-2%	986.83	300.86
			0%	935.92	285.34
			2%	891.79	271.89
			4%	853.18	260.12
			6%	819.11	249.73

Prairie View A&M University



5-2 = 3/10 + 1 = 4/10

~~Two submitted for grading~~
Two submitted for grading
1st submission

Missing Section # -1

CVEG 305- Transportation Engineering
Lecture Assignment #2

Assigned: February 6, 2020

Due: February 11, 2020

Submitted by: Erik Smith(12), Alex Martinez(8), and Johnathan Chevalier(3)

Submitted to: Dr. Judy Perkins

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

SPRING 2021

Instructor: Dr. Judy Perkins, P.E.

Title of Assignment

**Lecture Assignment #2A - Stopping Sight Distance Computer Exercise
Chapter 3 – Characteristics of the Driver, the
Pedestrian, the Bicyclist, the Vehicle, and the Road**

Outcome Measured Using this Assignment

Student Outcome 5

**An ability to function effectively on a team whose members together
provide leadership, create a collaborative and inclusive environment,
establish goals, plan tasks, and meet objectives**

Brief Description of the suitability of this assignment for the outcome

This assignment requires the student to use a computer spreadsheet software to analyze the stopping distance for design speeds ranging from 30 km/hour to 120 km/hour in increments of 10 km/hour and grades ranging from -6% to +6% in 2% increments.

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 3053 – Transportation Engineering
Spring 2021**

Lecture Assignment #2A – Stopping Sight Distance Computer Exercise

Given: 11 February 2021

Due: 18 February 2021 NLT 7:05am CST

Measuring Outcome ABET 3 (5) - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Chapter 3 Stopping Sight Distance Computer Exercise - Point value is (10-points)

This is a group (at least two and no more than three individuals) assignment. Your team must complete the computer exercise described below. Ensure that your submission follows the following format:

- Lecture Report Cover Page:
 - Complete title of lecture assignment
 - Course number, name, and section number
 - First name and last name of each group member
 - Date Given
 - Date Due
 - Excel File and Hard-Copy Submission:
 - Heading with course number, name, and section number centered
 - Heading with complete title of lecture centered
 - Footer with due date – left aligned
 - Upload the complete assignment to your respective Dropbox folder
1. Use Excel to construct a table of stopping sight distance for design speeds ranging from 30 km/hour to 120 km/hour in increments of 10 km/hour and grades ranging from -6% to +6% in 2% increments. You must use the US stopping sight distance equations.

Standards and Practices

AASHTO Recommended Friction Coefficients

(km/hr)	Coefficient of Skidding Friction (f)
30	0.40
40	0.38
50	0.35
60	0.33
70	0.31
80	0.30
90	0.30
100	0.29
110	0.28
120	0.28

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department

CVEG 3053 – Transportation Engineering
Spring 2021

Lecture Assignment #2A – Stopping Sight Distance Computer Exercise -Solution

Given: 11 February 2021

Due: 18 February 2021 NLT 7:05am CST

Measuring Outcome ABET 3 (5) - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Chapter 3 Stopping Sight Distance Computer Exercise - Point value is (10-points)

This is a group (at least two and no more than three individuals) assignment. Your team must complete the computer exercise described below. Ensure that your submission follows the following format:

- Lecture Report Cover Page:
 - Complete title of lecture assignment - 0.5
 - Course number, name, and section number - 0.5
 - First name and last name of each group member 0.5
 - Date Given 0.5
 - Date Due 0.5
- Excel File and Hard-Copy Submission: x1
 - Heading with course number, name, and section number centered
 - Heading with complete title of lecture centered 0.5
 - Footer with due date – left aligned 0.5
- Upload the complete assignment to your respective Dropbox folder

Handwritten notes:
0.5/3 = 0.16
0.16
0.18

1. Use Excel to construct a table of stopping sight distance for design speeds ranging from 30 km/hour to 120 km/hour in increments of 10 km/hour and grades ranging from -6% to +6% in 2% increments. You must use the US stopping sight distance equations.

Handwritten note: 6 pts

Standards and Practices

AASHTO Recommended Friction Coefficients

(km/hr)	Coefficient of Skidding Friction (f)
30	0.40
40	0.38
50	0.35
60	0.33
70	0.31
80	0.30
90	0.30
100	0.29
110	0.28
120	0.28

Worksheet

km/h -> m/s factor =
 Acceleration of gravity =
 Reaction time =

0.277778
9.8
2.5

Speed, km/h	f	Grade						
		-0.06	-0.04	-0.02	0.00	0.02	0.04	0.06
30.00	0.40	31.25	30.68	30.16	29.69	29.27	28.89	28.54
40.00	0.38	47.46	46.30	45.27	44.35	43.52	42.77	42.09
50.00	0.35	68.66	66.47	64.55	62.84	61.32	59.96	58.73
60.00	0.33	94.16	90.54	87.38	84.61	82.16	79.97	78.01
70.00	0.31	125.77	120.06	115.13	110.84	107.07	103.73	100.75
80.00	0.30	160.54	152.46	145.54	139.54	134.29	129.66	125.54
90.00	0.30	195.37	185.15	176.38	168.79	162.15	156.29	151.08
100.00	0.29	240.61	226.91	215.25	205.19	196.44	188.74	181.92
110.00	0.28	292.91	274.87	259.60	246.51	235.17	225.25	216.49
120.00	0.28	341.01	319.54	301.37	285.80	272.30	260.49	250.07

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department



5/10

CVEG 3053 Z01 – Transportation Engineering ✓

Spring 2021

**Lecture Assignment #2A – Stopping Sight
Distance Computer Exercise** ✓

Paige Hines, Michael LeBlanc, Maalvika Aggarwal ✓

Given: 11 February 2021 ✓

Due: 23 February 2021 ✓

CVEG 3053 Z01 – Transportation Engineering ✓
Lecture Assignment #2A – Stopping Sight Distance Computer Exercise ✓

Stopping Sight Distance for Design Speed									
Velocity		Skidding Friction Coefficient	SSD for non-level roads			SSD for level roads	SSD for non-level roads		
(km/hr)	(mph)	(f)	Grade (g)						
~	~	~	-6%	-4%	-2%	0%	2%	4%	6%
30	18.6	0.40	72.4	72.7	72.9	73.1	73.4	73.6	73.8
40	24.9	0.38	97.9	98.3	98.8	99.2	99.6	100.0	100.4
50	31.1	0.35	123.5	124.2	124.8	125.4	126.1	126.7	127.4
60	37.3	0.33	149.5	150.5	151.4	152.3	153.2	154.2	155.1
70	43.5	0.31	175.6	176.9	178.1	179.4	180.7	181.9	183.2
80	49.7	0.30	202.5	204.1	205.8	207.4	209.1	210.7	212.3
90	55.9	0.30	230.5	232.6	234.7	236.8	238.9	241.0	243.1
100	62.1	0.29	258.0	260.5	263.1	265.7	268.3	270.8	273.4
110	68.4	0.28	285.5	288.6	291.7	294.8	297.9	301.0	304.2
120	74.6	0.28	314.8	318.5	322.2	325.9	329.6	333.3	337.1

incorrect values - 5

- ✓ CVEG 3053-Z01 Transportation Engineering
 - ✓ Lecture Assignment #2A-Stopping Sight Distance Computer Exercise
 - ✓ Given: 11 February 2021
 - ✓ Due: 23 February 2021
 - ✓ Submitted by: Nathaniel Smith, Caleb Ross, and Omar Rafey
- Submitted to: Dr. Perkins

10/10

CVEG 3053-Z01 Transportation Engineering
Lecture Assignment #2A-Stopping Sight Distance Computer Exercise

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9
Design Speed (mph)	SSD with -6% Grade		SSD with -4% Grade		SSD with -2% Grade		SSD with 0%	
18.6	102.27		100.39		98.7			
24.85	152.3		148.91		145.89			
31.1	225.47		218.29		211.99			
37.3	308.84		297		286.68			
43.5	412.16		393.47		377.36			
49.7	525.72		499.33		476.71			
55.9	639.43		606.05		577.43			
62.1	787.72		742.41		704.32			
68.4	960.24		901.17		851.19			
74.6	1117.36		1047.09		987.64			

CVEG 3053-Z01 Transportation Engineering
Lecture Assignment #2A-Stopping Sight Distance Computer Exercise

Column10	Column11	Column12	Column13	Column14	Column15	Column16
Grade	SSD with 2% Grade		SSD with 4% Grade		SSD with 6% Grade	
97.19		95.81		94.56		93.42
145.49		140.71		138.48		136.07
206.41		201.43		196.96		192.93
277.65		269.58		262.42		255.99
363.33		351		340.08		330.34
457.1		439.95		424.81		411.36
552.63		530.93		511.79		494.77
671.48		642.89		617.75		595.49
808.34		771.21		738.72		710.05
936.67		892.51		853.86		819.76

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

SPRING 2021

Instructor: Dr. Judy Perkins, P.E.

Title of Assignment

**Lecture Assignment #2B – Stopping Sight Distance Problems
Chapter 3 – Characteristics of the Driver, the
Pedestrian, the Bicyclist, the Vehicle, and the Road**

Outcome Measured Using this Assignment

Student Outcome 5

**An ability to function effectively on a team whose members together
provide leadership, create a collaborative and inclusive environment,
establish goals, plan tasks, and meet objectives**

Brief Description of the suitability of this assignment for the outcome

This assignment requires the student to compute the minimum sight distance based on a variety of scenarios related to vehicle speed and the roadway grade (slope).

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department

CVEG 3053 – Transportation Engineering
Spring 2021

Lecture Assignment #2B – Stopping Sight Distance Problems

Given: 11 February 2021

Due: 18 February 2021 NLT 7:05am CST

Measuring Outcome ABET 3 (5) - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Chapter 3 Stopping Sight Distance Problems - Point value is (30-points)

This is a group (at least two and no more than three individuals) assignment. Your team must complete the problems described below. Ensure that your submission follows the following format:

- Lecture Report Cover Page:
 - Complete title of lecture assignment
 - Course number, name, and section number
 - First name and last name of each group member
 - Date Given
 - Date Due
 - Submitting your response to the problems requiring calculations is as follows:
 - Use **only engineering paper (no graph paper)**
 - Each problem should start a new page
 - The method to use to solve each problem is
 - Given
 - Find
 - Approach
 - Answer with a block around it
 - Your numerical answer should not go beyond two places after the decimal point.
 - Upload the complete assignment to your respective Dropbox folder
- .
1. Determine the stopping sight distance on a -2.5% grade at a design speed of 56 mph and the skidding friction factor is 0.30.
 2. Determine the stopping sight distance on a +1.5% grade at a design speed of 62 mph and the skidding friction factor is 0.29.
 3. Determine the stopping sight distance on a -4.0% grade at a design speed of 43 mph and the skidding friction factor is 0.31.

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department

CVEG 3053 – Transportation Engineering
Spring 2021

Lecture Assignment #2B – Stopping Sight Distance Problems - Solution

Given: 11 February 2021

Due: 18 February 2021 NLT 7:05am CST

Measuring Outcome ABET 3 (5) - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Chapter 3 Stopping Sight Distance Problems - Point value is (30-points)

This is a group (at least two and no more than three individuals) assignment. Your team must complete the problems described below. Ensure that your submission follows the following format:

- Lecture Report Cover Page:
 - Complete title of lecture assignment 1 pt
 - Course number, name, and section number 1 pt
 - First name and last name of each group member 1 pt
 - Date Given 1 pt
 - Date Due 1 pt
 - Submitting your response to the problems requiring calculations is as follows:
 - Use **only engineering paper (no graph paper)**
 - **Each problem should start a new page**
 - The method to use to solve each problem is
 - Given
 - Find
 - Approach
 - Answer with a block around it
 - Your numerical answer should not go beyond two places after the decimal point.
 - Upload the complete assignment to your respective Dropbox folder
1. Determine the stopping sight distance on a -2.5% grade at a design speed of 56 mph and the skidding friction factor is 0.30. 8.33 pts

Total required stopping sight distance

$$s = d_r + d_b$$

Reaction distance

$$d_r = vt_r = (90 \text{ km/h}) \left(\frac{1,000 \text{ m/km}}{3,600 \text{ s/h}} \right) (2.5 \text{ s}) = 62.5 \text{ m}$$

Braking Distance

$$f = 0.30 \text{ (Table 3.3)}$$

$$G = -0.025 \text{ (given)}$$

$$d_b = \frac{v^2}{2g(f \pm G)} = \frac{\left[(90 \text{ km/h}) \left(\frac{1,000 \text{ m/km}}{3,600 \text{ s/h}} \right) \right]^2}{2(9.8 \text{ m/s}^2)(0.30 - 0.025)} = 116.0 \text{ m}$$

Total sight distance

$$s = d_r + d_b = 62.5 + 116.0 = 178.5 \text{ m} = 585.63 \text{ ft}$$

2. Determine the stopping sight distance on a +1.5% grade at a design speed of 62 mph and the skidding friction factor is 0.29.

Total required stopping sight distance

$$s = d_r + d_b$$

Reaction distance

$$d_r = vt_r = (100 \text{ km/h}) \left(\frac{1,000 \text{ m/km}}{3,600 \text{ s/h}} \right) (2.5 \text{ s}) = 69.4 \text{ m}$$

Braking Distance

$$f = 0.29 \text{ (Table 3.3)}$$

$$G = +0.015 \text{ (given)}$$

$$d_b = \frac{v^2}{2g(f \pm G)} = \frac{\left[(100 \text{ km/h}) \left(\frac{1,000 \text{ m/km}}{3,600 \text{ s/h}} \right) \right]^2}{2(9.8 \text{ m/s}^2)(0.29 + 0.015)} = 129.1 \text{ m}$$

Total sight distance

$$s = d_r + d_b = 69.4 + 129.1 = 198.5 \text{ m}$$

$$= 651.2 \text{ ft}$$

3. Determine the stopping sight distance on a -4.0% grade at a design speed of 43 mph and the skidding friction factor is 0.31.

Total required stopping sight distance

$$s = d_r + d_b$$

$$= 48.6 + 71.4 = 120 \text{ m} = 393.70 \text{ ft}$$

Reaction distance

$$d_r = vt_r = (70 \text{ km/h}) \left(\frac{1000 \text{ m/km}}{3600 \text{ s/h}} \right) (2.5 \text{ s}) = 48.6 \text{ m}$$

Braking Distance

$$f = 0.31 \text{ (Table 3.3)}$$

$$G = -0.04 \text{ (given)}$$

$$d_b = \frac{v^2}{2g(f \pm G)} = \frac{\left[(70 \text{ km/h}) \left(\frac{1000 \text{ m/km}}{3600 \text{ s/h}} \right) \right]^2}{2(9.8 \text{ m/s}^2)(0.31 - 0.04)} = 71.4 \text{ m}$$

8:33pts

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department



30/30

CVEG 3053 Z01 – Transportation Engineering ✓

Spring 2021

Lecture Assignment #2B – Stopping Sight ✓

Distance Problems

Paige Hines, Michael LeBlanc, Maalvika Aggarwal ✓

Given: 11 February 2021 ✓

Due: 23 February 2021 ✓

①

QUESTION-1

• Given:-

$$V = 56 \text{ mph}$$

$$g = -2.5\%$$

$$f = 0.30$$

• Find:-

Stopping sight distance (SSD)

• Approach:-

$$SSD = 1.47 Vt + \frac{V^2}{30(f \pm g)}$$

Here, $t = 2.5 \text{ s}$ (default)

$$g = \frac{2.5}{100} = 0.025$$

Putting all the values in the equation

$$SSD = 1.47(56)(2.5) + \frac{(56)^2}{30(0.30 - 0.025)}$$

$$SSD = 208.8 + 380.12$$

$$SSD = 585.92 \text{ ft}$$



+ 8.33

2

QUESTION 2

• Given :-

$$V = 62 \text{ mph}$$

$$g = 1.5 \%$$

$$f = 0.29$$

• Find :-

Stopping sight distance (SSD)

• Approach:

$$SSD = 1.47 Vt + \frac{V^2}{30(f+g)}$$

$$\text{Here, } t = 2.5 \text{ s (default)}$$

$$g = \frac{1.5}{100} = 0.015$$

Putting all the values in the equation,

$$SSD = 1.47(62)(2.5) + \frac{(62)^2}{30(0.29 + 0.015)}$$

$$SSD = 227.85 + 420.11$$

$$SSD = 647.96 \text{ ft}$$

+8.33

3

QUESTION 3

• Given:

$$v = 43 \text{ mph}$$

$$g = -4.0 \%$$

$$f = 0.31$$

• Find:

stopping sight distance (SSD)

• Approach:-

$$SSD = 1.47 vt + \frac{v^2}{30(t+g)}$$

Here,

$$t = 2.5 \text{ s (default)}$$

$$g = \frac{4.0}{100} = 0.04$$

Putting all the values in the equation

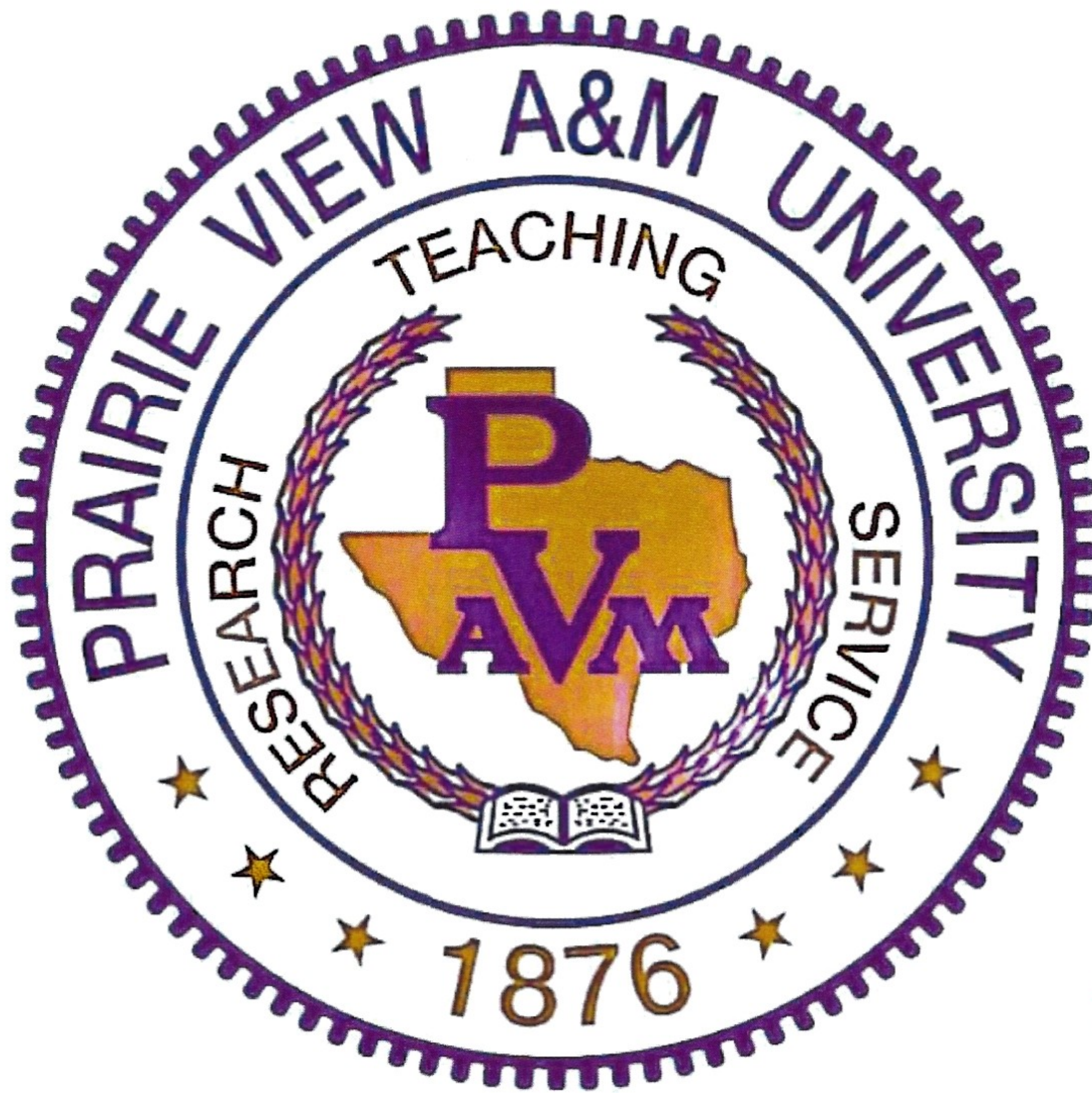
$$SSD = 1.47(43)(2.5) + \frac{43^2}{30(0.31 - 0.04)}$$

$$SSD = 158.03 + 228.27$$

$$SSD = 386.29 \text{ ft}$$

✓ +8.33

Prairie View A&M University



30/30

CVEG 3053-Z01 Transportation Engineering ✓

Lecture Assignment #2B-Stopping Sight Distance Problems ✓

Given: 11 February 2021 ✓

Due: 23 February 2021 ✓

Submitted by: Nathaniel Smith, Caleb Ross, and Omar Rafey ✓

Submitted to: Dr. Perkins ✓

1. Determine the stopping sight distance on a -2.5% grade at a design speed of 56 mph and the skidding friction factor is 0.30.

Given: $V = 56 \text{ mph}$

$$g = -2.5\% = -0.025$$

$$f = 0.30$$

$$t = 2.5 \text{ s}$$

Find: Stopping Sight Distance, SSD

Approach:
$$SSD = 1.47 Vt + \frac{V^2}{30(f \pm g)}$$

$$SSD = 1.47(56 \text{ mph})(2.5 \text{ s}) + \frac{(56 \text{ mph})^2}{30(0.3 - 0.025)}$$

$$SSD = 205.8 + 380.12$$

$SSD = 585.92 \text{ ft}$

+8.33

2. Determine the stopping sight distance on a +1.5% grade at a design speed of 62 mph and the skidding friction factor is 0.29.

Given: $V = 62 \text{ mph}$
 $g = +1.5\% = 0.015$
 $f = 0.29$
 $t = 2.5 \text{ s}$

Find: Stopping Sight Distance, SSD

Approach: $SSD = 1.47Vt + \frac{V^2}{30(f \pm g)}$

$$SSD = 1.47(62 \text{ mph})(2.5 \text{ s}) + \frac{(62 \text{ mph})^2}{30(0.29 + 0.015)}$$

$$SSD = 227.85 + 420.11$$

$SSD = 647.96 \text{ ft}$

 ✓

+ 8.33

3. Determine the stopping sight distance on a -4.0% grade at a design speed of 43 mph and the skidding friction factor is 0.31.

Given: $V = 43 \text{ mph}$

$g = -4.0\% = -0.04$

$f = 0.31$

$t = 2.5 \text{ s}$

Find: Stopping Sight Distance, SSD

Approach: $SSD = 1.47Vt + \frac{V^2}{30(f \pm g)}$

$$SSD = 1.47(43 \text{ mph})(2.5 \text{ s}) + \frac{(43 \text{ mph})^2}{30(0.31 - 0.04)}$$

$$SSD = 158.03 + 228.27$$

$SSD = 386.30 \text{ ft}$

 ✓

+8.33

ASSIGNMENTS FOR OUTCOME “5”

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

‘Laboratory Performance Based Outcome Assessment Tools’

**CIVIL & ENVIRONMENTAL ENGINEERING
DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

**SPRING 2022
Instructor: Dr. Kai-Wei Liu**

Title of Assignment

Lab 2: Traffic Spot Speed Studies

Outcome Measured Using this Assignment

Outcome 5

**An ability to function effectively on a team whose members together
provide leadership, create a collaborative and inclusive environment,
establish goals, plan tasks, and meet objectives**

**Brief Description of the suitability of this assignment for the
outcome**

Through field measurement, students were able to conduct a spot speed study and to statistically analyze the obtained data for a speed limit recommendation through teamwork. Students communicated their findings in technical lab report.

