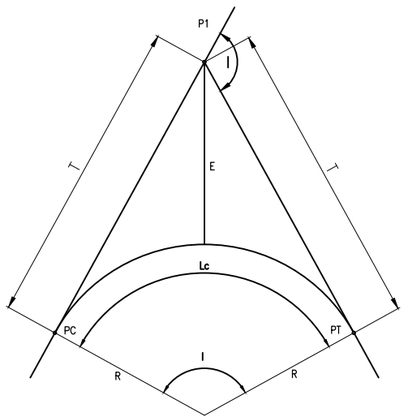



A 3 SIMPLE CURVE (CIRCULAR)
SCALE NTS

FORMULA:

T = R(tan I/2)

LC = 20(I)/D

E = T(tan I/4)

STA. PC = STA. PI−T

STA. PT = STA. PC+LC

WHERE:

PI = POINT OF HORIZONTAL INTERSECTION

I = INTERSECTION ANGLE (CENTRAL ANGLE)

T = LENGTH OF TANGENT

R = HORIZONTAL RADIUS

Lc = LENGTH OF CIRCULAR CURVE

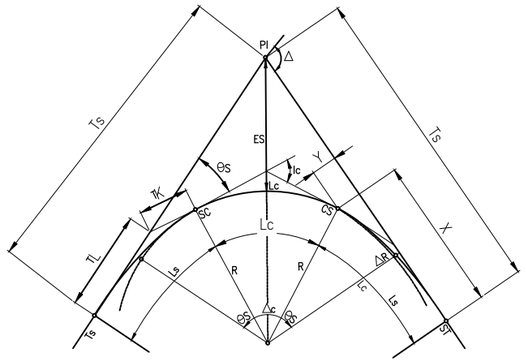
E = TOTAL EXTERNAL DISTANCE

PC = POINT OF CURVATURE

PT = POINT OF TANGENCY

NOTE:

NO HORIZONTAL CURVE IS REQUIRED WHEN THE INTERSECTION (CENTRAL) ANGLE ( I ) IS LESS THAN ONE DEGREE (1° 0' 0")




B 3 HORIZONTAL CURVE W/ (CLOTHOID SPIRAL)
SCALE NTS

WHERE:

PI = POINT OF INTERSECTION

Δ = INTERSECTION ANGLE

R = RADIUS OF CIRCULAR CURVE

Ls = LENGTH OF SPIRAL

A = PARAMETER OF CLOTHOID

θs = SPIRAL ANGLE

X,Y = COORDINATES OF POINT SC AND CS WITH RESPECT TO MAIN TANGENTS

ΔR = OFFSET BETWEEN CIRCULAR CURVE AND MAIN TANGENT ("THROW" OF SPIRAL)

Ts = TOTAL TANGENT DISTANCE

TL = LONG TANGENT OF SPIRAL

TK = SHORT TANGENT OF SPIRAL

Δc = CENTRAL ANGLE OF CIRCULAR CURVE

LC = LENGTH OF CIRCULAR CURVE

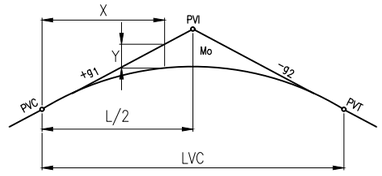
TS = BEGINNING OF SPIRAL CURVE

SC = BEGINNING OF CIRCULAR CURVE

CS = END OF CIRCULAR CURVE

ST = END OF SPIRAL CURVE

C 3 HORIZONTAL CURVE
SCALE NTS

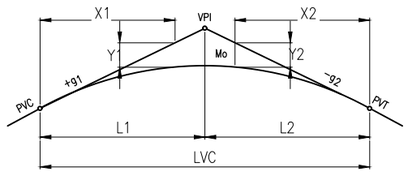



B−1 3 SYMMETRICAL
SCALE NTS

FORMULA:

$Mo = \frac{LVC(g2-g1)}{800}$

$Y = \frac{X^2\,(Mo)}{(L/2)^2}$




B−2 3 UNSYMMETRICAL
SCALE NTS

FORMULA:

$Mo = \frac{L1L2(g2-g1)}{200LVC}$

$Y1 = \frac{(Mo)(X1)^2}{(L1)^2}$

$Y2 = \frac{(Mo)(X2)^2}{(L2)^2}$

WHERE:

PVI = POINT OF VERTICAL INTERSECTION

PVC = POINT OF VERTICAL CURVE

PVT = POINT OF VERTICAL TANGENCY

LVC = LENGTH OF VERTICAL TANGENCY

g1,g2 = GRADIENT

Mo = MIDDLE ORDINATE

X1,X2 = DISTANCE FROM PVC OR PVT TO ANY POINT OF CURVE

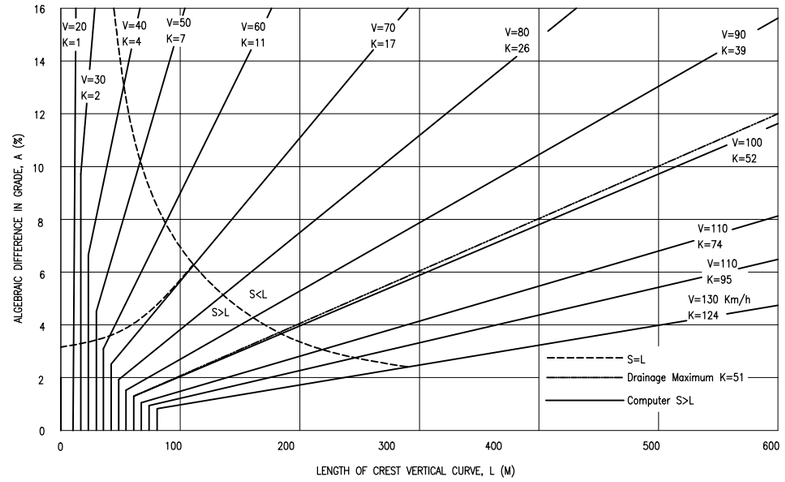
Y1,Y2 = VERTICAL OFFSET W/ RESPECT TO DISTANCE X

NOTE:

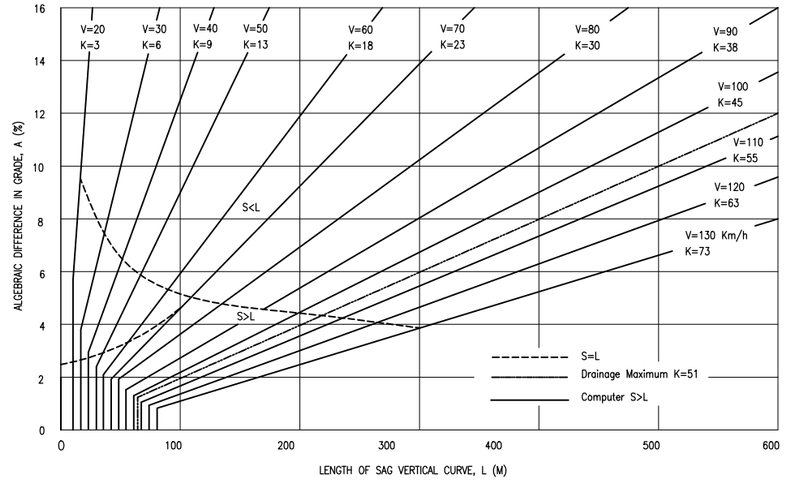
NO VERTICAL CURVE IS REQUIRED WHEN THE ALGEBRAIC DIFFERENCE IN GRADES IS LESS THAN 0.50 %

D 3 VERTICAL CURVE
SCALE NTS

STD−H ROAD GEOMETRIC DESIGN, HOR. AND VERT. CURVES
SCALE AS SHOWN




CREST VERTICAL CURVES
BASED ON MINIMUM STOPPING SIGHT DISTANCE(HEADLIGHT DISTANCE)




SAG VERTICAL CURVES
BASED ON MINIMUM STOPPING SIGHT DISTANCE(HEADLIGHT DISTANCE)

FORMULA:

LVC = KA

A = G2−G1

LEGEND:

A − ALGEBRAIC DIFFERENCE OF GRADIENTS (%)

K − RATE OF VERTICAL CURVATURE

E 3 DESIGN CONTROLS VERTICAL CURVES
SCALE NTS

## 1.0 SPECIFICATIONS & REFERENCE

1.1 ALL WORKS SHALL COMPLY WITH THE DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS", 2013 EDITION, VOLUME II, SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS PERTAINING TO THIS PROJECT.