LAB 2
GROUP # 1

CRITERIA	Maximum Points	Points Awarded
1. TITLE PAGE Includes the title of the report, the authors and team number, and date.	5	5
2. TABLE OF CONTENTS Includes all sections of the report, figures, tables, and appendices with corresponding page numbers.	5	5
3. ABSTRACT Summarizes what was done, what was found, and its importance	10	10
4. INTRODUCTION Includes motivation, general summary, definitions, theory, and background.	10	10
5. PROCEDURE Describes the procedure step-by-step.	10	6
6. RESULTS	40	
Average speed of vehicles	8	8
Standard deviation of measurements	8	8
Comparison of the average speed with the speed limit and provide suggestions	8	8
SSD for the average speed and the speed limit on level roads	8	8
SSD comparison	8	8
7. DISCUSSION Analysis of the results based on the reporting requirements. Problems encountered during the procedure and effects on the results are discussed.	10	10
8. CONCLUSIONS Summary of the analysis results, lessons, and recommendations.	10	7
TOTAL		93

Suggestions:

1. Titles of tables were not provided. When a table is listed in the content, it needs to be shown after the paragraph.
2. Tested results need to be shown in the results and discussion section.
3. Procedures should not be just a bullet form.
4. Please provide recommendations for future improvement and/or future research

Prairie View A&M University
College of Engineering
Department of Civil & Environmental Engineering



CVEG 3302 P01 Transportation Engineering
LABORATORY REPORT ON
"Traffic Spot Speed Studies"

Conducted on
February 24th, 2022

Submitted by: Group 1
Denia Leroy
Allyssa Reynolds
Hunter Rodgers

On
March 3rd, 2022
To
Dr. Lui

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Abstract

The purpose of this experiment is to conduct a spot speed study on a selected street on PVAMU campus. The students conducting the procedure found that the current speed limit is acceptable for the roadway being tested. It's important to conduct this type of study, so engineers can collect and analyze the average speed among vehicles such as cars, pick up trucks, buses, and trucks for establishing proper speed limits along main highways and streets.

Introduction

Speed is a very important aspect of traffic engineering because it deals with the safety and comfortability of drivers on the road. Speed is measured for a wide range of traffic analyses by engineers. A spot speed study is an instantaneous speed of a vehicle at a specified location. There are different measurements used to determine the spot speed as accurately as possible such as the enoscope, radar, and direct measurement of time.

This experiment closely studies the average speed of randomly selected cars traveling down a selected site to determine the sustainability of the set speed limit. To determine the appropriate roadway speed limit many factors have to be considered such as weather, traveling distance, road conditions, and direction.

The objective of the traffic spot speed study is to calculate the average speed among all the vehicles considered for the experiment, standard deviation, and stopping sight distance (SSD). The stopping sight is defined as the minimum sight distance required for a driver to stop a vehicle after seeing an object in the path of the vehicle without hitting an object.

Experimental Procedure

1. Select street to conduct spot speed study of vehicles
2. Record the time, traveling distance, direction, weather and surface conditions of the site
3. Record a sample of at least 20 vehicles
4. Avoid alerting motorists the presence of a spot speed study to prevent innaccurate samples caused by distractions

Results

Table 1.0:

Car No.	Speed (ft/s)	Speed (mph)
1	27.49	18.75
2	24.95	17.01
3	25.44	17.35
4	26.24	17.89
5	23.96	16.34
6	28.32	19.31
7	19.03	12.97
8	18.52	12.63
9	27.04	18.43
10	20.46	13.95
11	26.43	18.02
12	26.13	17.82
13	14.95	10.19
14	28.80	19.64
15	30.36	20.70
16	30.12	20.54
17	16.53	11.27
18	24.05	16.40
19	29.60	20.18
20	28.74	19.59
21	25.65	17.49
Average	24.90	16.97

Table 1 represents each car's speed over the distance of 0.071 miles and the average speed of 21 cars total.

Results and Discussion

There were numerous parameters identified during this experiment, including the individual and average speed of the vehicles, the standard deviation of the individual speeds, the stopping sight distance from the average speed, and the suitability of the current speed limit.

The average speed of the vehicles found was 24.90 feet per second (ft/s) or 16.97 miles per hour (mph), as provided from Table 1.0. The standard deviation obtained was 3.07. The percentage variance of the actual and average speed limit was 15.15%, as the speed limit of the leveled roadway is 20 mph. This means there was a slight variance between the actual and average speed limits. This variance allowed us to determine that the current speed limit is adequate for the traffic flow and roadway conditions. The stopping sight distance, SSD, was determined to be

0.017 miles for the average speed, and 0.021 miles for the actual speed. The variance between the two showed a 19.05% difference, showing the current speed limit is acceptable.

There were various problems/errors identified while conducting this experiment. One error identified was human error. Due to the road length observed, the time it took for the cars to reach the total distance of 0.071 miles may have been incorrect. This is due to human sight, as group members struggled to identify the starting and stopping points consistently. This could have been avoided by choosing a shorter distance to observe. Another error identified was a systematic error. The road observed was a high traffic area, so the car's speed significantly decreased as the road became crowded. This caused some of the results to be incorrect, as the experimental conditions were altered. This could have been avoided by choosing a roadway with moderate traffic flow.

Conclusion

All objectives were met. The average speed determined was 16.97 mph over a distance of 0.071 miles. When compared to the current speed limit of 20 mph, we believe the current speed limit is adequate for the roadway. Other parameters were determined, such as the stopping sight distance (SSD), standard deviation, and errors identified within the experiment. One significant error that occurred was systematic, as the heavy traffic flow directly impacted the speed of each vehicle. This caused our investigation to be conducted under unregular conditions, providing inaccurate information.

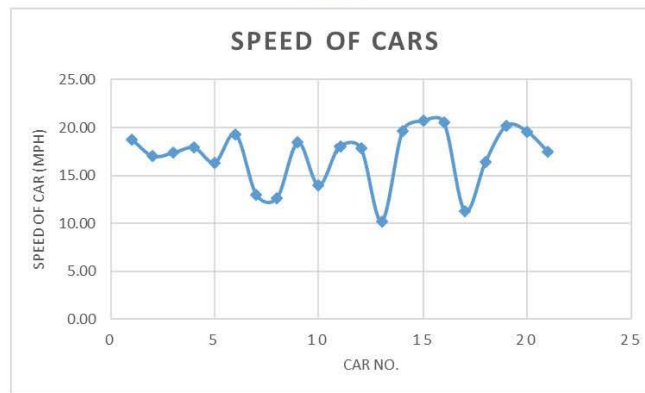
Appendices

Table 2.0:

Car No.	Distance (ft)	Distance (miles)	Time (s)	Time (hr)	Speed (ft/s)	Speed (mph)
1	375	0.071	13.64	0.0038	27.49	18.75
2	375	0.071	15.03	0.0042	24.95	17.01
3	375	0.071	14.74	0.0041	25.44	17.35
4	375	0.071	14.29	0.0040	26.24	17.89
5	375	0.071	15.65	0.0043	23.96	16.34
6	375	0.071	13.24	0.0037	28.32	19.31
7	375	0.071	19.71	0.0055	19.03	12.97
8	375	0.071	20.25	0.0056	18.52	12.63
9	375	0.071	13.87	0.0039	27.04	18.43
10	375	0.071	18.33	0.0051	20.46	13.95
11	375	0.071	14.19	0.0039	26.43	18.02
12	375	0.071	14.35	0.0040	26.13	17.82
13	375	0.071	25.08	0.0070	14.95	10.19
14	375	0.071	13.02	0.0036	28.80	19.64
15	375	0.071	12.35	0.0034	30.36	20.70
16	375	0.071	12.45	0.0035	30.12	20.54
17	375	0.071	22.69	0.0063	16.53	11.27
18	375	0.071	15.59	0.0043	24.05	16.40
19	375	0.071	12.67	0.0035	29.60	20.18
20	375	0.071	13.05	0.0036	28.74	19.59
21	375	0.071	14.62	0.0041	25.65	17.49
Average			15.66	0.0043	24.90	16.97

Table 2.0 reflects the average speed of each vehicle over a distance of 0.071 miles.

Graph 1.0:



Graph 1 is a graphical representation of each car's speed over a distance of 0.071 miles.

Equation 1: Conversion of feet to miles

$$\text{Distance in miles} = \frac{x \text{ (ft)}}{5280}$$

Equation 1a: Sample Calculation of Equation 1

$$\text{Distance} = \frac{x \text{ (ft)}}{5280} = \frac{375 \text{ ft}}{5280} = 0.071 \text{ miles}$$

Equation 2: Conversion of ft/s to miles/hour

$$\text{Speed} = \frac{x \text{ (ft)}}{\text{time(s)}} = \frac{\frac{x \text{ (ft)}}{5280}}{\text{time(s)} \cdot 60 \left(\frac{\text{min}}{\text{hr}} \right)}$$

Equation 2a: Sample Calculation of Equation 2

$$\text{Speed} = \frac{\frac{x \text{ (ft)}}{5280}}{\text{time(s)} \cdot 60 \left(\frac{\text{min}}{\text{hr}} \right)} = \frac{\frac{375}{5280}}{13.64 \cdot 60} = 18.745 \text{ miles per hour}$$

Equation 3: Stopping Sight Distance (SSD)

$$\text{SSD} = 1.47 \cdot u \cdot \text{PRT} + \frac{u^2}{30 \left(\frac{a}{g} - 32.2 \right)} \quad \text{SSD} = 1.47 \cdot 16.97 \cdot 2.5 + \frac{16.97^2}{30 \left(\frac{11.2}{32.2} - 32.2 \right)} = 38.33 \text{ ft} = 0.017 \text{ miles}$$

Equation 3a: Sample Calculation of Equation 3**Equation 4: Percentage Variance**

$$\frac{|\text{actual value} - \text{expected value}|}{\text{expected value}} \cdot 100$$

Equation 5: Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x_i - \mu)^2}{N}}$$

Equation 6: Average)

$$\frac{x+y}{2}$$

Equation 6a: Sample Calculation of Equation 3

$$\frac{10+10}{2} = 10$$

Reference

1. "Methods and Practices for Setting Speed Limits: An Informational Report - Safety | Federal Highway Administration." *Dot.gov*, 2009, safety.fhwa.dot.gov/speedmgt/ref_mats/fhwas12004/.
2. <https://www.engineeringenotes.com/transportation-engineering/traffic-engineering/spot-speed-studies-in-traffic-engineering-endoscope-measurement-and-methods/48389>

**CIVIL & ENVIRONMENTAL ENGINEERING
DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

**SPRING 2022
Instructor: Dr. Kai-Wei Liu**

Title of Assignment

Lab 5: Signal Analysis

Outcome Measured Using this Assignment

Outcome 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Brief Description of the suitability of this assignment for the outcome

Through field measurement, students were able to conduct a signal analysis and to statistically analyze the obtained data for improving the signal's design by changing the phasing pattern and/or durations of green, yellow, and all-red time through teamwork. Students communicated their findings in technical lab report.

LAB 5
GROUP # _____ 1 _____

CRITERIA	Maximum Points	Points Awarded
1. TITLE PAGE Includes the title of the report, the authors and team number, and date.	2	2
2. TABLE OF CONTENTS Includes all sections of the report, figures, tables, and appendices with corresponding page numbers.	3	3
3. ABSTRACT Summarizes what was done, what was found, and its importance	5	2
4. INTRODUCTION Includes motivation, general summary, definitions, theory, and background.	5	5
5. PROCEDURE Describes the procedure step-by-step.	5	3
6. RESULTS	55	
turning movement volumes for all approaches	10	10
record the current signal phasing pattern	10	10
length of the green, yellow, and all-red time for each phase	10	10
delay for each lane group, each approach, and the intersection as a whole	15	15
Improve the signal's design	10	10
7. DISCUSSION Analysis of the results based on the reporting requirements. Problems encountered during the procedure and effects on the results are discussed.	10	6
8. CONCLUSIONS Summary of the analysis results, lessons, and recommendations.	10	6
9. AUTHOR CONTRIBUTIONS	5	5
TOTAL		87

Suggestions:

1. A brief summary of results should be shown in Abstract.
2. Please provide some sentences before the bullets in the section of procedure.
3. Title of table should be placed above the table. Once a table is referred in a paragraph, the table should be listed after the paragraph.
4. It is not clear which design was chosen. In Abstract and Results and Discussion, it states Design 1 was chosen; however, it shows Design 2 was chosen in Conclusion.

Prairie View A&M University

College of Engineering

Department of Civil & Environmental Engineering



CVEG 3302 P01 Transportation Engineering

LABORATORY REPORT ON

"Signal Analysis "

Conducted on

April 24th, 2022

Submitted by: Group 1

Allyssa Reynolds

Hunter Rodgers

On

April 30th, 2022

To

Dr. Lui

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Abstract

The purpose of this experiment is to analyze a signalized intersection in Prairie View. After conducting an analysis on the selected intersection, the lab group decided that we will choose Design 1 to improve the signals. Design 1 has a lower cycle length, allows the public to access the intersection quicker, and reduces public opposition. It is important to conduct this type of study because retiming traffic signals can improve traffic safety and a cities quality of life.

Introduction

Traffic signals have a significant role in our roadway systems. They are supposed to help move traffic safely and in a timely manner. Signalized intersections could have insufficient timing which can affect traffic flow. To improve traffic flow, we must adjust the cycle length if needed. Cycle length is defined as the time required for all intervals to occur. The capacity at a signalized intersection is defined as the maximum rate of flow for the subject lane group that can go through the intersection under signalized conditions. Capacity is given in units of vehicles/hour but is based on the flow during a 15 minute time period. The cycle length is defined as the time required for all intervals to occur. The objective of the signal analysis study is to examine the signalized intersection, and to improve the signals design.

Experimental Procedure

- Select a signalized intersection in Prairie View
- Obtain turning movement volumes for all approaches for 15 min
- Record the current signal phasing pattern and length of the green, yellow, and all-red time for each phase

Tabular Results

Phase	Design 1		Cycle Length, s
	Green Time, s	Yellow Time, s	
1	13	10.5	71.5
2	16	32	71.5

Table 1.0 reflects Design 1 green time, yellow time, and cycle length for each phase.

Results and Discussion

The original signal cycle for the PVAMU four-way intersection was as follows: 37.01s, 35.03s, 32.06s, and 27.13s. The green time observed for the four-way junction was: 14.76s, 17.82s, 8.28s, and 10.45s. The yellow time observed for the four-way intersection was as follows: 3.66s, 3.56s, 3.34s, 3.01s. The vehicle volume observed was vehicle/15 minutes and converted to vehicle/hour by multiplying the original volume by 60 and a factor of 15. The following volume was observed for the left lane only: 420 veh/hr, 180 veh/hr, 780 veh/hr, and 900 veh/hr. The following volume was observed for the combined lane: 1980 veh/hr, 2340 veh/hr, and 480 veh/hr. The length of the east-west bound intersection was observed to be 321.04 feet. The length of the north-south bound intersection was observed to be 250.63 feet. Both measurements were obtained using the google maps feature to develop and analyze a line.

The delay observed for the original traffic configuration is as follows for the delay: 22.58s and 7.08s for Phases I and II. The average delay observed for each intersection is 7.66s, 2.52s, 2.59s, and 3.30s for intersections 1-4. The average delay observed for each junction is 2.59s, 0.90s, 0.27s, and 0.64s for intersections 1-4, respectively.

During this laboratory, two designs were developed to optimize the final design choice. For Design 1, two phases were observed. The speed limit for all roadways were observed to be 35 mph. The ratio of design volume to saturation flow was determined to be 0.017 and 0.021 for Y_1 and Y_2 respectively. The saturation flow was assumed to be 1900 pcphpl, as this is a standard value. Phase I included both lanes for vehicles driving west and east bound. Phase II included both lanes for vehicles driving north and south bound. Phase II held a critical value of 0.021. The yellow time was found to be 10.5s for Phase I, and 32s for Phase II. The cycle length was

determined to be 71.5s. The green time was determined to be 13s for Phase I, and 16s for Phase II.

For Design 2, three phases were observed. The speed limit for all roadways were observed to be 35 mph. The ratio of design volume to saturation flow was determined to be 0.007, 0.017, and 0.021 for Y_1, Y_2, Y_3 respectively. The saturation flow was assumed to be 1900 pcphpl, as this is a standard value. Phase I included only one lane for vehicles driving westbound. Phase II included only one lane for vehicles driving eastbound. Phase III included both lanes for vehicles driving north and south bound. Phase III held a critical value of 0.021. The yellow time was found to be 10.5s for Phase I, 10.5s for Phase II, and 32s for Phase III. The cycle length was determined to be 88.5s. The green time was determined to be 5.5s for Phase I, 13.5s for Phase II, and 16.5s for Phase III. This design was the most optimized choice not only due to its delay observed, but due to its capacity to allow more vehicles to pass for a longer period.

Specific data for Design 1 and 2 can be found near the end of Appendix A. Raw data for Design can be found in both Appendix A and B.

Design 1 was chosen as the most optimized solution due to its lower cycle length time. Having a shorter cycle length would allow the public to access the intersection quicker, and reduce public opposition for the configuration. As Design 1 was selected, the original configuration of the intersection remained the same.

Sources of Error

There were numerous errors observed during this experiment. This source of error was a personal error. As the intersection cycle was being evaluated, multiple readings were not taken for each traffic signal. Thus, the data obtained may not have been accurate. This could have been avoided by conducting multiple timings for each intersection and taking the average.

Conclusion

Two designs were developed to improve the signal's design. Design 2 was the most optimized solution due to its shorter cycle length. The configuration of the intersection didn't due to choosing this design. Sources of error identified within the experiment include personal error, as multiple timings for each intersection were not obtained. Recommendations include completing the experiment in duplicates to obtain accurate readings and expanding the project for daily traffic volume and cycle length observations. This would provide an opportunity for a more optimized design to be developed.

Author Contributions

The authors confirm their contribution to the report as follows: written narrative/report: Hunter Rodgers. Allyssa Reynolds; abstract and introduction: Hunter Rodgers; experimental procedure: Hunter Rodgers; analysis and interpretation of results: Allyssa Reynolds; conclusion: Allyssa Reynolds; All authors reviewed the results and approved the final version of the report.

References

Garber, Nicholas J, and Lester A. Hoel. Traffic and Highway Engineering. St. Paul: West Pub. Co, 2015. Print.

Appendix A

Intersection	Green Time, s	Yellow Time, s	Red Time, s	Overall Time, s
1	14.76	3.66	18.59	37.01
2	17.82	3.56	13.65	35.03
3	8.28	3.34	20.44	32.06
4	10.45	3.01	13.67	27.13

Table 1.0 reflects the readings obtained from the intersection analysis.

Intersection	(Left-Lane)	(Straight/Right Lane)	(Left-Lane) Phase 1	(Straight/Right Lane) Phase 2
	Phase 1	Phase 2	Vehicle Volume, qi, veh/hr	Vehicle Volume, qi, veh/hr
1.00	7.00	33.00	420.00	1980.00
2.00	3.00	39.00	180.00	2340.00
3.00	13.00	-	780.00	
4.00	15.00	8.00	900.00	480.00

Table 2.0 reflects the vehicle volume obtained from the intersection analysis.

Intersection	Length, m	Length, ft
1	97.85	321.04
2	76.39	250.63
3	76.39	250.63
4	97.85	321.04

Table 3.0 reflects the length of each intersection.

Design 2			
Phase	Green Time, s	Yellow Time, s	Cycle Length, s
1	5.5	10.5	88.5
2	13.5	10.5	88.5
3	16.5	32	88.5

Table 4.0 reflects Design 2 green time, yellow time, and cycle length for each phase.

	Lane Group	Capacity, Ci	Degree of Saturation, Xi
Phase 1	1.00	633.79	0.66
	2.00		3.12
	3.00		1.23
Phase 2	1.00	1728.22	0.52
	2.00		0.28
	3.00		0.10
	4.00		1.35

Table 5.0 represents the degree of saturation and capacity found from raw calculations.

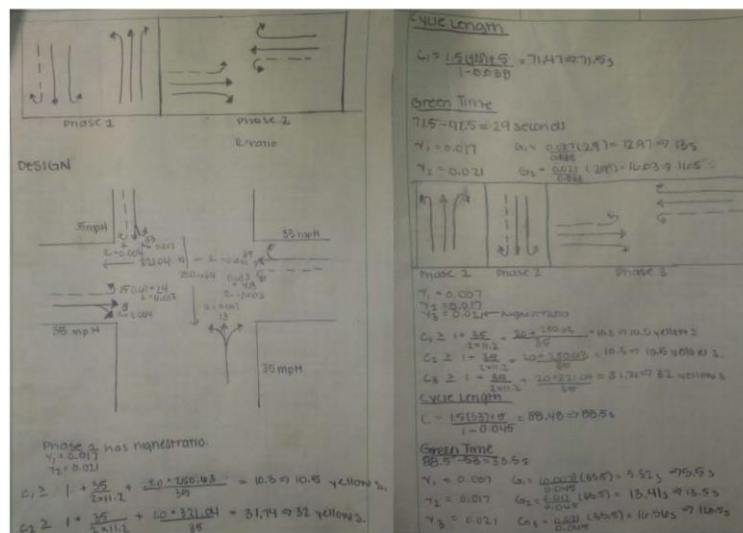
		Total Delay					
Phase 1	Lane Group		Average Delay				di*qi
			Intersection	da			
	1.00		1.00	7.66	54197.73669		
	2.00	22.58	2.00	2.52	17841.65413		
	3.00		3.00	2.49	17614.26443		
Phase 2	1.00		4.00	3.30	23364.07089		
	2.00	7.08					
	3.00						
	4.00						
Average Intersection Delay							
Intersection		d	da*qa				
1.00		2.59	18372.11413				
2.00		0.90	6350.419267				
3.00		0.27	1940.554555				
4.00		0.64	4554.013817				

Tables 6.0-9.0 represent the total delay, average delay, and average intersection delay results found for the original traffic configuration.

	Original				
	Uniform Delay			Incremental Delay	
Phase 1	Lane Group		Phase 1	Lane Group	
	1.00	17.05		1.00	5.53
	2.00			2.00	
	3.00			3.00	
Phase 2	1.00	6.96	Phase 2	1.00	0.12
	2.00			2.00	
	3.00			3.00	
	4.00			4.00	

Table 10.0 reflects the uniform delay and incremental delay used for the total delay, average delay, and average intersection delay results for the original configuration.

Appendix B



Figures 1.0 and 2.0 reflect Design 1 and 2 configurations and how the yellow time, green time, and cycle length were obtained.

ASSIGNMENTS FOR OUTCOME “5”

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

**‘Tests/Exams Performance Based Outcome Assessment Tools’
(Communication to the Instructor via Problem Solution
Using Techniques Learned in Lecture)**

**CIVIL & ENVIRONMENTAL ENGINEERING
DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

**SPRING 2022
Instructor: Dr. Kai-Wei Liu**

Title of Assignment

**Exam 2: Applications of Assessing Highway Surveys, Location, Safety,
Capacity, and Level of Service**

Outcome Measured Using this Assignment

Outcome 5

**An ability to function effectively on a team whose members together
provide leadership, create a collaborative and inclusive environment,
establish goals, plan tasks, and meet objectives**

**Brief Description of the suitability of this assignment for the
outcome**

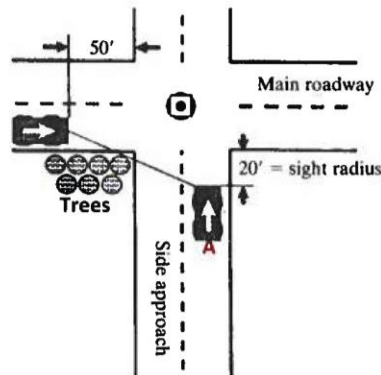
Through hands-on problem solving, students are able to demonstrate their ability to (i) determine highway capacity and level of service, (ii) increase highway safety and (iii) design horizontal curve.

True or False

1. (10 pts) Vertical curves are parabolic and horizontal curves are circular. TRUE
2. (10 pts) Level of service (LOS) describes the operating conditions within a traffic stream using density as the quantitative variable and an alphabetic grading system ranging from A to F. At LOS A, breakdown conditions exist and uniform moving flow cannot be maintained. FALSE
3. (10 pts) In general, there are more steps involved in determining level of service and capacity of two-lane highway than multilane highways. TRUE
4. (10 pts) The most commonly used format to present and analyze spot speed data is the frequency distribution table. TRUE

Multiple Choice (only one correct answer)

1. (10 pts) Which of the following is the most effective way to increase sight radius for the vehicle A?



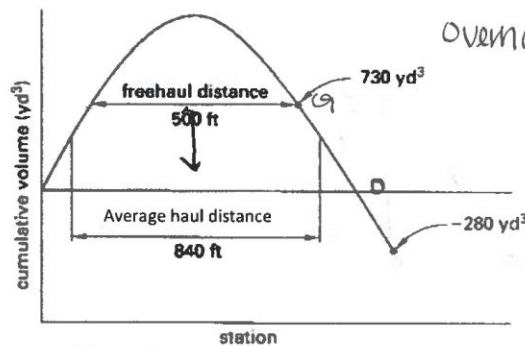
- a. Reduce speed limit
 - b. Increase speed limit
 - ☒ c. Remove trees
 - d. Reduce the height of trees
2. (10 pts) Which of the following is NOT true?
 - ☒ Surveying techniques can be split into three categories: ground surveys, remote sensing, and computer graphics
 - ☒ A crash modification factor is used to compute the expected number of crashes after implementing a safety design on a road or intersection.
 - ☒ One of the presentation and analysis of traffic volume is graphical intersection summaries. The traffic volume on each route is represented by the width of a band.

* The capacity and level of service for multilane highways can be analyzed by applying the procedures developed for basic highway segments.

3. (10 pts) A crash modified factor cannot be modified by changing
- * access point density
 - * the width of lane
 - * radius of curvature of roadway curves
 - none of the above

Calculation

1. (10 pts) A highway under construction requires fill and cut based on the ground profile. The following mass diagram indicates the net accumulation of cut and fill between two stations. The maximum distance for which there are no additional hauling charge is 500 ft. The overhaul unit cost is \$9.75 per yd³ per station. What is the overhaul cost for the two stations shown? $\text{station} = \frac{\text{distance}}{100}$



$$\text{overhaul } \# = G-D$$

$$\# = \frac{1}{2} \ln \left(\frac{\text{avg. haul distance}}{\text{freehaul distance}} \right)$$

$$= (730 - 280) = 450 \text{ yd}^3$$

$$1 \text{ yd} = 3 \text{ ft}$$

$$1 \text{ yd}^3 = 27 \text{ ft}^3$$

Station 1

overhaul

$$\text{overhaul } \# (\text{avg. haul distance} - \text{freehaul distance})$$

$$= (730 \text{ cy}) (840' - 500') \left(\frac{1 \text{ yd}^3}{27 \text{ ft}^3} \right) \times \frac{\$}{\text{yd}^3 \times \text{sta.}} \times \frac{1 \text{ station}}{100 \text{ ft}}$$

$$= 248,200 \text{ yd}^3 \times \text{ft}$$

Cost =

$$\frac{\$ 9.75}{\text{yd}^3 \cdot \text{station}} \times 730 \text{ yd}^3 \times \frac{(840' - 500')}{100 \text{ ft}} \cdot \text{station} = \$ 24,199.50$$

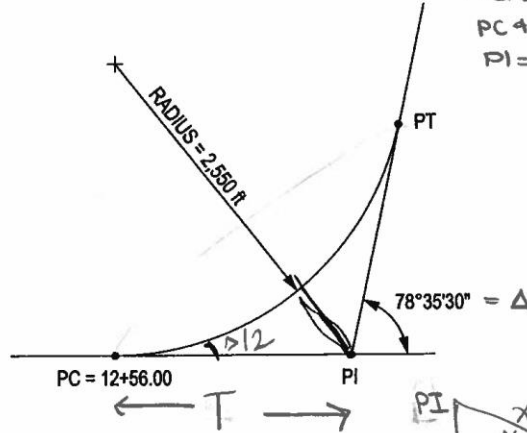
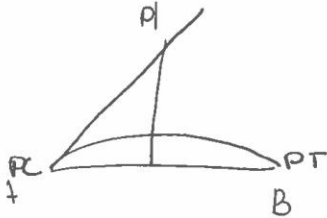
$340/100 = 3.4 \text{ station}$

(eq. can be used / only requires given info.)

2. (10 pts) Referring to the horizontal curve shown in the figure below, what is the station of the PI?

Find distance between PC & PI.

$$PI = PC + \text{distance}$$



SOH CAH

TOA

$$R = 2550 \text{ ft}$$

$$L = R(\Delta)(\pi/180)$$

$$= 2550 (78^\circ 35' 30'') (\frac{\pi}{180})$$

$$= 3497.8 \text{ ft}$$

$$PI = \frac{1}{2}(PC - PT)$$

$$= \frac{1}{2}(L)$$

$$= 1748.9 \text{ ft}$$

$$PI = 1256 \text{ ft} + 1748.9 = 3004.9 \text{ ft}$$

$$= 30+04.9 \text{ sta}$$

$$PI = 1256 + 1748.98$$

$$= 2870.97$$

$$= 28+70.97 \text{ sta}$$

$$\cos\left(\frac{\Delta}{2}\right) = \frac{T}{R}$$

$$T = R \tan \frac{\Delta}{2}$$

$$= 2550 \tan\left(\frac{78.6}{2}\right)$$

$$= 2086.94$$

$$2086.4 \text{ ft}$$

$$1256 + 2086$$

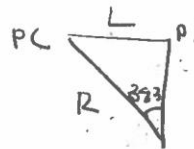
$$3342$$

$$= 33+42.84 \text{ sta}$$

$$\cos(39.3) = \frac{T}{R}$$

$$= \frac{2086.4}{2550}$$

$$= 1614.54 \text{ ft}$$



$$\sin(39.3) = \frac{L}{R}$$

$$L = 1973.3$$

3. (10 pts) The speeds in miles per hour, tabulated below were observed with a radar gun. What is the space-mean speed in miles per hour? Find equation + plot # into eq.

60 56 47 48 50

55 51 54 43 38

$$\begin{aligned}
 \bar{u}_s &= \frac{\# \text{ vehicles}}{\sum \left(\frac{1}{\text{speed}} \right)} \\
 &= \frac{10 \text{ veh}}{\left(\frac{1}{60} \right) + \left(\frac{1}{56} \right) + \frac{1}{47} + \frac{1}{48} + \frac{1}{50} + \frac{1}{55} + \frac{1}{51} + \frac{1}{54} + \frac{1}{43} + \frac{1}{38}} \\
 &= \frac{10 \text{ veh}}{0.203} \\
 &= 49.38 \text{ mph}
 \end{aligned}$$

**CIVIL & ENVIRONMENTAL ENGINEERING
DEPARTMENT
OUTCOME SPECIFIC ASSIGNMENT
COVER SHEET**

TRANSPORTATION ENGINEERING

SPRING 2022

Instructor: Dr. Kai-Wei Liu

Title of Assignment

**Final Exam: Applications of Traffic Flow, Intersection Design/Control, and
Pavement Design**

Outcome Measured Using this Assignment

Outcome 5

**An ability to function effectively on a team whose members together
provide leadership, create a collaborative and inclusive environment,
establish goals, plan tasks, and meet objectives**

**Brief Description of the suitability of this assignment for the
outcome**

Through hands-on problem solving, students are able to demonstrate their ability to (i) determine traffic flow, (ii) design and control intersection, and (iii) formulate pavement layers.

TaskStream

Completion of TaskStream.

True or False

- (10 pts) We decide the thickness of the top layer for a flexible pavement and the thickness of the top three layers for a rigid pavement. FALSE
- (10 pts) Signal delay could be reduced by adjusting the phase pattern and phase lengths by time of day. TRUE
- (10 pts.) A traffic engineer should design a dilemma zone for an intersection. FALSE

Multiple Choice (only one correct answer)

- (10 pts) On an intersection, there are three phases. For each phase, the light is yellow for 5 seconds. The light is green for 13 seconds for phase 1, 15 seconds for phase 2 and 14 seconds for phase 3. Which of the following is the total cycle length of this intersection?

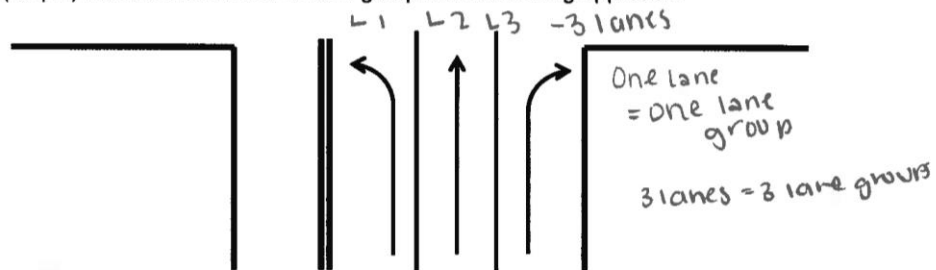
- ☒ 47 seconds
- ☐ 57 seconds
- ☐ 52 seconds
- ☐ 42 seconds

cycle length = time required for all intervals to occur.
 $5(3) + 13 + 15 + 14$

- (10 pts) Which of the following is NOT true?

- ☐ Flexible pavement is easier to repair than rigid pavement. TRUE
- ☐ Flexible pavement is less durable than rigid pavement. TRUE
- ☒ Rigid pavement has higher unit price per ft² than flexible pavement. TRUE
- ☐ In extreme hot weather, rigid pavement tends to become softer than flexible pavement. FALSE

- (10 pts) What is the number of lane group of the following approach?



- ☐ a. 1
- ☐ b. 2
- ☒ c. 3
- ☐ d. 4

Calculation

1. (10 pts.) The figure below shows a portion of the shockwave diagram created by an incident. In Region I, the volume is 800 vehicles per hour and the density is 25 vehicles per mile; in Region II, the volume is 500 vehicles per hour and the density is 100 vehicles per mile; and in Region III, the volume is 1100 vehicles per hour and the density is 70 vehicles per mile. What are the speeds of shockwaves I-II and II-III?

$$\frac{\text{veh}}{\text{hr}} \times \frac{\text{mile}}{\text{veh}} = \text{mph}$$

$$q = UK$$

$$800 = 32 K \quad K = 25$$

I

$$q_{\max} = \frac{U_f K_j}{4}$$

$$q_1 = 800 \frac{\text{veh}}{\text{hr}}$$

$$1100 = \frac{(32) K_j}{4} \rightarrow K_j = 137.5 \frac{\text{veh}}{\text{mi}}$$

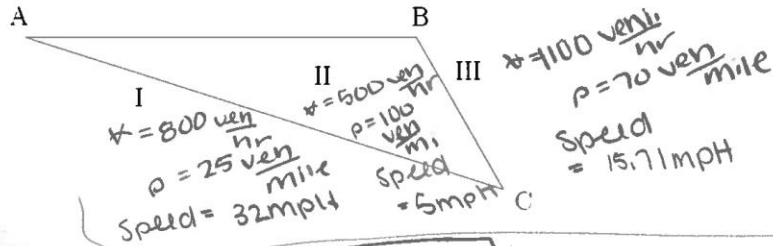
$$\begin{aligned} \text{I} - \text{II} \\ &= \frac{q_1 - q_2}{K_1 - K_2} = \frac{800 - 500}{24.36 - 137.5} = \\ &= \frac{300}{-113.14} = -2.65 \text{ mi/hr} \end{aligned}$$

$$U_f = 0 \rightarrow -7.1 \text{ mph}$$

$$\text{II} - \text{III}$$

$$\frac{(q_{\text{II}} - q_{\text{III}})}{K_{\text{II}} - K_{\text{III}}} = \frac{(500 - 1100)}{(137.5 - 68.75)} = \frac{-600}{68.75} = -8.73 \text{ mi/hr}$$

$$\text{if } q_{\text{II}} = 0 \rightarrow -16 \text{ mph}$$



$$\begin{aligned} u_1 &= u_f (1 + \sqrt{1 - q_1 / q_{\max}}) / 2 \\ &= 32 (1 + \sqrt{1 - 800 / 1100}) / 2 \\ &= 24.36 \text{ mph} \end{aligned}$$

$$\begin{aligned} \text{II} \\ u_2 &= 0, K_2 = K_j = 137.5 \frac{\text{veh}}{\text{mi}} \\ q_2 &= 500 \frac{\text{veh}}{\text{hr}} \end{aligned}$$

$$\begin{aligned} \text{III} \\ q_3 &= 1100 \frac{\text{veh}}{\text{hr}} \\ K_3 &= \frac{K_j}{2} = \frac{137.5}{2} = 68.75 \frac{\text{veh}}{\text{mi}} \end{aligned}$$

-5

WORK CONT'D ON BACK OF
THIS PAGE!

- FLEXIBLE

2. (20 pts) An interstate 8-lane highway pavement composed of an asphalt surface course, a base course, and a sand-gravel subbase is to be designed for an average annual daily traffic volume of 12000 with the following vehicle distribution: 50% passenger cars (1000 lb/axle), 33% 2-axle single unit trucks (6000 lb/axle), and 17% 3-axle single unit trucks (10,000 lb/axle). A growth rate of 4%, design period of 20 years, and predicting 45% of traffic are on the design lane. Equivalency factors for passenger cars, 2-axle single unit trucks, and 3-axle single unit trucks are 0.00002, 0.010, and 0.088. The quality of drainage is considered fair because water can be removed from the pavement within a week. However, there is a large amount of precipitation, so more than 25% of the time the pavement will be exposed to moisture level approaching saturation. Use a reliability level of 99%, a standard deviation of 0.35, a design serviceability loss of 2.0, resilient modulus of 15000 psi for subgrade, resilient modulus of 400000 psi for asphalt concrete, resilient modulus of 40000 psi for base course, resilient modulus of 20000 psi for subbase course to determine a suitable pavement structure by applying AASHTO design method. (Please use figures and/or tables on the following pages and show your work)

$$ESAL_i = F_d(G_{rn}) (365 \times AADT_i)^{N_i} F_{E_i}$$

$$AADT = 12,000 \quad G_{rn} = \left[\frac{1 + r^n}{1 + r} - 1 \right] / r$$

$$Mr_4 = 15,000 \text{ lb/in}^2 \text{ (subgrade)}$$

$$Mr_3 = 20,000 \text{ lb/in}^2 \text{ (subbase)}$$

$$Mr_2 = 40,000 \text{ lb/in}^2 \text{ (base)}$$

$$Mr_1 = 400,000 \text{ lb/in}^2 \text{ (asphalt concrete)}$$

$$S_0 = 0.35$$

$$r = 4\%$$

$$P_T - P_T = 2$$

$$50\% \text{ 2-axle (1000 lb/axle) } , 0.00002$$

$$33\% \text{ 2-axle (6000 lb/axle) } , 0.010$$

$$17\% \text{ 3-axle (10,000 lb/axle) } , 0.088$$

$$r = 4\%$$

$$\text{period} = 20 \text{ yrs}$$

$$45\% \text{ on design lane}$$

$$8 \text{ lanes total}$$

$$ESAL_{2\text{-axle p.c.}} = (45/100) \left[\left(1 + \frac{4}{100} \right)^{20} - 1 \right] \times (365 \times 12,000 \times 0.5) (2) (0.00002)$$

$$= 0.45 (29.79) \left(\frac{4}{100} \right) (2,190,000) (4 \times 10^{-5})$$

$$= 1174.32$$

$$ESAL_{2\text{-axle truck}} = (45/100) \left[\left(1 + \frac{4}{100} \right)^{20} - 1 \right] \times (365 \times 0.33 \times 12,000) (2) (0.010)$$

$$= 0.45 (29.79) \left(\frac{4}{100} \right) (445,100) (2) (0.010)$$

$$= 3.88 \times 10^5$$

$$ESAL_{3\text{-axle truck}} = (45/100) \left[\left(1 + \frac{4}{100} \right)^{20} - 1 \right] \times (365 \times 0.17 \times 12,000) (3) (0.088)$$

$$= 0.45 (29.79) \left(\frac{4}{100} \right) (744,100) (3) (0.088)$$

$$= 2.11 \times 10^6$$

$$\text{Total ESAL} = 3.03 \times 10^6$$

$$ESAL = 3.03 \times 10^6$$

$$D_1 = \frac{SN_1}{a_1} = \frac{2.51}{0.4} = 6.275 \quad \boxed{7 \text{ in}}$$

$$SN_1 = 2.51$$

USE Mr_2

$$L_{40,000}$$

USE Mr_3

$$= 2.51$$

$$SN_2 = a_1 D_1 + a_2 D_2 m_2$$

$$3.2 = (0.4)(7) + (0.172)(D_2)(0.8)$$

$$D_2 = 2.907$$

$$\boxed{= 3 \text{ in}}$$

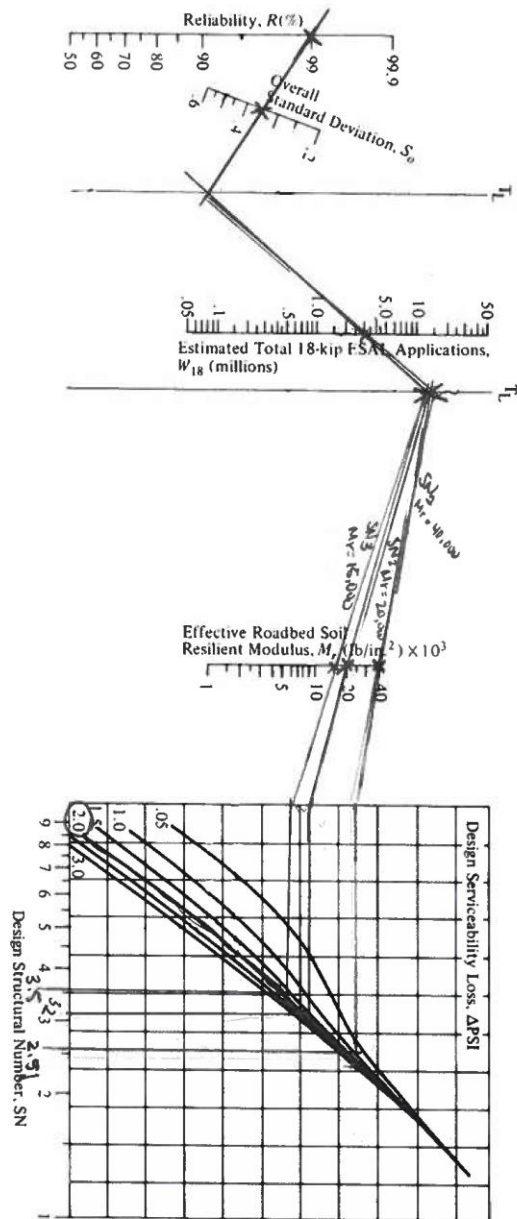
check min. thickness requirement!

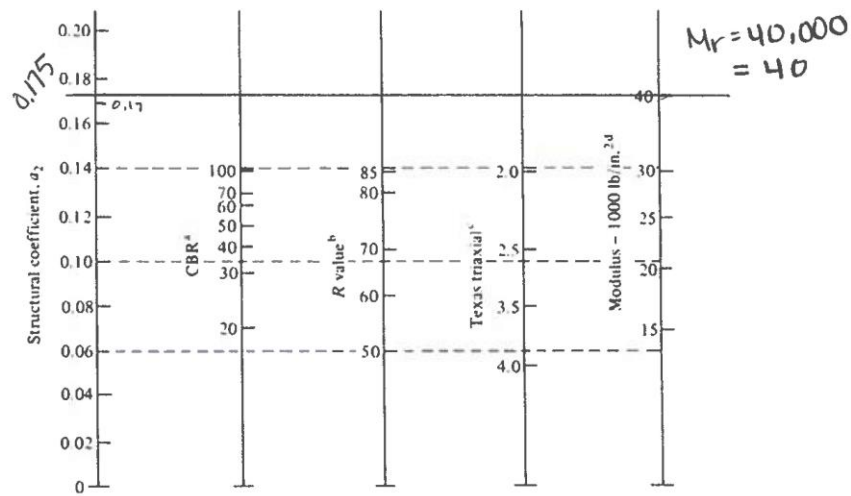
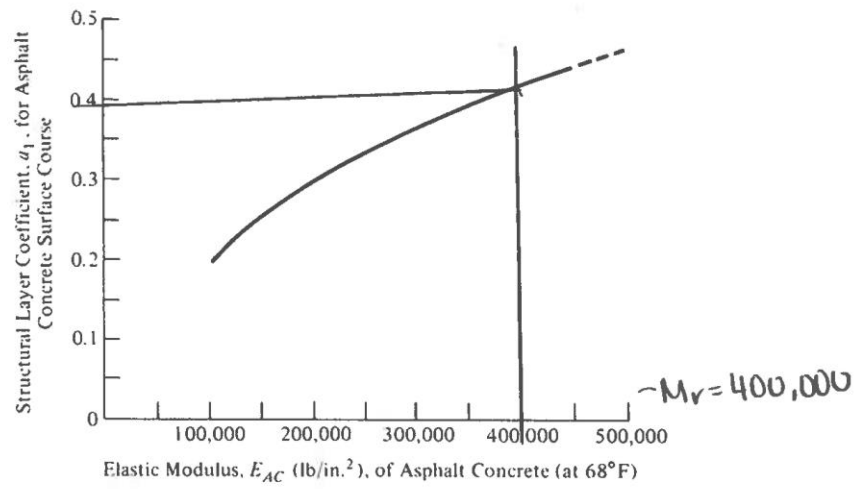
$$SN_3 = (0.4)(7) + (0.172)(3)(0.8) + (0.145)(D_3)(0.8)$$

$$3.5 = 2.8 + 0.413 + 0.116(D_3)$$

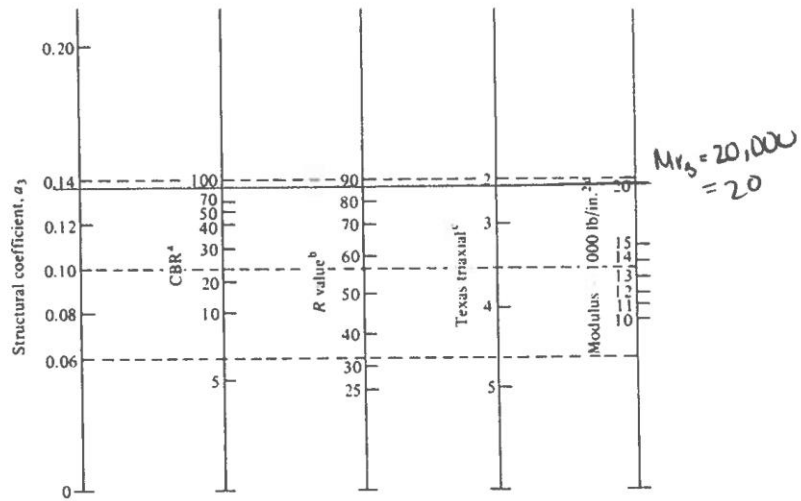
$$\frac{0.287}{0.116} = 2.46$$

$$\boxed{= 3 \text{ in}}$$





- ^aScale derived by averaging correlations obtained from Illinois.
^bScale derived by averaging correlations obtained from California, New Mexico, and Wyoming.
^cScale derived by averaging correlations obtained from Texas.
^dScale derived on NCHRP project 128, 1972.



^a Scale derived from correlations from Illinois.

^b Scale derived from correlations obtained from The Asphalt Institute, California, New Mexico, and Wyoming.

^c Scale derived from correlations obtained from Texas.

^d Scale derived on NCHRP project 128, 1972.

Table 19.7 Definition of Drainage Quality

Quality of Drainage	Water Removed Within*
Excellent	2 hours
Good	1 day
Fair	1 week
Poor	1 month
Very poor	(water will not drain)

*Time required to drain the base layer to 50% saturation.

SOURCE: Based on AASHTO Guide for Design of Pavement Structures, 1993, AASHTO, Washington, D.C.

Table 19.8 Recommended m_1 Values

Quality of Drainage	Percent of Time Pavement Structure Is Exposed to Moisture Levels Approaching Saturation			
	Less Than 1%	1 to 5%	5 to 25%	Greater Than 25%
Excellent	1.40-1.35	1.35-1.30	1.30-1.20	1.20
Good	1.35-1.25	1.25-1.15	1.15-1.00	1.00
Fair	1.25-1.15	1.15-1.05	1.00-0.80	0.80
Poor	1.15-1.05	1.05-0.80	0.80-0.60	0.60
Very poor	1.05-0.95	0.95-0.75	0.75-0.40	0.40

SOURCE: Based on AASHTO Guide for Design of Pavement Structures, 1993, AASHTO, Washington, D.C.

**OUTCOME “5” SPECIFIC ASSIGNMENTS
USED TO ASSESS THE OUTCOME IN**

**CVEG 4053
TRANSPORTATION ENGINEERING DESIGN**

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
CVEG 4053: TRANSPORTATION ENGINEERING DESIGN
FALL 2019**

Instructor: Dr. Judy A. Perkins

Title of Assignment

**HOMEWORK ASSIGNMENT #2A - TERM PROJECT
PARKING TASK GANTT CHART**

Outcome Measured Using this Assignment

Outcome 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Check the teaming problem characteristics related to this assignment

Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment.	
Requires students working in groups to:	
X	Organize and assign team roles; plan and keep good record of team meetings including documentation of individual contributions
X	Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).
X	Resolve conflicts professionally within the group with the view of creating an inclusive and collaborative environment
Establish goals, plan tasks, and meet objectives.	
Requires students working in groups to:	
X	Set goals and objectives
X	Identify and break down work into tasks and subtasks and identify the personnel and deliverables for each.
X	Develop a Gantt chart and critical path analysis for managing the project.
X	Establish major milestones for tracking progress and define performance metrics to measure success.
X	Track progress of team members to ensure project is on schedule and meets objectives (through submission of progress reports).

Brief justification of the suitability of assignment for the outcome

Designed to supplement and reinforce Team building skills needed to complete a single task of an undergraduate level open-ended design project in a given semester.

**ASSIGNMENT STATEMENT/QUESTIONS
&
GRADING SCHEME FOR ASSIGNMENT**

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 4053 – Transportation Engineering Design
Fall 2019**

Homework Assignment #2A - Term Project Parking Task

Given: 17 September 2019

Due: 19 September 2019 NLT 8:05am

Total point value is (15-points)

- Measuring ABET Criterion 3. Student Outcome 3 - an ability to communicate effectively with a range of audiences
 - Measuring ABET Criterion 3. Student Outcome 5 - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
1. This is a group assignment.
 - Create the organizational structure of your group. Ensure the division of labor is captured in the structure.
 - Create a Gantt Chart for the Parking Task. Ensure the Gantt Chart fits on a single page. Ensure it displays a wide array of symbols that articulates your work effort as well as division of labor.
 2. Your assignment submission will need to include a single cover page that follows the format shown below:
 - Assignment Cover Page:
 - **Complete** title of assignment
 - Course number, section and name
 - Name and roster number of each group member
 - Given Date of Assignment
 - Due Date of Assignment

SECTION-P01

CIVIL ENGINEERING DEPARTMENT PRAIRIE VIEW A&M UNIVERSITY



CVEG 4053- P01

Transportation Engineering Design

Fall 2019

Given on 09/17/2019

“Homework #2A- Term Project Parking Task”

Submitted by

Loriell Campbell #3

Kelvin Castillo Dilone #4

Dontevius Robinson #20

Wahab Syed #22

Due On

09/19/2019

To

Dr. Perkins

13
15

Kevin Castillo

Design and Technical Editor

Responsible for the design and layout of the book, ensuring it is visually appealing and easy to read. Also responsible for the design and layout of the book, ensuring it is visually appealing and easy to read.

Dante Robinson:
Design Draftman

Responsible for the design and layout of the book, ensuring it is visually appealing and easy to read. Also responsible for the design and layout of the book, ensuring it is visually appealing and easy to read.

Loñell Campbell:

Data Computation & Analysis

Responsible for the design and layout of the book, ensuring it is visually appealing and easy to read. Also responsible for the design and layout of the book, ensuring it is visually appealing and easy to read.

Wahab Syed:

Data Computation & Analysis

Respon
Lot Ana
Capacit

Drainage Calculation

[illegible]

SECTION-P02

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department



CVEG 4053- Transportation Engineering Design

Fall 2019

Section P02

Homework Assignment #2A

Term Project Parking Task

Submitted by:

The Unknown

Harris Abbasi #1

Maverick Beissner #4

David Burrows #5

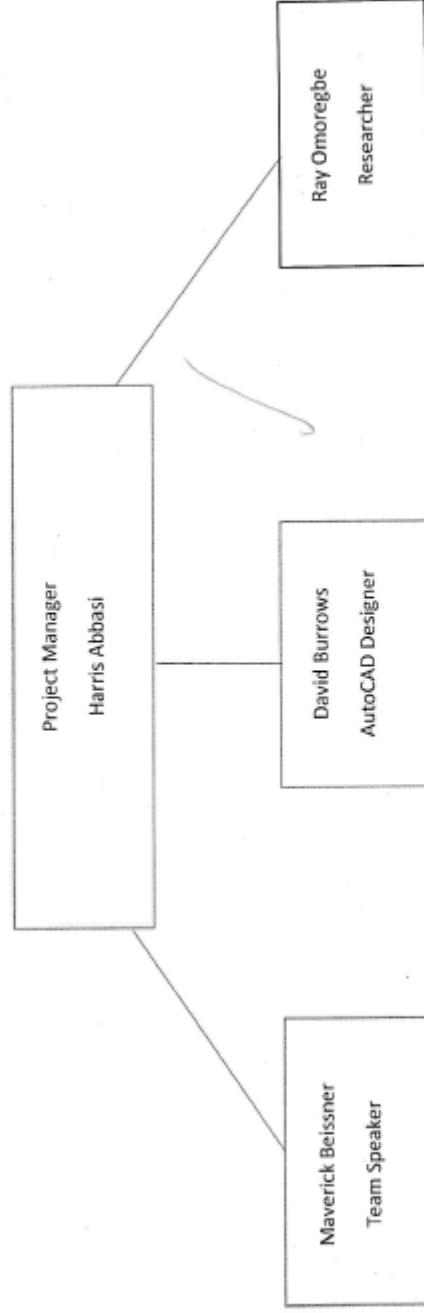
Ray Omoregbe #13

Given: 17 September 2019

Due: 24 September 2019

14
15
Extension DATE ok

The Unknown Organization Chart

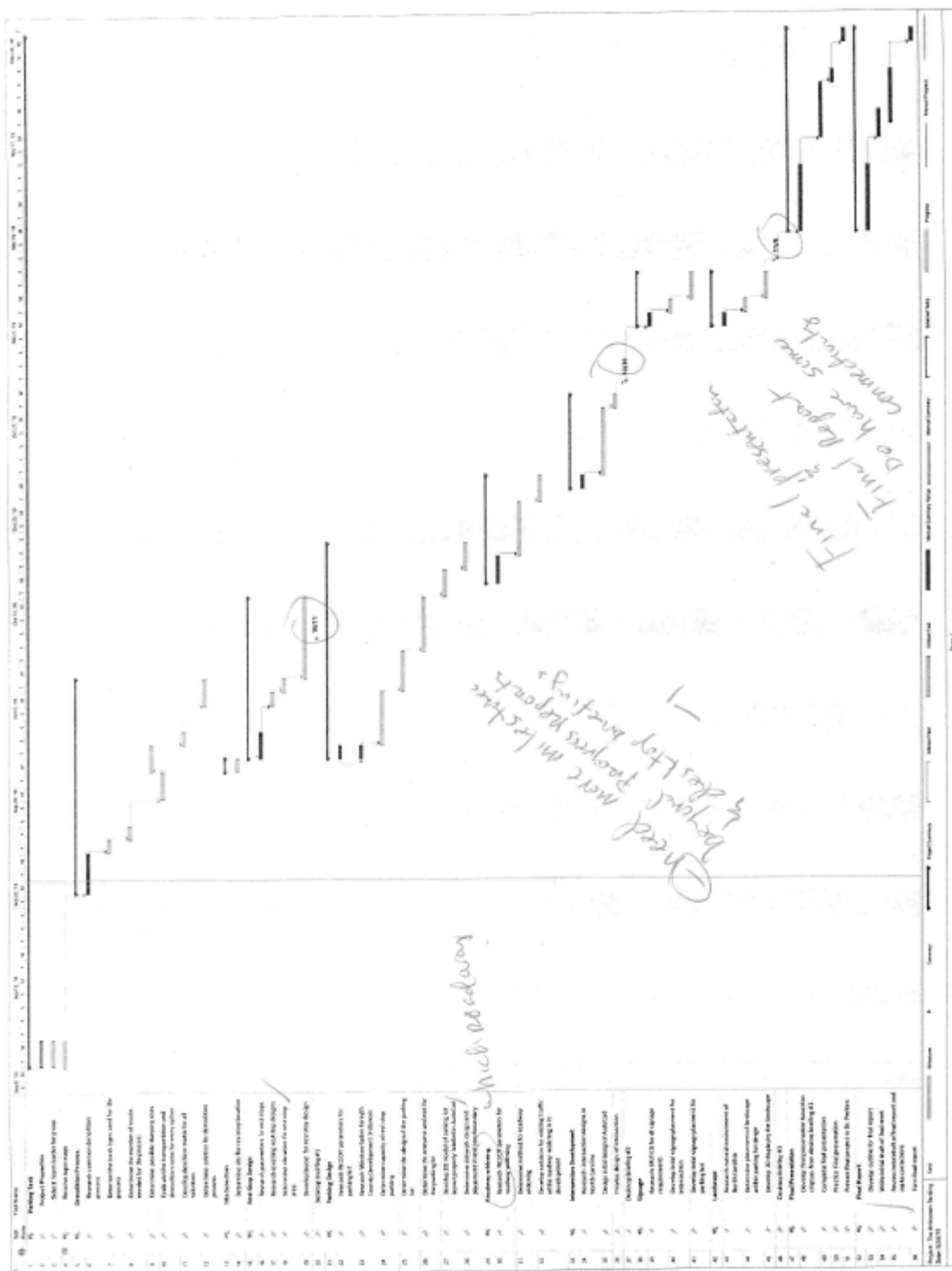


Team Speaker: Supplies communication with the group and Dr. Perkins over matters of the project.

Research: Look up parameters for development and design for particular aspects of the project.

AutoCAD Designer: Develop the AutoCAD designs for the project.

Project Manager: Manage the team and give finalization for all aspects of the project.



SECTION-P01

Prairie View A&M University
Roy G. Perry College of Engineering
Homework Assignment #2:
Parking Organizational Chart and Gantt Chart



CVENG 4053 P01 Transportation Engineering Design

Cameron Lavergne #14

Austin Allen #1

Daniel Doyle #7

Omar Hunter #10

Date Given:

17 September 2019

Due Date:

119 September 2019 NLT 8:05am

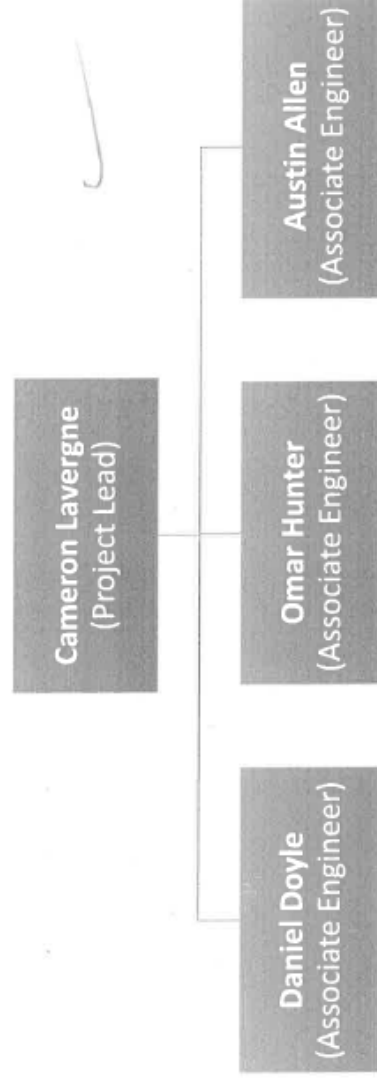
Submitted To:

Dr. Judy Perkins

See Hand-out

8.25
15

T-Mobile Engineering Organizational Chart & Responsibilities



Responsibilities:

- **Cameron Lavergne** – Lead engineering team and develop schedule. Perform design work within team and conduct calculations.
- **Daniel Doyle** – Perform design work within team and conduct calculations. Serve as staff writer and maintain records of team.
- **Omar Hunter** – Perform design work within team and conduct calculations. Maintain Gantt Chart and other softwares.
- **Austin Allen** – Perform design work within team and conduct calculations. Schedules meetings on behalf of team.

Legend:

T - Mobile Group

Progress

Task

Critical Task

Milestone

Unassigned

September

October

November



Preparation of Project and Organization Chart
Research similar projects

Organizing Meetings
Define Problem Structure
Demolition

Setting Criteria
Brainstorming Phase
Brainstorming Ideas

Create Objectives
Create rough models for ideas
Choosing an Alternative

Consider Benefits & Demerits of Ideas
Consult Criteria
Narrow down Alternatives

Efficient Alternative
Sketches
Final Phase

Park N Ride Design
Sidewalk Design
Landscape Design

To add more data, insert new rows ABOVE this one

SECTION-P02

Homework Assignment #2

Gantt Chart & Organizational Chart

CVEG 4053, P01 Transportation Engineering Design

Khaleel Wilson (17)

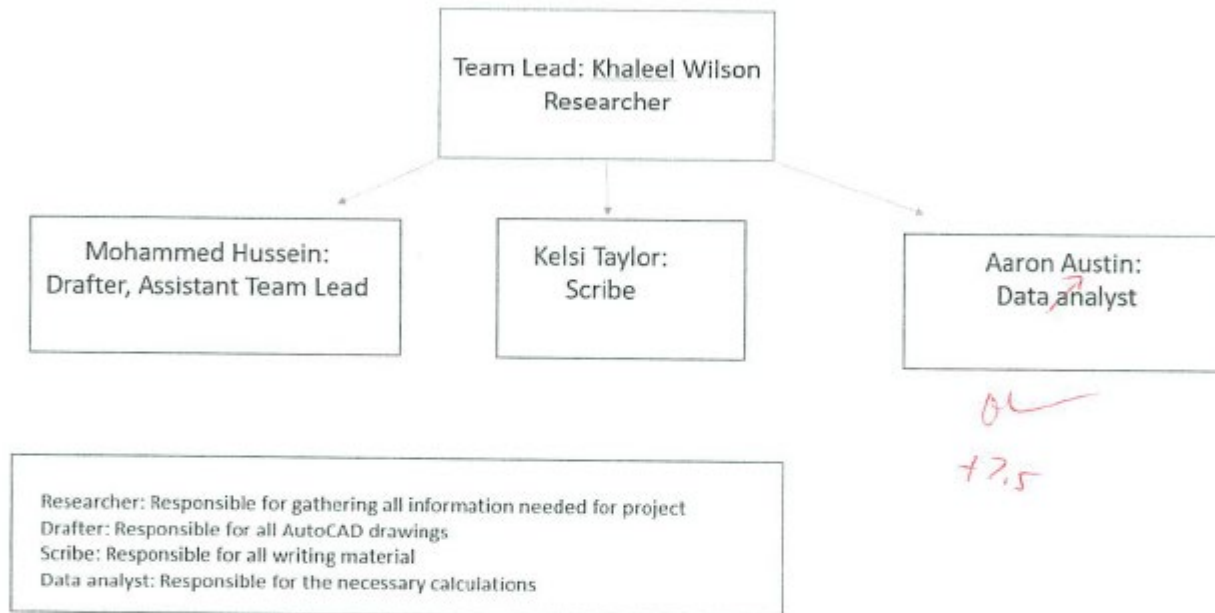
Aaron Austin (3)

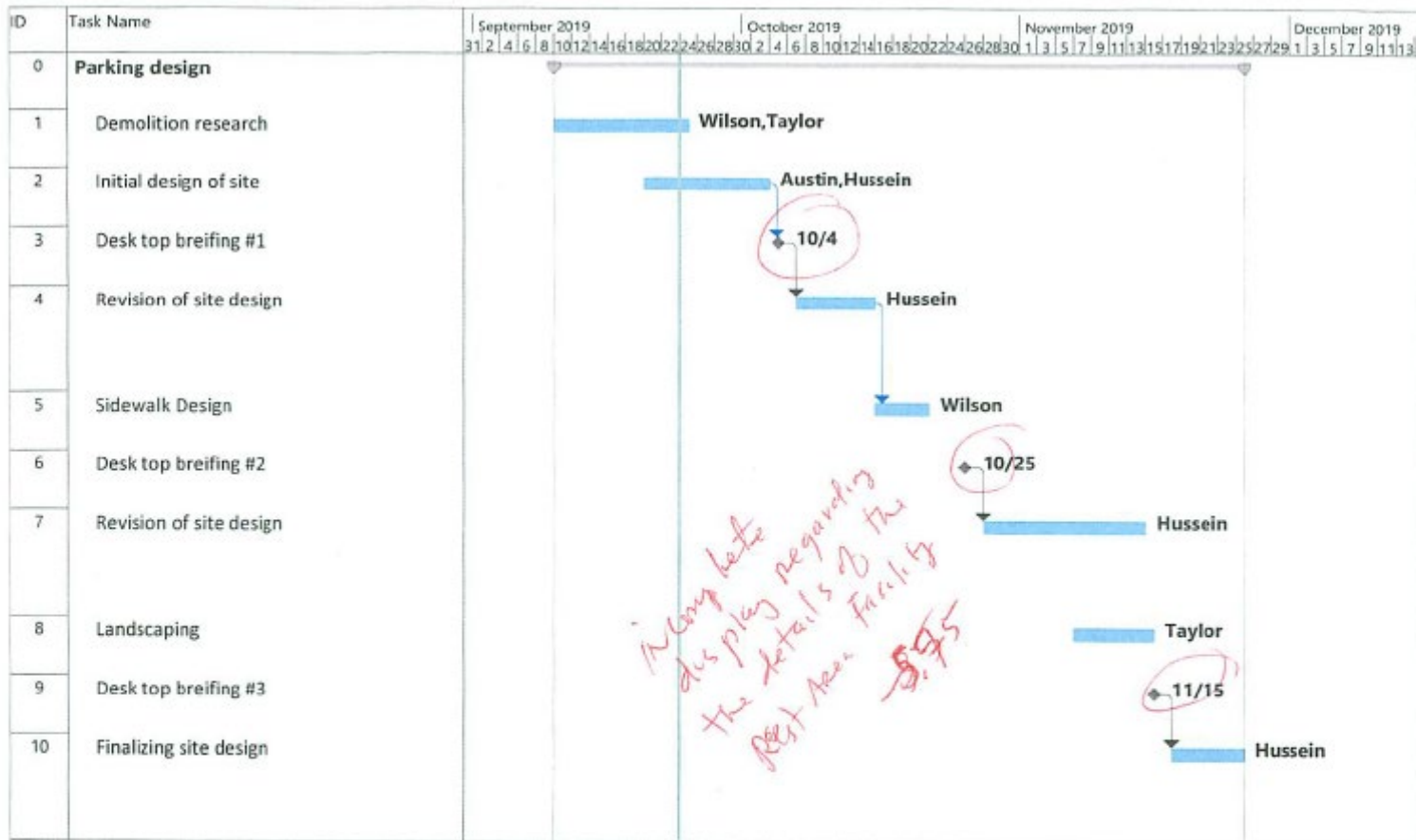
Kelci Taylor (14)

Mohammed Hussein (9)

Given: 17 September 2019

Due: 19 September 2019





Project: Parking design
Date: Tue 9/24/19

Task

Milestone

Project Summary

Progress

Manual Progress

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
CVEG 4053: TRANSPORTATION ENGINEERING DESIGN
FALL 2019**

Instructor: Dr. Judy A. Perkins

Title of Assignment

**HOMEWORK ASSIGNMENT #2B - TERM
PROJECT GANTT CHART**

Outcome Measured Using this Assignment

Outcome 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Check the teaming problem characteristics related to this assignment

Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment.	
Requires students working in groups to:	
X	Organize and assign team roles; plan and keep good record of team meetings including documentation of individual contributions
X	Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).
X	Resolve conflicts professionally within the group with the view of creating an inclusive and collaborative environment
Establish goals, plan tasks, and meet objectives.	
Requires students working in groups to:	
X	Set goals and objectives
X	Identify and break down work into tasks and subtasks and identify the personnel and deliverables for each.
X	Develop a Gantt chart and critical path analysis for managing the project.
X	Establish major milestones for tracking progress and define performance metrics to measure success.
X	Track progress of team members to ensure project is on schedule and meets objectives (through submission of progress reports).

Brief justification of the suitability of assignment for the outcome

Designed to supplement and reinforce Team building skills needed to complete an undergraduate level open-ended design project in a given semester.

**ASSIGNMENT STATEMENT/QUESTIONS
&
GRADING SCHEME FOR ASSIGNMENT
Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 4053 – Transportation Engineering Design
Fall 2019**

Homework Assignment #2B - Term Project

Given: 19 September 2019

Due: 26 September 2019 NLT 8:05am

Total point value is (25-points)

- Measuring ABET Criterion 3. Student Outcome 3 - an ability to communicate effectively with a range of audiences
 - Measuring ABET Criterion 3. Student Outcome 5 - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
1. This is a group assignment.
 - Create a Gantt Chart for the Term Project. Ensure the Gantt Chart fits on a single page. Ensure it displays a wide array of symbols that articulates your work effort as well as division of labor.
 2. Your assignment submission will need to include a single cover page that follows the format shown below:
 - Assignment Cover Page:
 - **Complete** title of assignment
 - Course number, section and name
 - Name and roster number of each group member
 - Given Date of Assignment
 - Due Date of Assignment

SECTION-P01

**CIVIL ENGINEERING DEPARTMENT
PRAIRIE VIEW A&M UNIVERSITY**



**CVEG 4053 TRANSPORTATION ENGINEERING
DESIGN - P01**

FALL 2019

HOMEWORK ASSIGNMENT #2B

TERM PROJECT

Submitted by:

Loriell Campbell - #3

Kelvin Castillo - #4

Dontevius Robinson - # 20

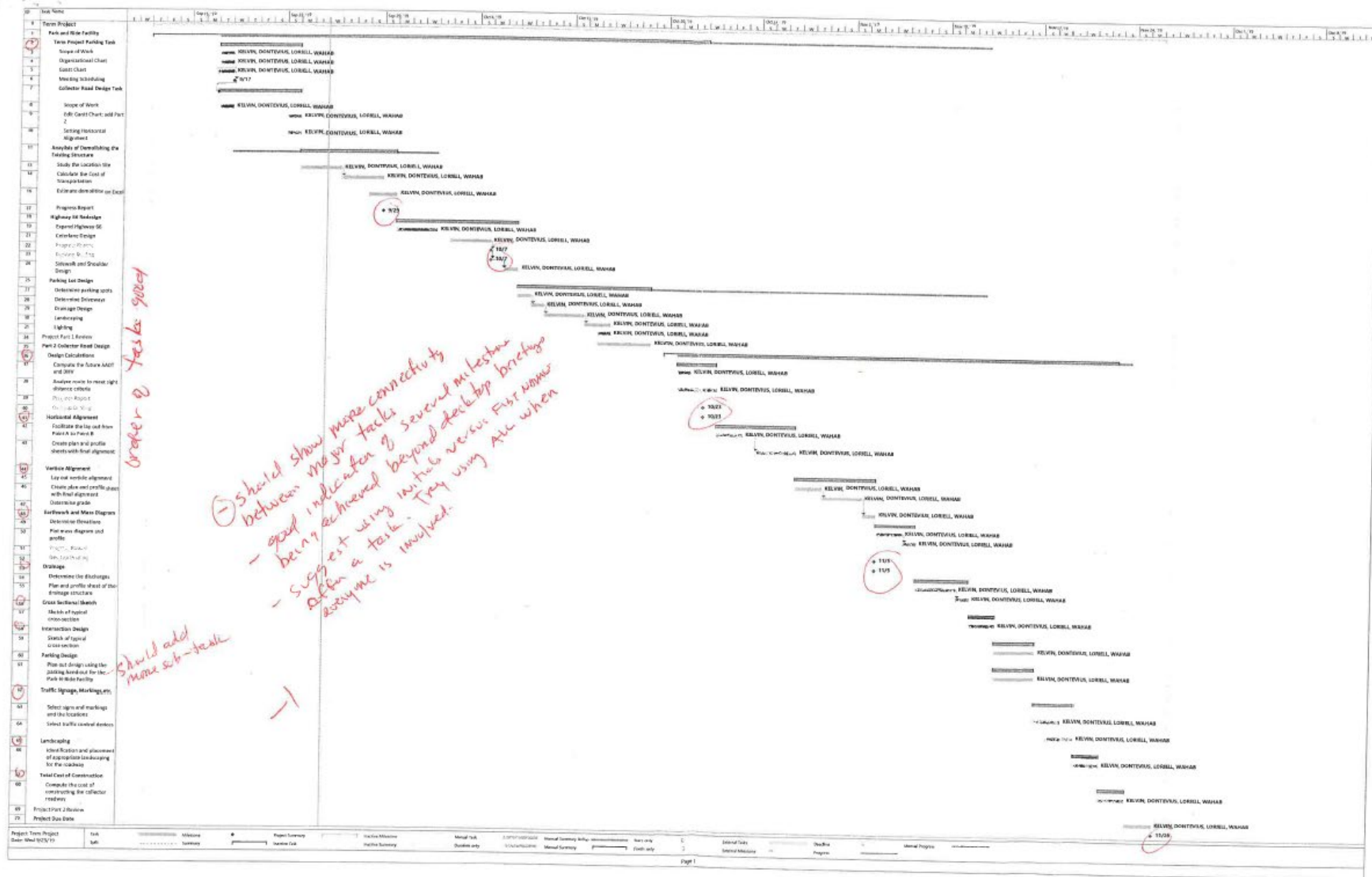
Wahab Syed - #22

Given on: September 19, 2019

Due: September 26, 2019

To: Dr. Judy Perkins

24
25



SECTION-P02

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department



20/25

CVEG 4053- Transportation Engineering Design

Fall 2019

Section P02

Homework Assignment #2B

Term Project

Submitted by:

The Unknown

Harris Abbasi #1

Maverick Beissner #4

David Burrows #5

Ray Omoregbe #13

Given: 24 September 2019

Due: 1 October 2019

01212M-18 5000

- ① Design & calculate Tack machine
- ② Design & calculate Tack machine
- ③ Design & calculate Tack machine
- ④ Design & calculate Tack machine
- ⑤ Design & calculate Tack machine
- ⑥ Design & calculate Tack machine
- ⑦ Design & calculate Tack machine
- ⑧ Design & calculate Tack machine
- ⑨ Design & calculate Tack machine
- ⑩ Design & calculate Tack machine

① 2005年1月1日

15/05/2020

5/2/2015

Yokohama

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17/11/2017

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[illegible][illegible]

SECTION-P01

Prairie View A&M University
Roy G. Perry College of Engineering
Homework Assignment #2B:

Gantt Chart with Roadway and Park and Ride



LATE - 10

~ 8:57am

Submission

1/2
PJS
SEE
HAND-OUT

Technically Term Project

CVES 4053 P01 Transportation Engineering Design

Cameron Lavergne #14

Austin Allen #1

Daniel Doyle #7

Omar Hunter #10

Date Given:

19 September 2019

Due Date:

26 September 2019 NLT 8:05am

Submitted To:

Dr. Judy Perkins

11/25

Legend:

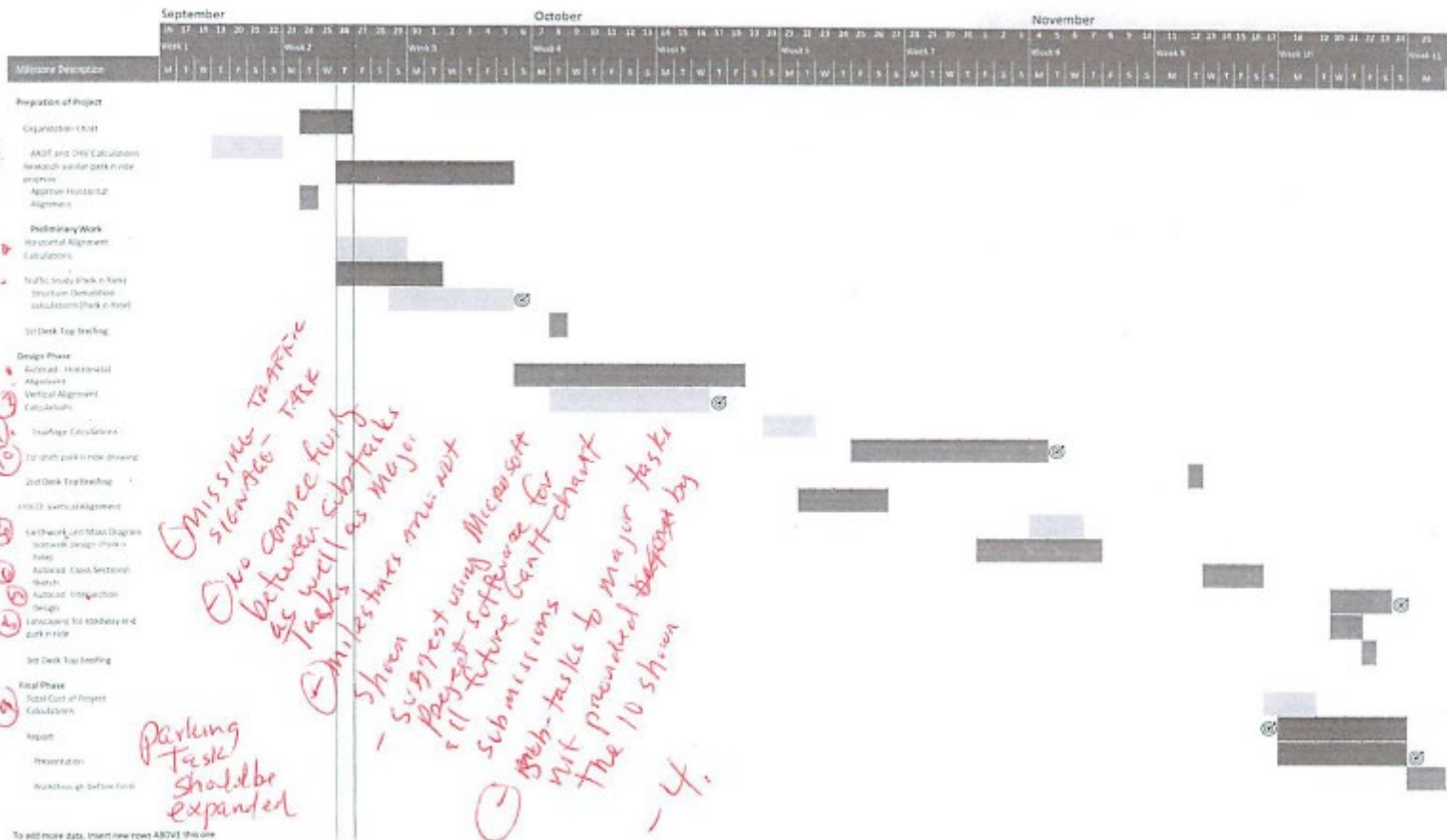
Autocad

Calculations

Milestone

Documentation

 Team Check in



SECTION-P02

Late
✓10

CIVIL ENGINEERING DEPARTMENT
PRAIRIE VIEW A&M UNIVERSITY



Section Missing -1

✓
CVEG 4053 Transportation Engineering Design

Fall 2019

Homework # 2B -1

Submitted by:

Khaleel Wilson #19 ✓

Mohammed Hussein #9 ✓

Kelsi Taylor #15 ✓

Aaron Austin #3 ✓

Assigned On: September 24, 2019 ✓

Due: October 1, 2019 ✓

Submitted to: Dr. Perkins

5.5
25

ASSIGNMENTS FOR OUTCOME 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
CVEG 4053: TRANSPORTATION ENGINEERING DESIGN
FALL 2020**

Instructor: Dr. Judy A. Perkins

Title of Assignment

**HOMEWORK ASSIGNMENT #1 –
TERM PROJECT TEAM BUILDING**

Outcome Measured Using this Assignment

Outcome 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Check the teaming problem characteristics related to this assignment

Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment.	
Requires students working in groups to:	
X	Organize and assign team roles; plan and keep good record of team meetings including documentation of individual contributions
X	Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).
X	Resolve conflicts professionally within the group with the view of creating an inclusive and collaborative environment
Establish goals, plan tasks, and meet objectives.	
Requires students working in groups to:	
X	Set goals and objectives
X	Identify and break down work into tasks and subtasks and identify the personnel and deliverables for each.
X	Develop a Gantt chart and critical path analysis for managing the project.
X	Establish major milestones for tracking progress and define performance metrics to measure success.
X	Track progress of team members to ensure project is on schedule and meets objectives (through submission of progress reports).

Brief justification of the suitability of assignment for the outcome

Designed to supplement and reinforce Team building skills needed to complete a single task of an undergraduate level open-ended design project in a given semester.

**ASSIGNMENT STATEMENT/QUESTIONS
&
GRADING SCHEME FOR ASSIGNMENT**

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 4053 – Transportation Engineering Design
Fall 2020**

Homework Assignment #1 - Term Project Team Building

Given: 17 September 2020

Due: 24 September 2020 NLT 7:05am

Total point value is (100-points)

- Measuring ABET Criterion 3. Student Outcome 3 - an ability to communicate effectively with a range of audiences
 - Measuring ABET Criterion 3. Student Outcome 5 - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
1. This is a group assignment.
 - Determine the name of your group.
 - Create the organizational structure of your group using the software of your choice. Ensure the division of labor at a minimum aligns with the project scope hand out.
 - Use Microsoft Project software to create a Gantt chart that aligns with your organizational structure and the project scope hand out. Ensure the Gantt chart fits on a single page. Ensure it displays a wide array of symbols that articulates at a minimum the work effort outlined in the project scope hand out.
 2. Your assignment submission will need to include a single cover page that follows the format shown below:
 - Assignment Cover Page:
 - **Complete** title of assignment
 - Course number, section and name
 - First Name and Last Name of each group member
 - Given Date of Assignment
 - Due Date of Assignment
 3. Convert the assignment requirements into a single PDF and upload the file into your group's Dropbox folder.

Homework Assignment #1 -Term Project Team Building ✓

Department of Civil & Environmental Engineering

Prairie View A&M University



89
+8
—
97

CVEG 4053 Z01 – Fall 2020 ✓

Transportation Engineering Design ✓

Submitted By:

TriFecta Engineering ✓ H10

Devan Addison Turner ✓

Frida Rubi ✓

Alex Martinez ✓

To:

Dr. Perkins, PE

Given: 17 September 2020 ✓

Due: 24 September 2020 NLT 7:05am ✓

22

TriFecta Engineering



Project Manager
Devan Addison-Turner

- Oversee entire transportation plan development
- Lead all design aspects and engineers
- Manage all civil design calculations & drawings
- Manage total cost of construction estimates
- Ensure all project deliverables meet deadlines



Project Engineer
Frida Rubi

- Aid in Design Calculations
- Horizontal & Vertical Alignment
- Sanitary & Water Diagrams
- Grading
- Field work at construction sites
- Review of project deliverables and cost



Traffic Engineer
Alex Martinez

- Aid in Design Calculations
- Traffic Signals, Markings, etc.
- Intersection Design
- Roadway Cross Sectional Sketches
- Parking Design
- Landscaping
- Review of project deliverables and cost

(+30)



**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
CVEG 4053: TRANSPORTATION ENGINEERING DESIGN
FALL 2020**

Instructor: Dr. Judy A. Perkins

Title of Assignment

**HOMEWORK ASSIGNMENT #2 - TERM
PROJECT COGO DATA & GANTT CHART**

Outcome Measured Using this Assignment

Outcome 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Check the teaming problem characteristics related to this assignment

Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment.	
Requires students working in groups to:	
X	Organize and assign team roles; plan and keep good record of team meetings including documentation of individual contributions
X	Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).
X	Resolve conflicts professionally within the group with the view of creating an inclusive and collaborative environment
Establish goals, plan tasks, and meet objectives.	
Requires students working in groups to:	
X	Set goals and objectives
X	Identify and break down work into tasks and subtasks and identify the personnel and deliverables for each.
X	Develop a Gantt chart and critical path analysis for managing the project.
X	Establish major milestones for tracking progress and define performance metrics to measure success.
X	Track progress of team members to ensure project is on schedule and meets objectives (through submission of progress reports).

Brief justification of the suitability of assignment for the outcome

Designed to supplement and reinforce Team building skills needed to complete an undergraduate level open-ended design project in a given semester.

**ASSIGNMENT STATEMENT/QUESTIONS
&
GRADING SCHEME FOR ASSIGNMENT**

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**

**CVEG 4053 – Transportation Engineering Design
Fall 2020**

Homework Assignment #2 - Term Project COGO Data & Gantt Chart

Given: 22 October 2020

Due: 27 October 2020 NLT 7:05am

Total point value is (100-points)

- Measuring ABET Criterion 3. Student Outcome 3 - an ability to communicate effectively with a range of audiences
 - Measuring ABET Criterion 3. Student Outcome 5 - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
1. This is a group assignment.
 - Create a sketch of your horizontal and vertical alignment as per the example found in the COGO handout. Ensure you follow the example as found in the COGO handout.
 - Use **Microsoft Project software only** to create a Gantt chart that aligns with your organizational structure and the actual term project scope dated 17 September 2020. Ensure the Gantt chart fits on a single page. Ensure it displays a wide array of symbols that articulates at a minimum the work effort outlined in the actual term project scope dated 17 September 2020.
 2. Your assignment submission will need to include a single cover page that follows the format shown below:
 - Assignment Cover Page:
 - **Complete** title of assignment
 - Course number, section and name
 - First Name and Last Name of each group member
 - Given Date of Assignment
 - Due Date of Assignment
 3. Convert the assignment requirements into a single PDF and upload the file into your group's Dropbox folder.

Department of Civil & Environmental Engineering
Prairie View A&M University



94
100

CVEG 4053 Z01 – Fall 2020

Transportation Engineering Design

Homework 2: Term Project COGO Data & Gantt Chart

Submitted By:

Group 1a

Devan Addison Turner

Alex Martinez

To:

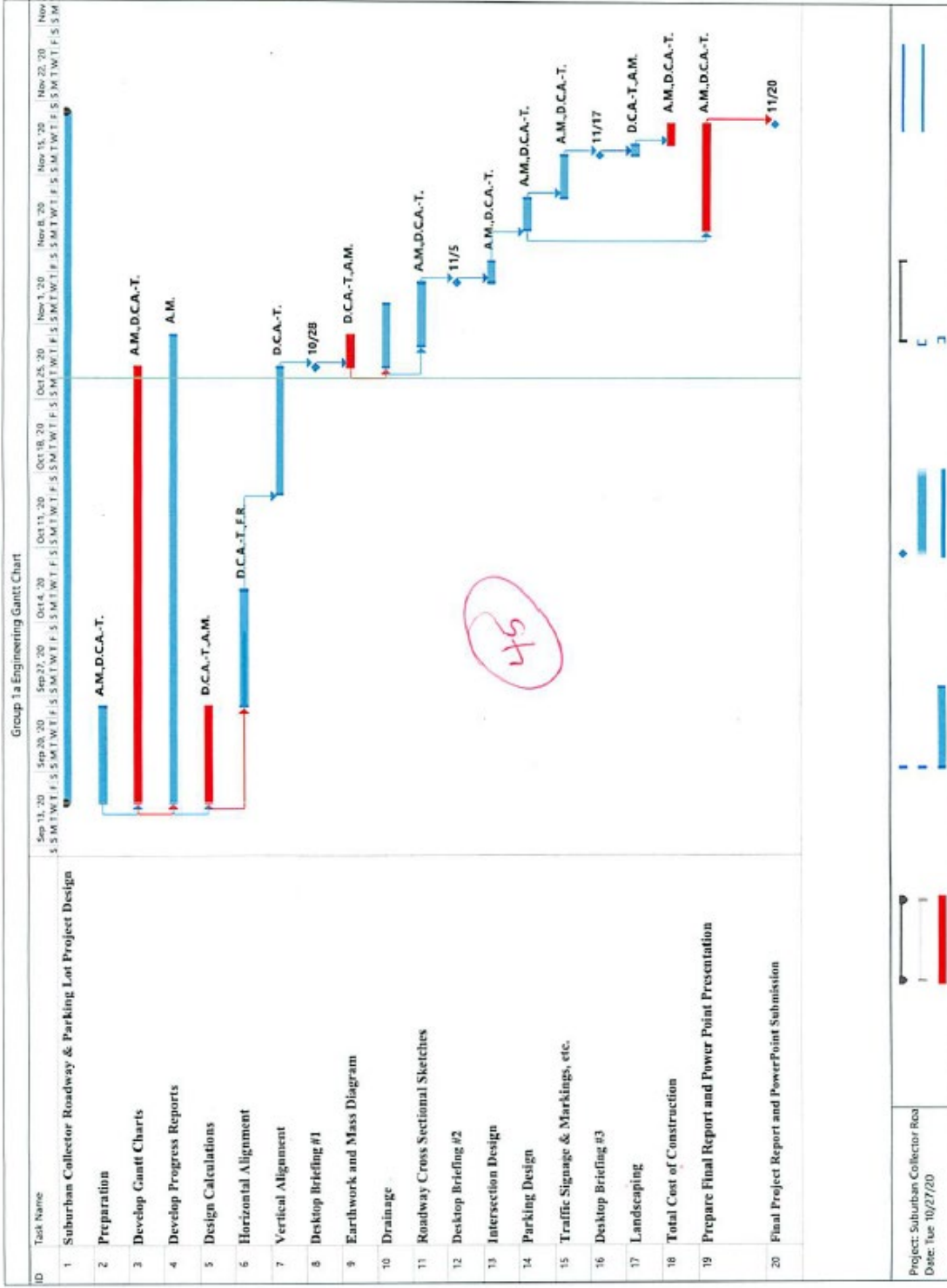
**Dr. Perkins, PhD, PE, Interim Head of Dept. of Civil &
Environmental Engineering**

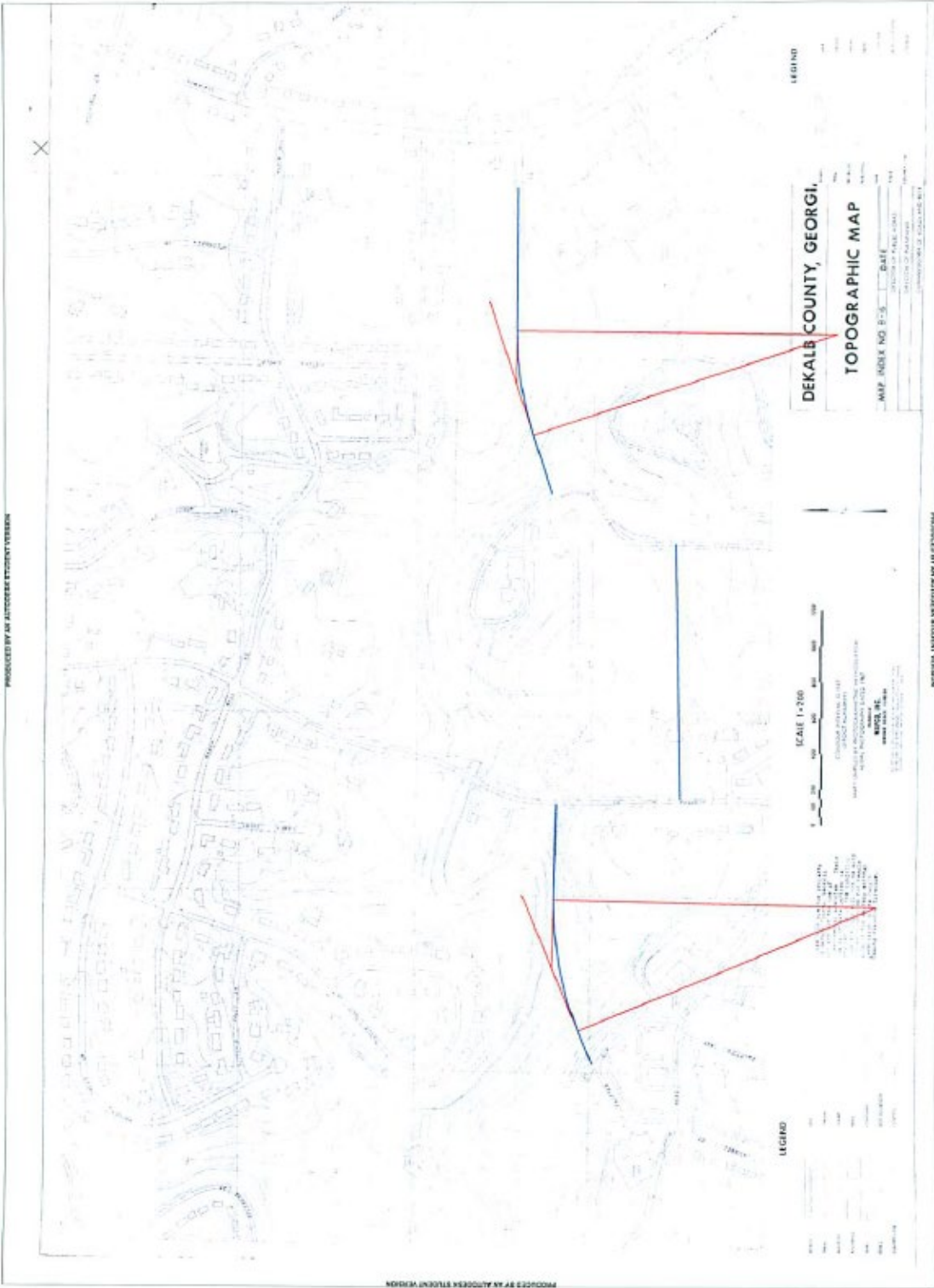
Submitted on

10/27/2020

Given data missing - 1

Group 1a Engineering Gantt Chart





PRODUCED BY AN AUTOCAD STUDENT VERSION

PRODUCED BY AN AUTOCAD STUDENT VERSION

PRODUCED BY AN AUTOCAD STUDENT VERSION

Devan Addison-Turner Group 1a

Simple Circular Horizontal Curves

$$D = \frac{100 \left(\frac{180}{\pi} \right)}{R} = \frac{18000}{\pi R} \quad \text{Curve 1}$$

$$\text{Degree of curve: } \Rightarrow 3.15^\circ$$

$$R = 1820.67 \text{ ft}$$

$$\Delta = 23.9^\circ$$

$$T = R \tan \frac{\Delta}{2} \Rightarrow 1820.67 \tan \left(\frac{23.9}{2} \right)$$

$$T = 385.35 \text{ ft}$$

$$E = R \left(\frac{1}{\cos(\Delta/2)} - 1 \right)$$

$$E = 1820.67 \left(\frac{1}{\cos(23.9/2)} - 1 \right) = 170.76 \text{ ft}$$

$$M = R \left(1 - \cos \frac{\Delta}{2} \right) \Rightarrow 1820.67 \left(1 - \cos \frac{23.9}{2} \right)$$

$$M = 39.46 \text{ ft}$$

$$L = \frac{\pi}{180} R \Delta \Rightarrow \frac{\pi}{180} 1820.67 (23.9)$$

$$L = 759.50 \approx 760 \text{ ft}$$

$$PC = PI - T = 585.35' - 385.35' = 200 \text{ ft}$$

Simple Horizontal Curves

Curve 2

$$D = \frac{100 \left(\frac{180}{\pi} \right)}{R} = \frac{18000}{\pi r} = D = 3.17^\circ$$

$$R = 1807.83 \text{ ft}$$

$$\Delta = 18.18^\circ$$

$$T = R \tan \frac{\Delta}{2} \Rightarrow 1807.83 \text{ ft} \tan \left(\frac{18.18}{2} \right)$$

$$T = 289.43 \text{ ft}$$

$$E = R \left(\frac{1}{\cos(\Delta/2)} - 1 \right) =$$

$$E = 1807.83 \text{ ft} \left(\frac{1}{\cos(18.18/2)} - 1 \right) = 23 \text{ ft}$$

$$M = R \left(1 - \cos \frac{\Delta}{2} \right) \Rightarrow 1807.83 (1 - \cos \left(\frac{18.18}{2} \right))$$

$$M = 22.70 \text{ ft}$$

$$L = \frac{\pi}{180} R \Delta = \frac{\pi}{180} (1807.83) (18.18)$$

$$L = 573.63 \text{ ft}$$

Frida Rube

Curve 1

$$\text{Start (Pt)} = N = 1,382,976' \\ E = 451,064'$$

$$PC (Pt) = N = 1383,053' \\ E = 451,248'$$

$$PI = N = 1,383,200' \\ E = 451,604'$$

$$PT (Pt) = N = 1,383,189' \\ E = 451,990'$$

Curve 2

$$\text{Start (Pt)} N = 1,383,265' \\ E = 454,290'$$

$$PC = N = 1383,343' \\ E = 454,565'$$

$$PI = N = 1383,439' \\ E = 454,853'$$

$$PT = N = 1,383,439' \\ E = 455,147'$$

$$\text{End (Pt)} = N = 1,383,439' \\ E = 455,949'$$

$$5^{\circ} 45' = 5.75 - \text{Min Degree curv.}$$

$$996' - \text{Min Radius}$$

~~$$25.6 - \text{Angle}$$~~

~~$$1969' - \text{Radius}$$~~

$$\text{Degree of curv.} = 1820.67 \cdot \frac{\pi}{180} = \frac{100}{31.77} \Rightarrow 3.15$$

$$23.9 - \text{Angle} \checkmark$$

Perp to Houston mill Rd.

$$\text{tangent} = 385' - 5''$$

~~$$\text{Central Angle}$$~~

$$1820' - 8''$$

$$\text{Radius} = 1820.67 \checkmark$$

Curve 2

$$t = 300'$$

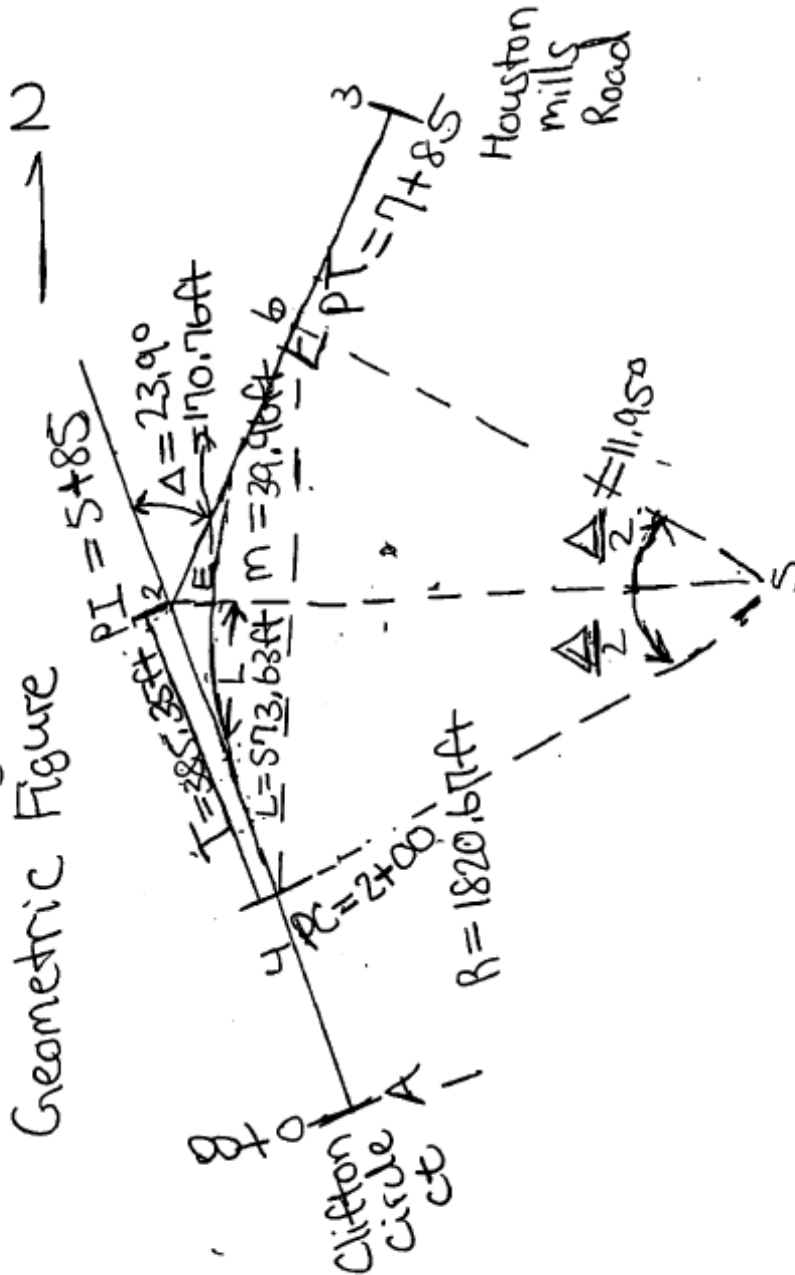
$$18.8 = \text{Angle}$$

$$\text{Radius} = 1807' - 10'' \quad 1807.223 \cdot \frac{\pi}{180} = \frac{100}{31.55}$$

$$\text{Degree of curv.} = 3.16$$

Section 1
Curve 1

Horizontal Alignment
Geometric Figure



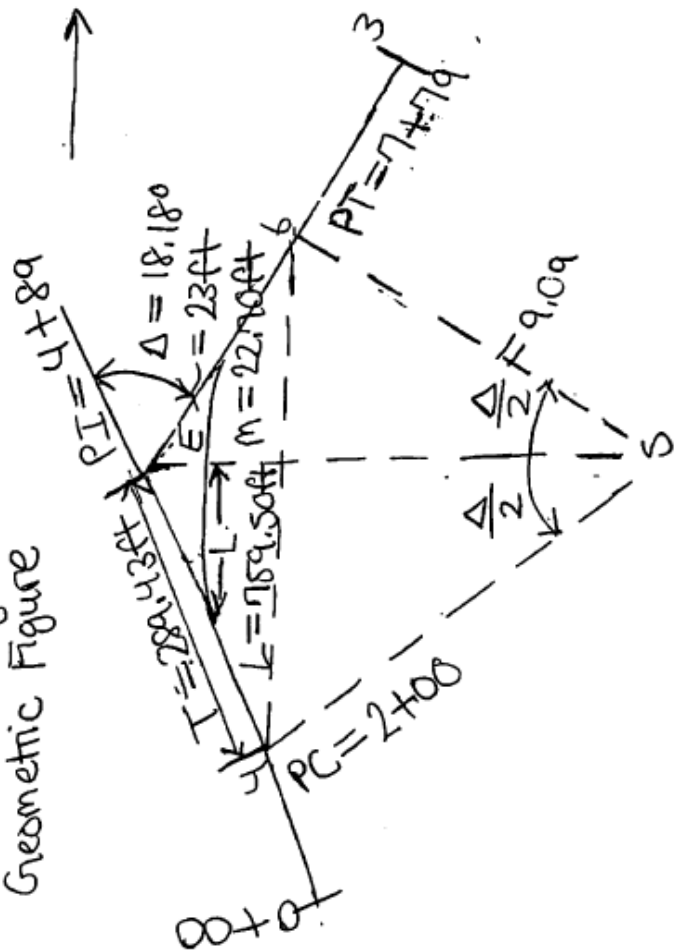
Section 2

Curve 2

2

Horizontal Alignment

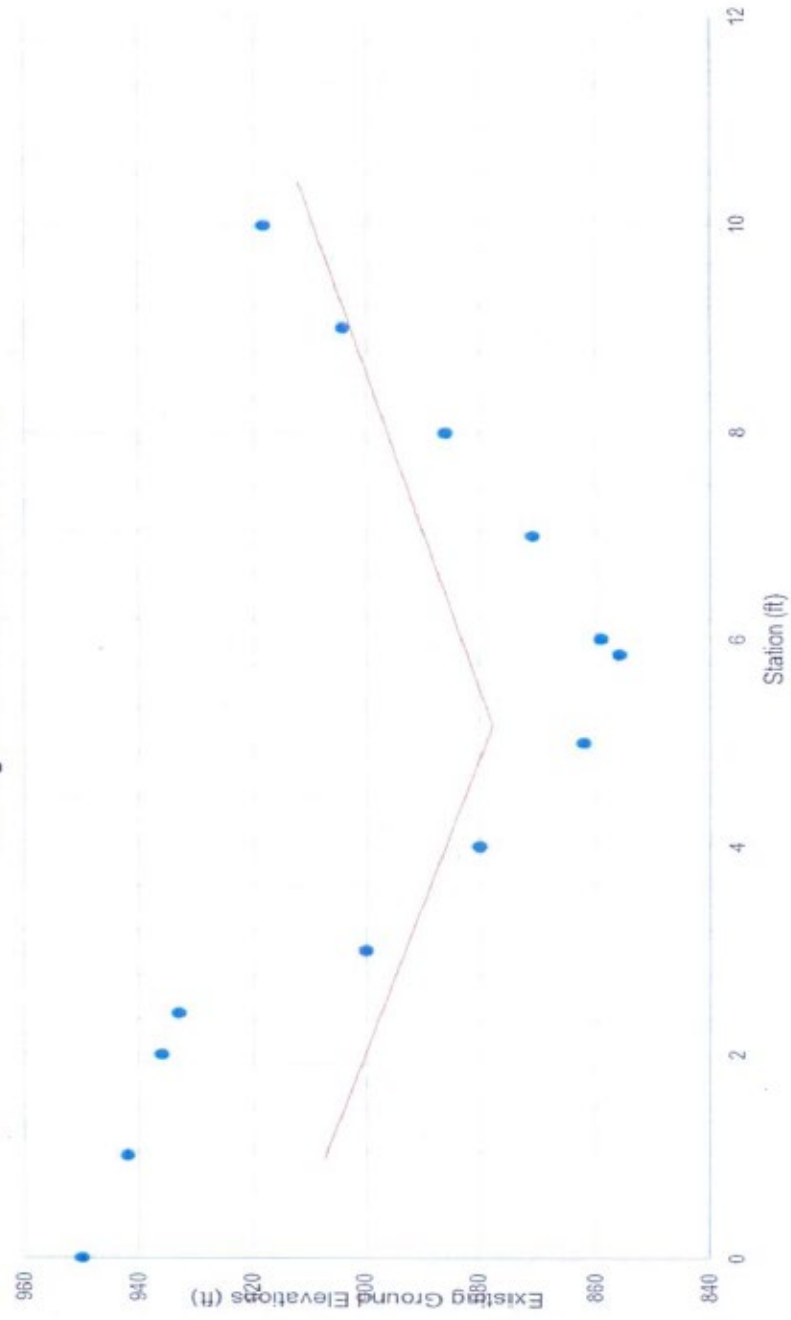
Geometric Figure



Vertical Curve 1		
	Station	Existing Ground Elevation
Starting Point A	0	950
	1	942
	2	936
PC	2.4	933
	3	900
	4	880
	5	862
PI	5.85	856
	6	859
	7	871
PT	8	886
	9	904
	10	918

Vertical Alignment Sag Curve I

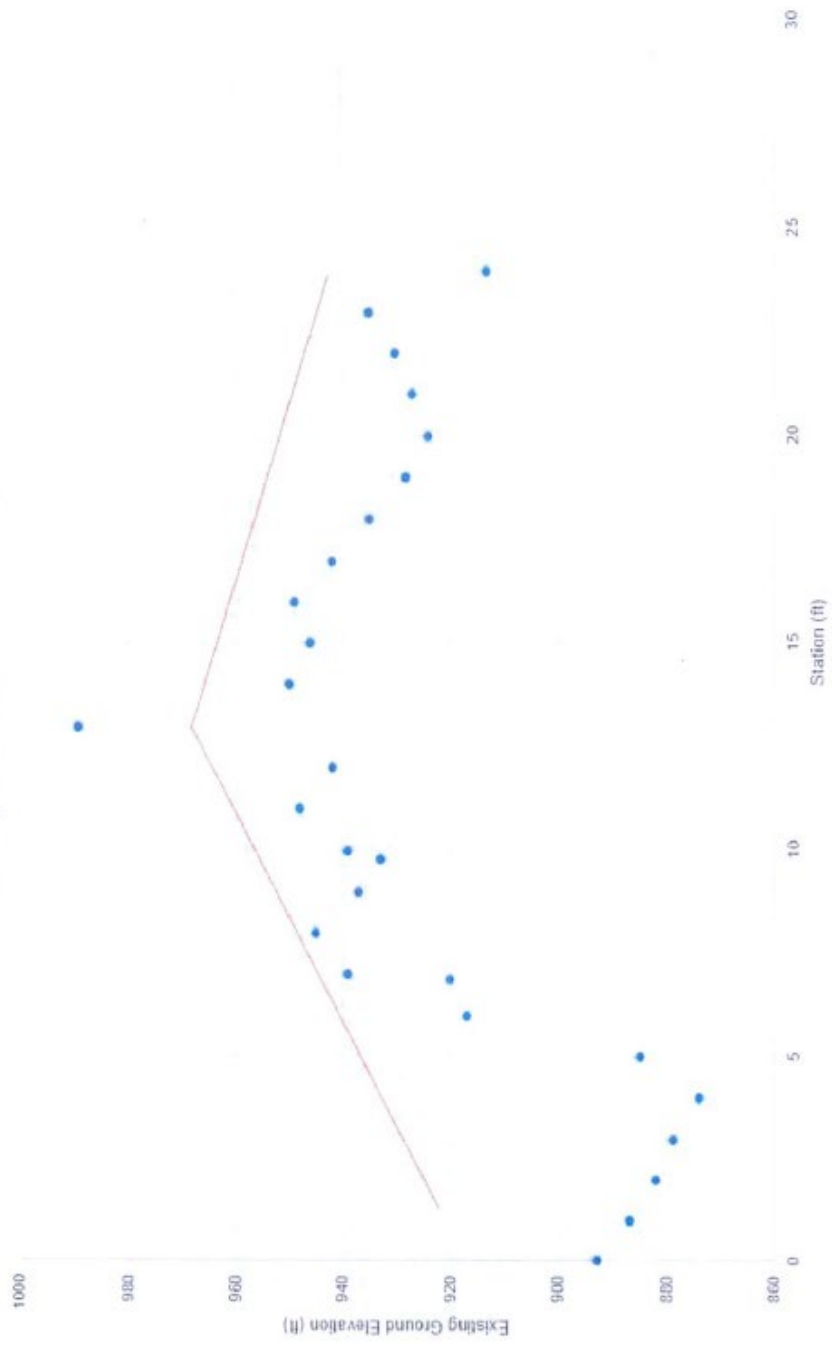
Existing Ground Elevation vs. Station



Vertical Curve 2		
	Station (ft)	Existing Ground Elevation (ft)
	0	893
	1	887
	2	882
	3	879
PC	4	874
	5	885
	6	917
PI	6.89	920
	7	939
	8	945
	9	937
PT	9.78	933
	10	939
	11	948
	12	942
	13	989
	14	950
	15	946
	16	949
	17	942
	18	935
	19	928
	20	924
	21	927
	22	930
	23	935
Ending Point B	24	913

Vertical Alignment Crest Curve 2

Existing Ground Elevation vs. Station



Devan Addison - Turner Group 1a

Sag curve 1

x = station

y = Existing Ground Elevation

$$m_1 = \frac{y_2 - y_1}{x_2 - x_1} \Rightarrow \frac{\text{rise}}{\text{run}}$$

Grade % - , downgrade

$$\frac{880.46\text{ft} - 909.32\text{ft}}{1120\text{ft} - 169\text{ft}} \times 100 = -3.03\%$$

OK ✓

Grade % + , upgrade

$$m = \frac{918.33\text{ft} - 880.46\text{ft}}{2774\text{ft} - 1120\text{ft}} \times 100 = +2.29\%$$

OK ✓

Vertical Alignment

Crest Curve 2 $x = \text{station}$ $y = \text{existing station}$

$$m_1 = \frac{y_2 - y_1}{x_2 - x_1}$$

Grade % + , upgrade

$$\frac{964.53\text{ft} - 918.34\text{ft}}{13.87\text{ft} - 1.88\text{ft}} \times 100 = 3.85\%$$

OK ✓

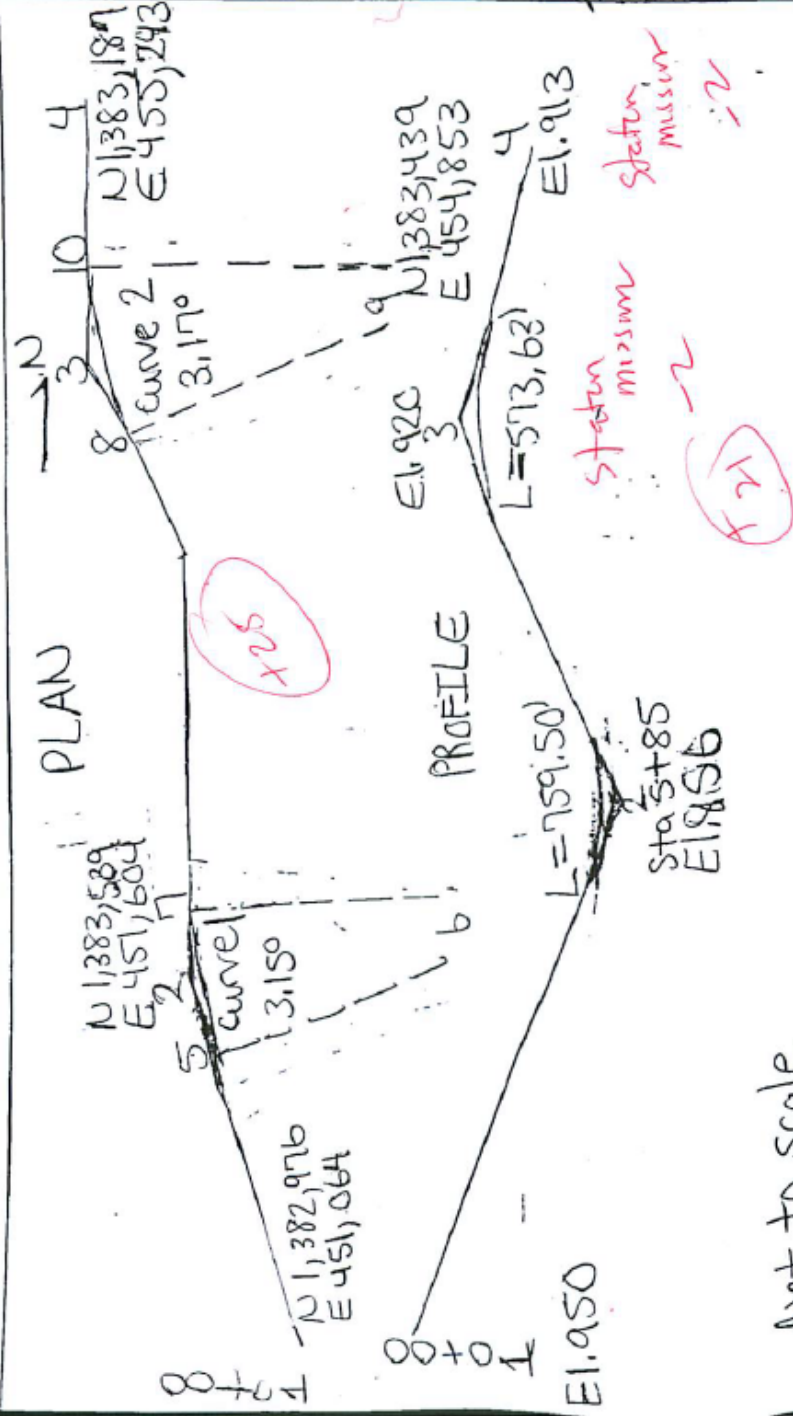
Grade % - , downgrade

$$\frac{939.11\text{ft} - 964.53\text{ft}}{23.72\text{ft} - 13.87\text{ft}} \times 100 = -2.58\%$$

Vertical Alignment

Suburban Collector Roadway Design

Devan Addison-Turner Group, Inc.



Not to scale

ASSIGNMENTS FOR OUTCOME 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
CVEG 4302: TRANSPORTATION ENGINEERING DESIGN
FALL 2021**

Instructor: Dr. Judy A. Perkins

Title of Assignment

**HOMEWORK ASSIGNMENT #1 –
TERM PROJECT TEAM BUILDING**

Outcome Measured Using this Assignment

Outcome 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Check the teaming problem characteristics related to this assignment

Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment.	
Requires students working in groups to:	
X	Organize and assign team roles; plan and keep good record of team meetings including documentation of individual contributions
X	Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).
X	Resolve conflicts professionally within the group with the view of creating an inclusive and collaborative environment
Establish goals, plan tasks, and meet objectives.	
Requires students working in groups to:	
X	Set goals and objectives
X	Identify and break down work into tasks and subtasks and identify the personnel and deliverables for each.
X	Develop a Gantt chart and critical path analysis for managing the project.
X	Establish major milestones for tracking progress and define performance metrics to measure success.
X	Track progress of team members to ensure project is on schedule and meets objectives (through submission of progress reports).

Brief justification of the suitability of assignment for the outcome

Designed to supplement and reinforce Team building skills needed to complete a single task of an undergraduate level open-ended design project in a given semester.

ASSIGNMENT STATEMENT/QUESTIONS
Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department

CVEG 4302 – Transportation Engineering Design
Fall 2021

Homework Assignment #1 - Term Project Team Building

Given: 23 September 2021

Due: 30 September 2021 NLT 8:05am CST

Total point value is (100-points)

- Measuring ABET Criterion 3. Student Outcome 3 - an ability to communicate effectively with a range of audiences
 - **Measuring ABET Criterion 3. Student Outcome 5** - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
1. This is a group assignment.
 - Determine the name of your group.
 - Create the organizational structure of your group using the software of your choice. Ensure the division of labor at a minimum aligns with the project scope hand out.
 - Use Microsoft Project software to create a Gantt chart that aligns with your organizational structure and the project scope hand out. Ensure the Gantt chart fits on a single page. Ensure it displays a wide array of symbols that articulates at a minimum the work effort outlined in the project scope hand out.
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 - Assignment Cover Page:
 - **Complete** title of assignment
 - Course number, section and name
 - First Name and Last Name of each group member
 - Given Date of Assignment
 - Due Date of Assignment
 3. Convert the assignment requirements into a single PDF and submit the group's Dropbox folder.

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department



88.5
100

CVEG 4302 P01 – Transportation Engineering Design

Spring 2021

Homework Assignment #1 – Term Project Team
Building

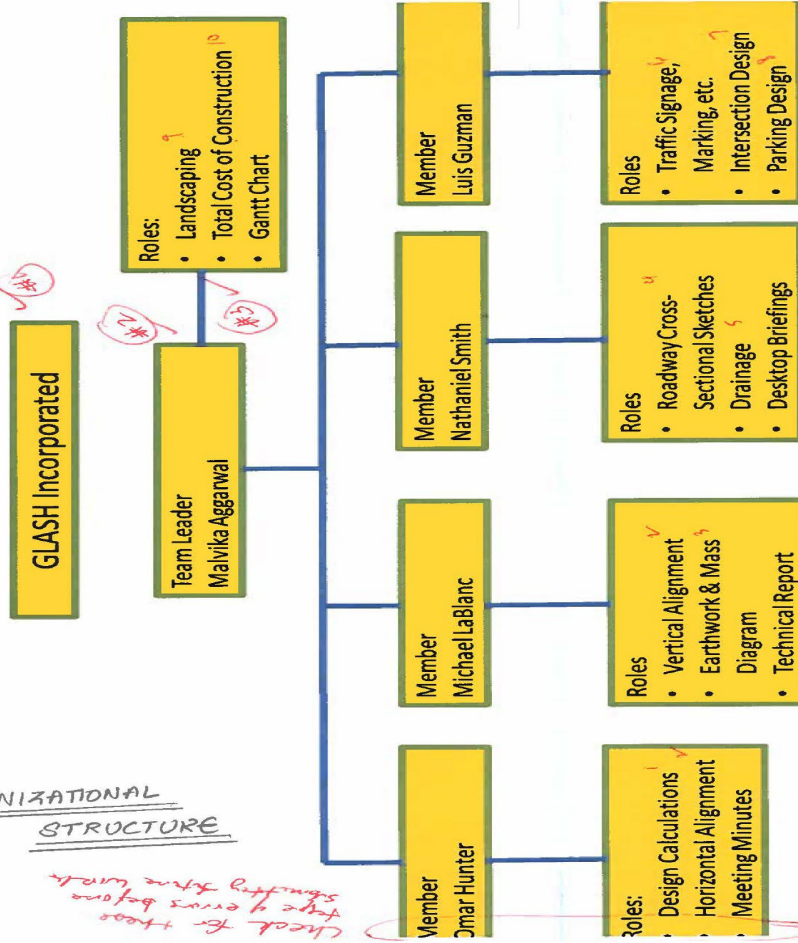
Maalvika Aggarwal, Luis Guzman, Omar Hunter, Nathaniel
Smith, Michael LeBlanc

49

Given: 23 September 2021

Due: 30 September 2021

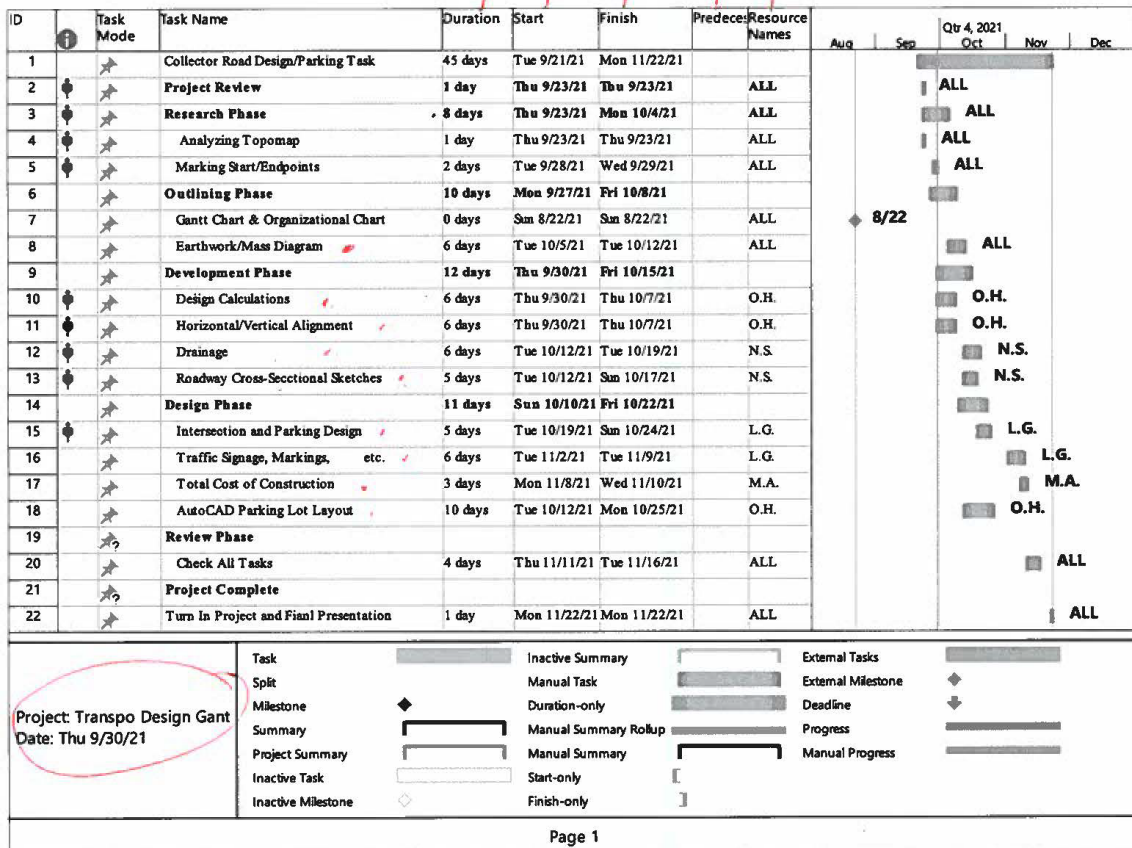
ORGANIZATIONAL
STRUCTURE



GANTT CHART

#5
? Landscaping
-1.5

collapse these columns



#4 -1.5
missing
Landscaping

#6

-7.5
Did not
display a
wide array of
symbols on the
Gantt chart

**CIVIL & ENVIRONMENTAL ENGINEERING DEPARTMENT
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET
CVEG 4302: TRANSPORTATION ENGINEERING DESIGN
FALL 2021**

Instructor: Dr. Judy A. Perkins

Title of Assignment

**HOMEWORK ASSIGNMENT #2 - TERM
PROJECT COGO DATA & GANTT CHART**

Outcome Measured Using this Assignment

Outcome 5

An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Check the teaming problem characteristics related to this assignment

Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment.	
Requires students working in groups to:	
X	Organize and assign team roles; plan and keep good record of team meetings including documentation of individual contributions
X	Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).
X	Resolve conflicts professionally within the group with the view of creating an inclusive and collaborative environment
Establish goals, plan tasks, and meet objectives.	
Requires students working in groups to:	
X	Set goals and objectives
X	Identify and break down work into tasks and subtasks and identify the personnel and deliverables for each.
X	Develop a Gantt chart and critical path analysis for managing the project.
X	Establish major milestones for tracking progress and define performance metrics to measure success.
X	Track progress of team members to ensure project is on schedule and meets objectives (through submission of progress reports).

Brief justification of the suitability of assignment for the outcome

Designed to supplement and reinforce Team building skills needed to complete an undergraduate level open-ended design project in a given semester.

ASSIGNMENT STATEMENT/QUESTIONS
Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department

CVEG 4302 – Transportation Engineering Design
Fall 2021

Homework Assignment #2 - Term Project COGO Data & Gantt Chart

Given: 14 October 2021

Due: 21 October 2021 NLT 8:05am CDT

Total point value is (100-points)

- Measuring ABET Criterion 3. Student Outcome 3 - an ability to communicate effectively with a range of audiences
 - **Measuring ABET Criterion 3. Student Outcome 5** - An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
1. This is a group assignment.
 - Create a sketch of your horizontal and vertical alignment as per the example found in the COGO handout. Ensure you follow the example as found in the COGO handout.
 - Use **Microsoft Project software only** to create a Gantt chart that aligns with your organizational structure and the actual term project scope. Ensure the Gantt chart fits on a single page. Ensure it displays a wide array of symbols that articulates at a minimum the work effort outlined in the actual term project scope.
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 - Course number, section and name
 - First Name and Last Name of each group member
 - Given Date of Assignment
 - Due Date of Assignment

Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department



94.5
100

CVEG 4302 P01 – Transportation Engineering Design ✓

Fall 2021

Homework Assignment #2 – Term Project COGO

Data & Gantt Chart ✓

**Maalvika Aggarwal, Omar Hunter, Nathaniel Smith,
Michael LeBlanc, Luis Guzman ✓**

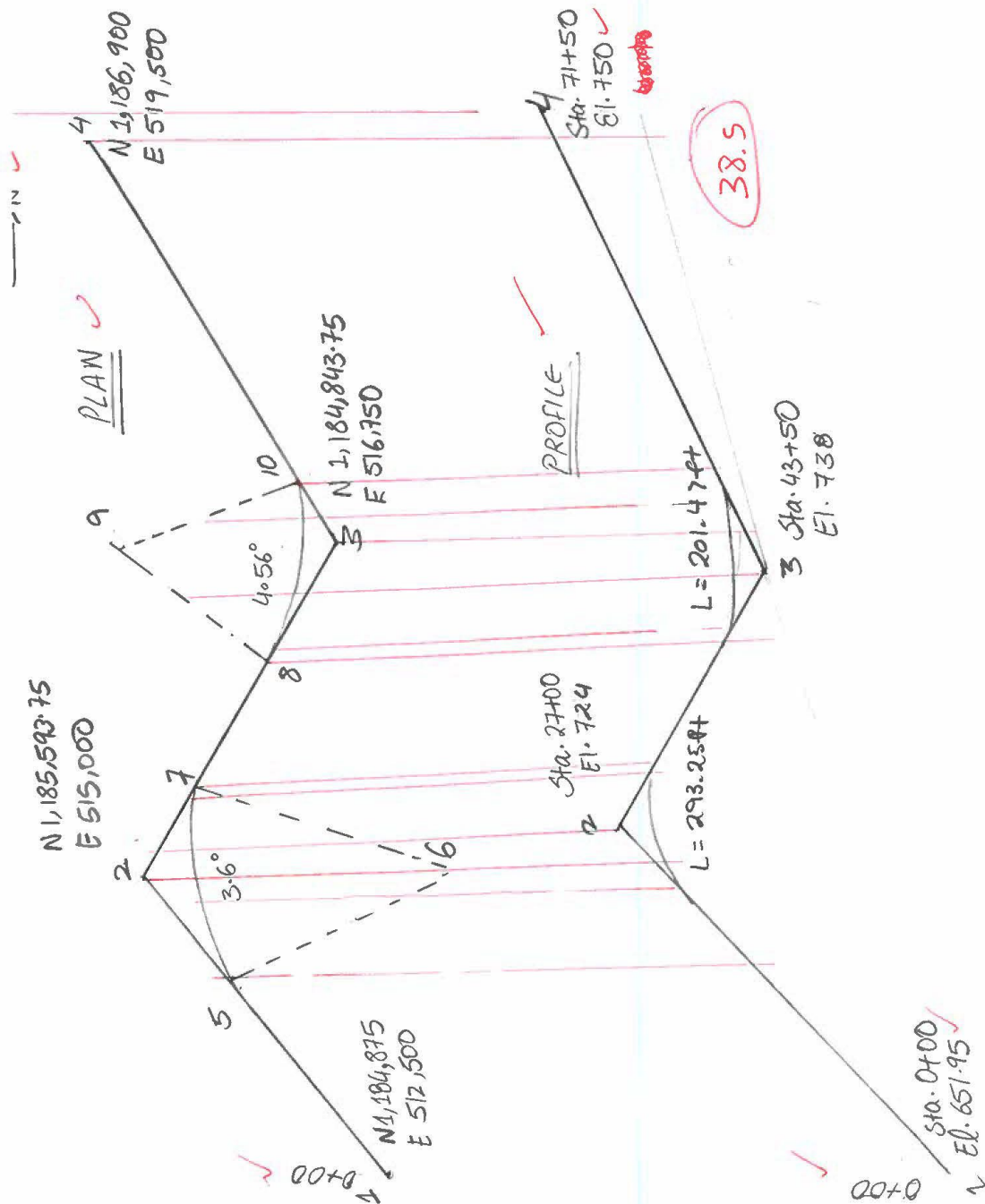
+10

Given: 14 October 2021 ✓

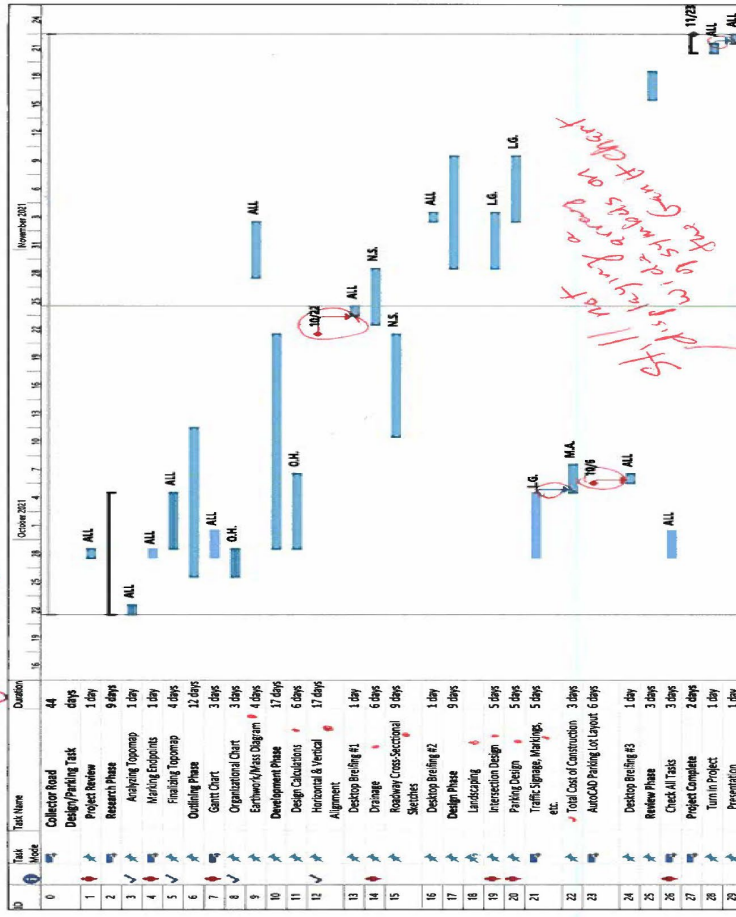
Due: 21 October 2021 ✓

10-20-21

ALIGNMENT



Collaborative



Incomplete

Project Collector Road Design
Date: Tue 10/26/21

Task: ☐ Task ☐ Milestone ☐ Summary

Project Summary: ☐ Project Summary ☐ Project Summary ☐ Project Summary

Task: ☐ Task ☐ Task ☐ Task ☐ Task

Summary: ☐ Summary ☐ Summary ☐ Summary ☐ Summary

Page 1

**OUTCOME “5” SPECIFIC ASSIGNMENTS
USED TO ASSESS THE OUTCOME IN**

**CVEG 4472
SENIOR DESIGN & PROFESSIONALISM I**

FALL 2019

CVEG 4472: SENIOR DESIGN & PROFESSIONALISM I

NO DATA COLLECTED

FALL 2020

CVEG 4472: SENIOR DESIGN & PROFESSIONALISM I

NO DATA COLLECTED

ASSIGNMENTS FOR OUTCOME “5”

An ability to (1) function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, (2) establish goals, plan tasks, and meet objectives.

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
CVEG 4200 Senior Design and Professionalism I
OUTCOMES SPECIFIC ASSIGNMENT COVER SHEET

FALL 2021

Instructor: Dr. Md Jobair Bin Alam

Title of Assignment

**Project Management, Identification of Tasks, Setting Milestones
and Gantt chart for the assigned Project**

Outcome Measured Using this Assignment

Outcome 5

An ability to (1) function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, (2) establish goals, plan tasks, and meet objectives.

Check the teaming problem characteristics related to this assignment

Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment.	
Requires students working in groups to:	
X	Organize and assign team roles; plan and keep good record of team meetings including documentation of individual contributions
X	Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).
	Resolve conflicts professionally within the group with the view of creating an inclusive and collaborative environment
Establish goals, plan tasks, and meet objectives.	
Requires students working in groups to:	
X	Set goals and objectives
X	Identify and break down work into tasks and subtasks and identify the personnel and deliverables for each.
X	Develop a Gantt chart and critical path analysis for managing the project.
X	Establish major milestones for tracking progress and define performance metrics to measure success.
X	Track progress of team members to ensure project is on schedule and meets objectives (through submission of progress reports).

Brief justification of the suitability of assignment for the outcome

Team dynamic activities will be given to ensure connection among team and group members. All members will be monitored to contribute to the identification of the project progress

FALL 2021

ASSIGNMENT STATEMENT/QUESTIONS GRADING SCHEME FOR ASSIGNMENT

Project Management	25 pts
Identification of Tasks	25 pts
Setting Milestones and Gantt chart	25 pts
Weekly Progress of the assigned Project	25 pts
Total:	100 pts

Insert here Student Sample Crit. 5

**Prairie View A&M University
Roy G. Perry College of Engineering
Civil & Environmental Engineering Department**



90

CVEG 4200: Senior Design

Section: P01

Course Number: 17739

Title: Assignment #04

Submitted By: Abram Auguste, Armando Gomez, Alex Martinez, Nathaniel Smith –

G.A.M.S. Engineering

Submitted To: Dr. Alam, Md Jobair Bin Ph.D., P.E.

Due Date: November 11, 2021 - 11:59PM

Management Report

Prepared by

Abram Auguste
AAuguste@pvamu.edu

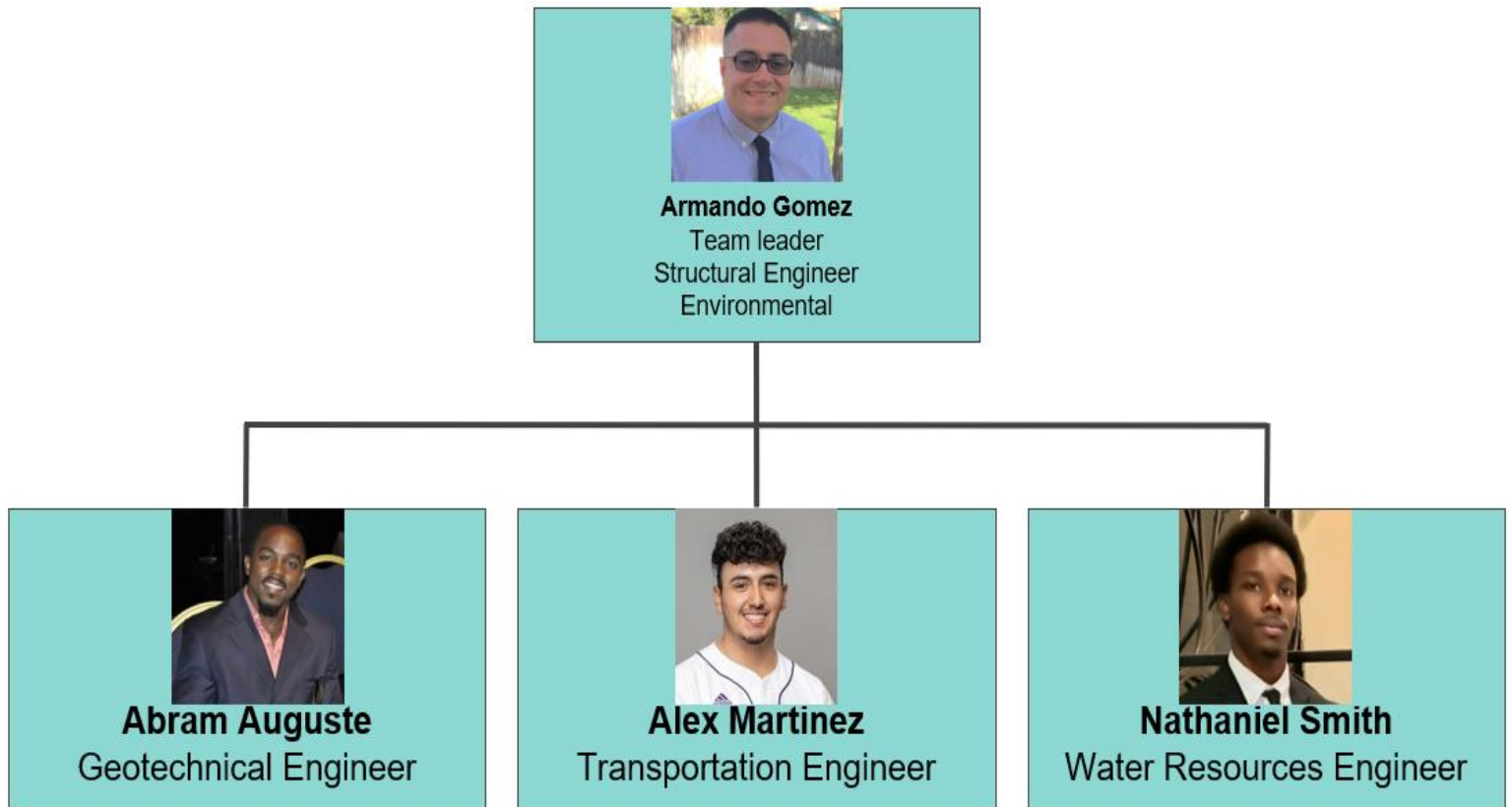
Alex Martinez
HAlex1011@gmail.com

Nathaniel Smith
Nkis1958@gmail.com

Armando Gomez
agomez28@pvamu.edu

November 11, 2021

Organizational Chart



Executive Summary

With a design objective issued by Dr. Alam, Jobair, G.A.M.S. Engineering implemented and commenced the senior design project on August 21, 2021. The project's main purpose is to establish the parameters for the execution of an Amazon Hub center in Brenham County, Texas. The report aims to detail the progress, milestones, and current gaps of the said project to complete it before its deadline.

Objectives

The objectives of this progress management report are:

1. To communicate the progress and milestone of the project
2. To report Individual efforts

Strategy

In developing the project, the project management team communicated with both the Internal Advisory Council (IAC) and Prairie View A&M University professors to help guide the project advancement. The necessary formulas and analysis was then conducted to see if the analyzed environmental parameters and project instructions can support the building's structure. Lastly, the team frequently communicated amongst each other to balance and assure each other's work.

Geotechnical Engineer (Abram Auguste)

Geotechnical engineers analyze soil integrity for building of infrastructure.

Responsibilities

- Model and apply ethical values and our guiding engineering principles throughout all our interactions and studies.
- Provide expert engineering advice and recommendations for the Amazon Hub projects
- Perform geotechnical studies, field tests, analysis, and design from Boring Logs provided
- Prepare and present findings and recommendations to Internal Advisory Council and Prairie View A&M University Faculty and staff
- Organize and direct geotechnical site assessment from maps provided and raw data
- Determine and obtain necessary compliance measures for the execution of the Amazon Hub
- Iteratively create and maintain high quality formulaic analysis, tests, and documentation that aligns with team goals.

- Document and share group progress in relevant lab meetings at least twice a week

Geotechnical Task

Geotechnical - The team was provided with raw boring and soil data of the site. The Geotechnical Engineer developed professional boring logs using the AutoCAD software.

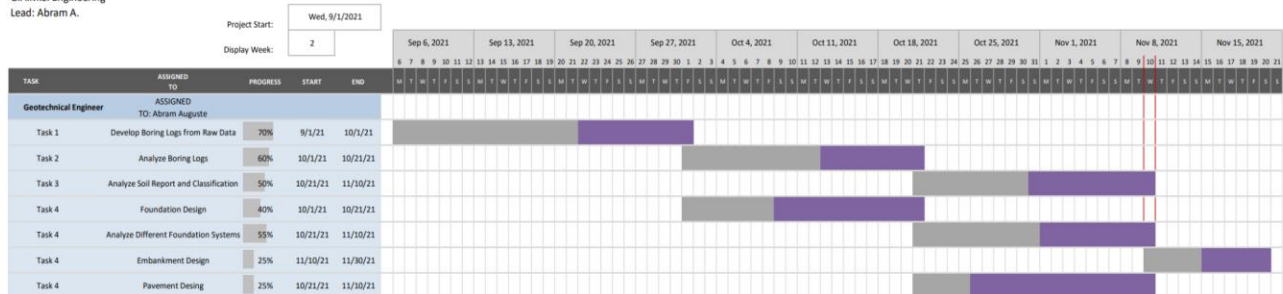
Geotechnical design meets the USACE, NAVFAC and TxDOT or local County standards.

- Analyzed boring logs to determine the soil quality and for the erection of the Amazon HUB
- Analyze soil report and soil classification to determine was modifications (ie. Cut and fill) of the soil classified.
- Foundation design: bearing capacity and settlement was determined applying formulas learned in both CVEG 3023 and 4100 courses.
- Analyze different foundation systems and recommend safe and low-cost foundation systems in tandem with the Structural Engineer (Armando Gomez). The Foundation type, size and depth and material specifications were determined and explained in the final report.

Geotechnical Gantt Chart

SENIOR DESIGN

G.A.M.S. Engineering
Lead: Abram A.



Structural Engineering Task (Armando Gomez)

The progress of the structural portion of the project is partially completed. There is still much work to be done but progress is being made each week. The Autocad drawings have had the most

progress and any changes to the design can be easily changed. STADD Pro has been the largest challenge and getting familiarized with the software. As there is a large array of things that can be done with this software. Progress is being made to be able to provide printouts of input and outputs of the structures. Have reached out to academic professors for meeting times for recommendations. The largest set back this year has been due to Covid as it had put me behind by two weeks but have continued to catch up on a daily basis.

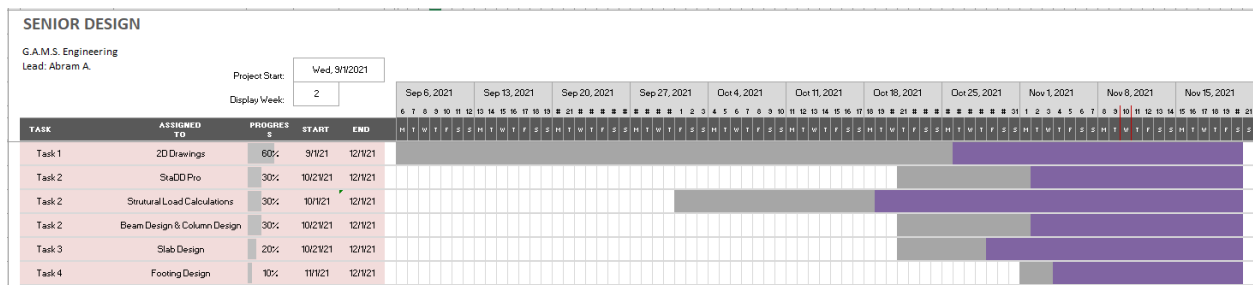
Responsibilities

- Model and apply ethical values and our guiding engineering principles throughout all our interactions and studies.
- Provide expert engineering advice and recommendations for the Amazon Hub projects
- Perform structural engineering studies, analysis, and design from research
- Prepare and present findings and recommendations to Internal Advisory Council and Prairie View A&M University Faculty and staff
- Determine and obtain necessary design requirements from structural steel design handbook
- Communications between the group on each others progress by meeting twice a week.

Structural Task

- Provide 2D drawing of all buildings including labeling dimensions, mark columns and beam placements.
- Determined the structural load calculation
- Provide a slab design slab design
- Provide a STADD Pro analysis of all buildings (dead, live and wind loads)
- Determine the beam and column design for all structure
- Provide STADD Pro maximum values of bending moments, shear, and axial load. Then to identify all members or components.
- Reinforcement concrete footing

Structural Engineering Gantt Chart



Water Resources Engineering (Nathaniel Smith)

The status of the water resources part of the project is partially completed. Almost all of the preliminary measurements and studies have been recorded. The last things that are left to do include finding the Manning's roughness coefficient, "n", and the appropriate sediment diameter for the land. After these two values are determined, the design of the trapezoidal water basin/ditch can be completed.

Responsibilities

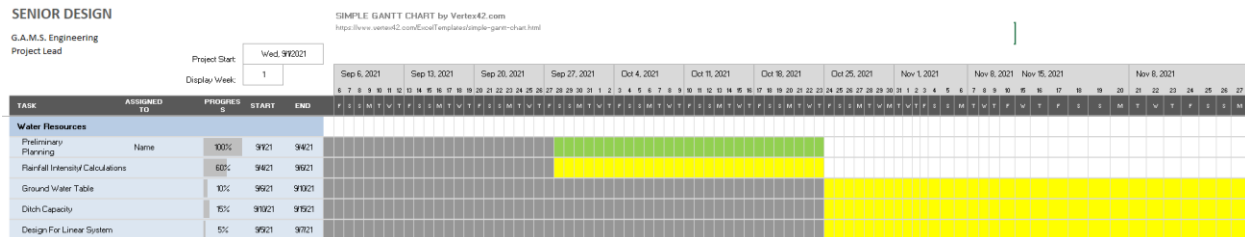
- Model and apply ethical values and our guiding engineering principles throughout all our interactions and studies.
- Provide expert engineering advice and recommendations for the Amazon Hub projects
- Perform water resource studies, analysis, and design from research
- Prepare and present findings and recommendations to Internal Advisory Council and Prairie View A&M University Faculty and staff
- Determine and obtain necessary design requirements from county flood control manual
- Iteratively create and maintain high quality formulaic analysis, tests, and documentation that aligns with team goals.

Water Resources Task

- Determine location of storm water ditch
- Determine the rainfall intensity from a 100-year rainfall investigation period
- Calculate the quantity of water
- Design stormwater runoff, while avoiding flooding risks and property damage

- Design capacity of the ditch based on rainfall study
- Design drainage ditch with profile and cross section

Water Resources Gantt Chart



Transportation Engineering (Alex Martinez)

Transportation Engineers design and analyze various modes for transportation and stationing.

Responsibilities

- Model and apply ethical values and our guiding engineering principles throughout all our interactions and studies.
- Provide expert engineering advice and recommendations for the Amazon Hub projects
- Perform Transportation studies, analysis, and design from existing land and roads within our project site
- Prepare and present findings and recommendations to Internal Advisory Council and Prairie View A&M University Faculty and staff
- Determine and obtain necessary compliance measures for connecting roads and parking lots
- Carry out studies, necessary formulaic analysis, and documentation that aligns with team goals

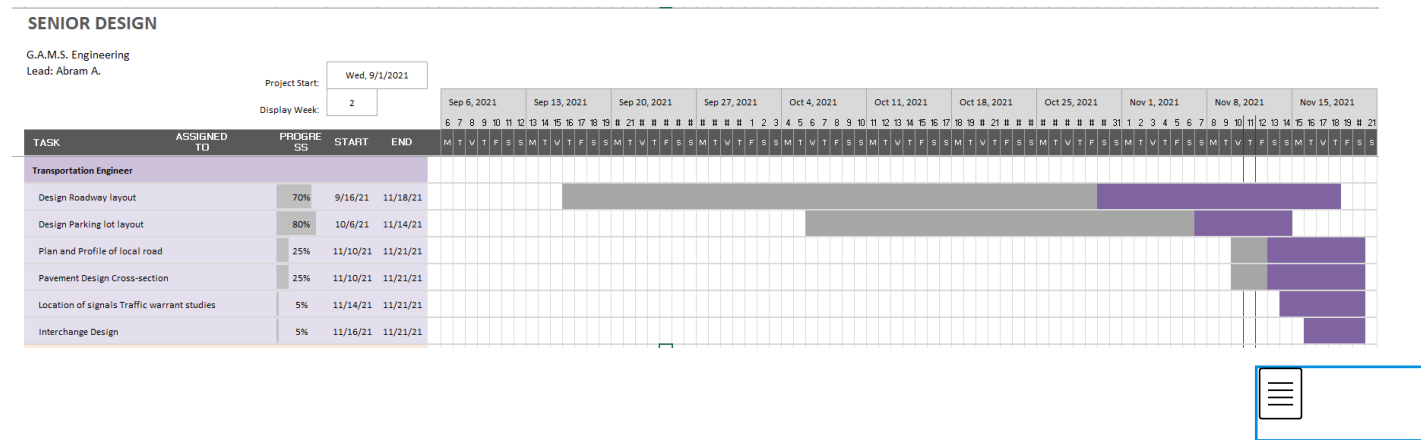
Transportation Task

The team was provided with parameters for where the Amazon Hub site would be located. The Transportation Engineer developed a professional layout of the project site using the AutoCAD software. Transportation design meets the TxDOT and US DOT requirements and specifications.

- Design Roadway Layout, using AutoCAD, for the entire project site. This will include a connecting road with highway 290.
- Determine Interchange design and analysis.

- Design Parking lot layout plan, using AutoCAD, for the entire project facility which includes separate lots for each building as well as a visitors parking lot, based on the number of employees.
- Analyze and Determine Location of signals within the roadway layout and related traffic warrant study.
- Provide a Plan and Profile of a typical local road in the development.
- Provide a Pavement Design cross-section for a typical local road in the development

Transportation Gantt Chart



Environmental Engineering (All)

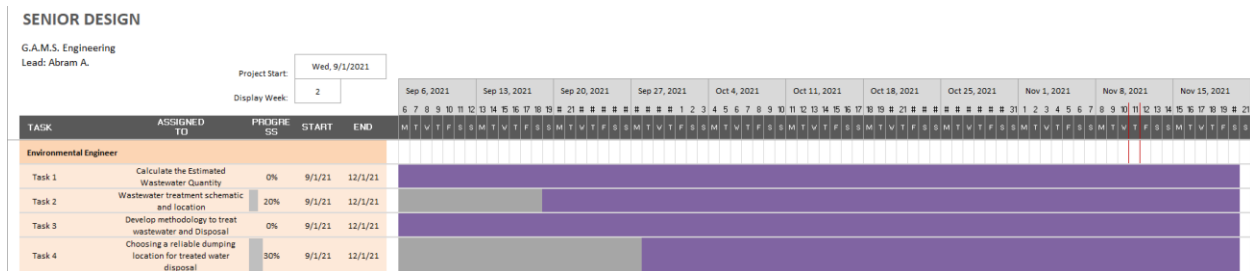
Responsibilities

- Model and apply ethical values and our guiding engineering principles throughout all our interactions and studies.
- Provide expert engineering advice and recommendations for the Amazon Hub projects
- Perform Transportation studies, analysis, and design from existing land and roads within our project site
- Prepare and present findings and recommendations to Internal Advisory Council and Prairie View A&M University Faculty and staff
- Determine and obtain necessary compliance measures for connecting roads and parking lots
- Carry out studies, necessary formulaic analysis, and documentation that aligns with team goals

Environmental Task

- Calculate the estimated wastewater quantity
- Schematic, and location wastewater treatment plant
- Develop an approach to treat the wastewater and disposal
- Choosing a reliable dumping location for treated water disposal

Environmental Gantt Chart



Findings

Geotechnical

1. The project execution met all the deliverables as it pertains to the outlined schedule provided in the initial Gantt Chart
2. The project's complete soil analysis should conclude by December 1, 2021 meeting all parameters outlined in the project instructions issued at the beginning of the semester.

Structural

1. Project status is outlined in the Gantt Chart as it pertains to the scheduled completion of the project for the semester.

Conclusion

Based on the report's findings and preliminary assessment, it is concluded that the project is a complete success, with the deliverables meeting all assigned dates and scope of work.

Recommendations

In a recommendation to ensure more successful projects in the future, Prairie View A&M University should

1. Continue monitoring students' individual progress on the projects from beginning to end, ensuring each goal/deliverable is completed on time.
2. Ensure that students have guaranteed access to the professor's according to their assigned job description.

CVEG 4200 P01 Senior Design Professionalism 1



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Homework #4

Date Given :November 3, 2021

Date Due : November 11, 2021

Jerral Walker ,12

Sydney Jones, 6

Paige Hines, 5

Michael LeBlanc Jr., 7

Johnathon Chevalier, 3

Prairie View A&M University
Roy G. Perry College of Engineering



75

Civil & Environmental Department
CVEG 4200: Senior Design Project

Autumn Carter

Shadaria Lynch

Scott McGary

Perla Zaldivar

Date Given: 11/4/2021

Date Due: 11/11/2021

Prairie View A&M University
Prairie View, Texas 77446

Project Management Report

Organization and Team Roles

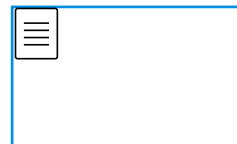
SAPS Engineering consists of four engineers that specialize in different areas of civil engineering. Scott McGary is the project manager for SAPS Engineering and Geotechnical Lead. Autumn Carter is the Environmental Lead as well as the Structural Co-Lead. Shadaria Lynch is the Transportation Lead as well as the Structural Co-Lead. Perla Zaldivar is the Water Resources Lead as well as the Structural Co-Lead.

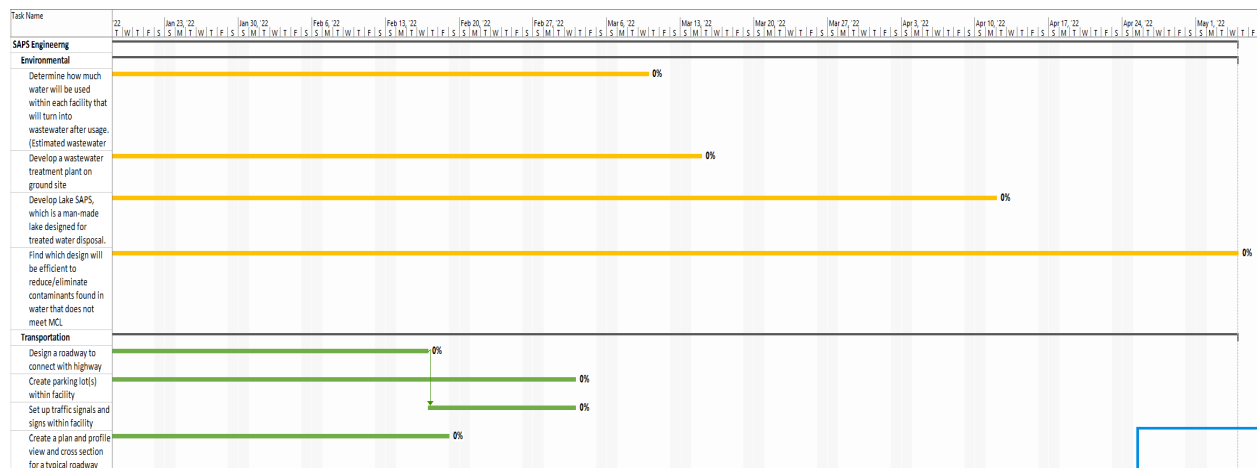
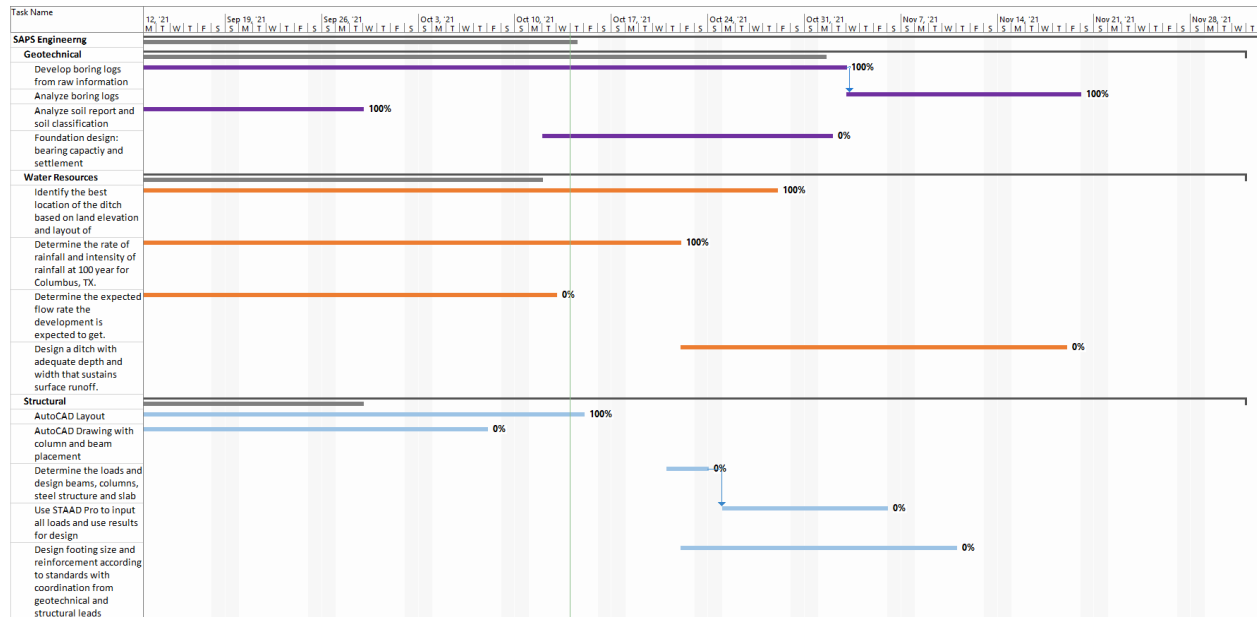
Goals and Objectives

The goal of the project is to effectively develop and design a distribution center, IT Hub and office buildings for the client. The project team is expected to provide Civil Engineering Site Development and Design services, as well as handle all of the project's requirements. Additionally, the team will perform new road network development, engineering design of pavement and pavement subgrade, intersections, sidewalks, driveways, and extension of major highways/service roads and connecting local road with highway, a storm water ditch connecting a major lake, a municipal solid waste and temporary recyclables disposal facility, and wastewater treatment process and facility. The students' objectives are to improve their ability to comprehend and use civil engineering information to design a system, component, or process that meets the needs of a civil engineering project. Develop the capacity to work as part of a team, follow ethical guidelines, and explain project design through reports and presentations to an audience.

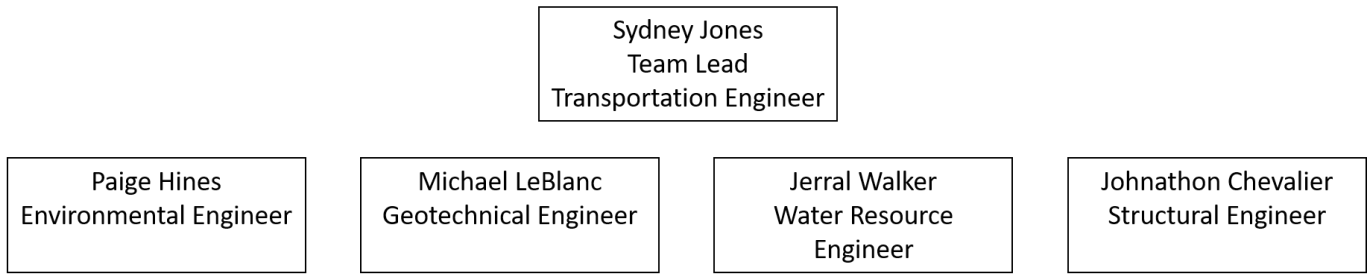
Gantt Chart

The gantt chart below shows the progress and anticipated progress for each discipline for the development of Amazon. The project is on schedule to be completed on time for the month of December.





Company Organizational Structure



Goals & Objectives

The overall goal of our project is to effectively and efficiently produce a distribution Center for Amazon in order for their business to continue to thrive at such a euphoric level. The mission is to use creativity and innovation along with technical knowledge to create multiple structures such as office buildings, water plants, and roads while ensuring the soil foundation is sufficient enough for longevity.

Structural Goals:

- Design structures within standards
- Be unique but careful with structure placement
- Less than 3 errors in Staad Pro output analysis
- Completely done by February 2022, besides adjustments
- To be as cost saving as possible

Transportation Goals:

- Effectively design a flow of traffic that mitigates vehicle collision the best
- Provide enough parking for all employees despite of shift working
- Implementation of traffic devices to ensure the flow of traffic is rarely disturbed

Environmental Goals:

- Reduce the amount of wear and tear on the surrounding environment
- Replacing any disturbed pre-existing environmental components.
- Propose a working method for treating wastewater with intentions on recycling water for usage.

Geotechnical Goals:

- Securing information on the soil in order to provide the okay for the buildings to begin the construction site plans.
- Identify and determine the best foundation system for the layout of the distribution center
- Create a design of the embankment from the highway

Water Resources Goal:

- Locate or Create a stormwater ditch system to help with the prevention of flood
- Educated hypothesis on the flood damage possibilities with regard to the location and the amount of rainfall
- Drainage, design a stable and efficient drainage system

Gantt Chart

Task	Assigned Task	Semester 1				Semester 2			
		4 weeks	8 weeks	12 weeks	16 weeks	4 weeks	8 weeks	12 weeks	16 weeks
Structual Engineering									
2D Drawing- Office Building, Warehouse, Convention Center, (Label dimensions, mark columns and beam placement)	Johnathon Chevalier								
Structural load calculation	Johnathon Chevalier								
Slab Design	Johnathon Chevalier								
Input and output after analyzing STADD Pro model for Office Buildings, Warehouse, Convention Center, (dead, live, and wind loads)	Johnathon Chevalier								
Beam and Column Design, steel structure design of warehouse	Johnathon Chevalier								
Analyze your output results obtained from STADD Pro.	Johnathon Chevalier								
Reinforcement bars and Reinforced Concrete Design for foundations including footing size, reinforcement.	Johnathon Chevalier								

Task	Assigned Task	Semester 1				Semester 2			
		4 weeks	8 weeks	12 weeks	16 weeks	4 weeks	8 weeks	12 weeks	16 weeks
Geo-Technical Engineering									
Create Boring logs based on raw data, Examine the soil report and classification.	Michael LeBlanc								
Bearing capacity and settling are two factors to consider while designing a foundation.	Michael LeBlanc								
Analyze various foundation systems and make recommendations for a safe and low-cost foundation (Type, size and depth and material for foundation, and related specifications)	Michael LeBlanc								
Design of the embankment (slope of major highway)	Michael LeBlanc, Sydney Jones								
Material specification and pavement design (geotechnical design)	Michael LeBlanc, Sydney Jones								

Task	Assigned Task	Semester 1				Semester 2			
		4 weeks	8 weeks	12 weeks	16 weeks	4 weeks	8 weeks	12 weeks	16 weeks
Transportation Engineering									
Design minor roads for project and connecting road with highway, Design interchanges for roads	Sydney Jones								
Plan parking lot in AutoCad for the entire project, Calculate total parking (regular and handicap)	Sydney Jones								
Pavement Design cross-section for a typical local road in the development	Sydney Jones								
Design roadway intersections with correct traffic signals, Display location of signals and related traffic warrant study	Sydney Jones								
Plan and Profile of a typical local road in the development	Sydney Jones								

Task	Assigned Task	Semester 1				Semester 2			
		4 weeks	8 weeks	12 weeks	16 weeks	4 weeks	8 weeks	12 weeks	16 weeks
Water Resources Engineering									
Location of stormwater ditch	Jerral Walker								
Rainfall intensity/Rainfall collection for 100-year flooding	Jerral Walker								
Calculation of the quantity of water	Jerral Walker								
Designing stormwater runoff, while avoiding flooding risks and property damage	Jerral Walker								
Design capacity of the ditch based on rainfall study	Jerral Walker								
Drainage ditch with profile and cross section	Jerral Walker								

Task	Assigned Task	Semester 1				Semester 2			
		4 weeks	8 weeks	12 weeks	16 weeks	4 weeks	8 weeks	12 weeks	16 weeks
Enviornmental Engineering									
Calculate and estimate wastewater quantity.	Paige Hines								
Wastewater treatment process and facility.	Paige Hines								
Wastewater Treatment Schematics and Location.	Paige Hines								
Develop methodology to treat wastewater and disposal.	Paige Hines								
Choosing a reliable dumping location for treated water disposal	Paige Hines								