1.2 DPWH DESIGN GUIDELINES AND CRITERIA STANDARDS 2015 EDITION AS REFERENCE.

REPUBLIC OF THE PHILIPPINES
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REGIONAL OFFICE No. IV-A
BATANGAS 2ND DISTRICT
ENGINEERING OFFICE
KUMINTANG ILAYA, BATANGAS CITY

PROJECT NAME AND LOCATION:
Opening and Concreting of Brgy. Estrella to Brgy. Laurel FMR, Brgy. Estrella and Brgy. Laurel, Mabini, Batangas

SHEET CONTENT:
GEOMETRIC DESIGN STANDARD HORIZONTAL AND VERTICAL

DRAFTED:
**MARK LEE M. DALANGIN**
ENGINEER II
PREPARED:
**JUNEIL RAY M. CHAVEZ**
ENGINEER II

REVIEWED :
**BRYAN EDWARD R. ANDAL**
ENGINEER II
DATE:

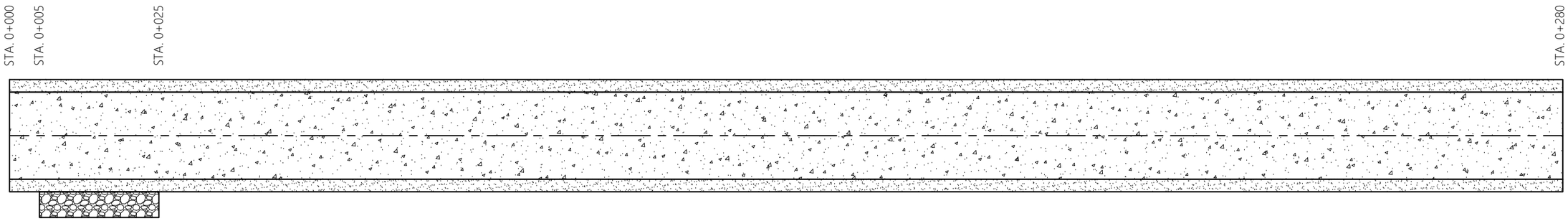
SUBMITTED :
**GEMMA L. OLAN**
CHIEF
PLANNING AND DESIGN SECTION
DATE:

RECOMMENDED:
**ARIEL V. ARMEDILLA**
ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:
**SONIA D. PAGLICAUAN**
DISTRICT ENGINEER
DATE:

SET NO. R 6 16

SHEET NO. 13 23




STRAIGHT LINE DIAGRAM

SCALE NTS

**LEGEND:**

SHOULDER

PCCP

STONE MASONRY

REPUBLIC OF THE PHILIPPINES
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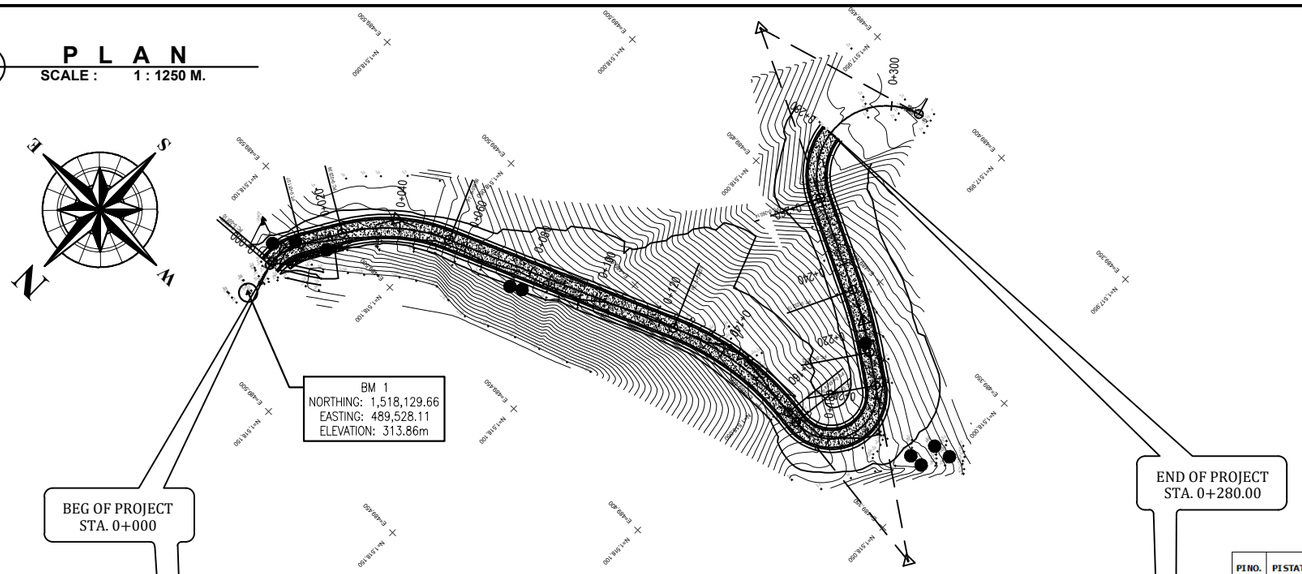
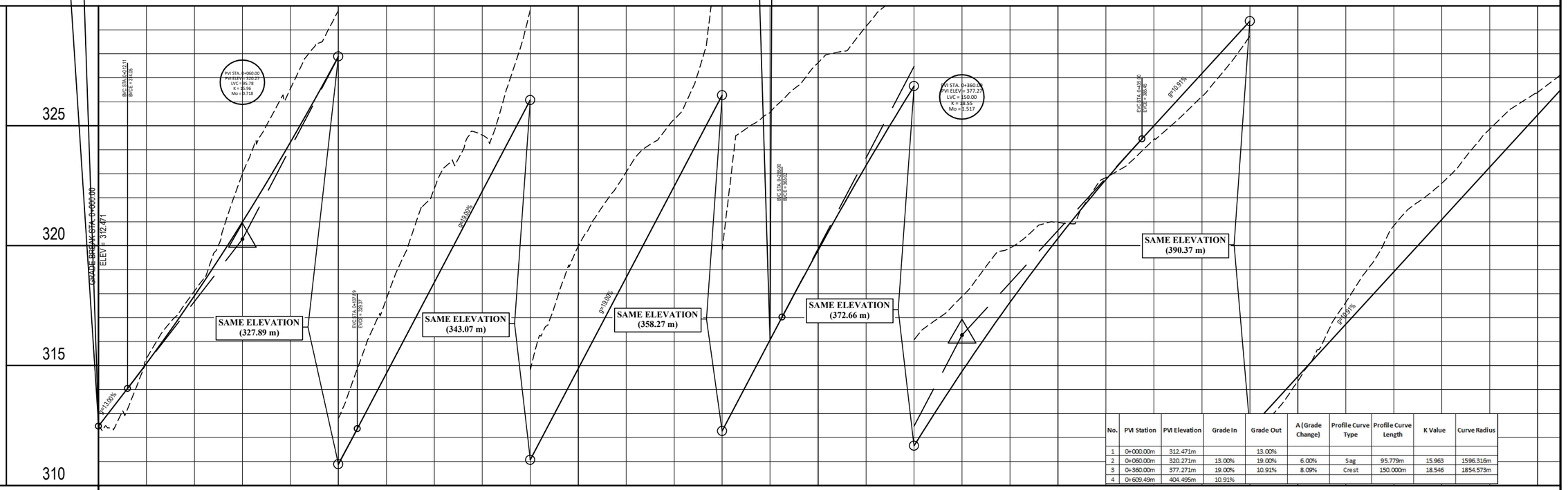
| PROJECT NAME AND LOCATION: | SHEET CONTENT: | DRAFTED: | REVIEWED : | SUBMITTED : | RECOMMENDED: | APPROVED: | SET NO. | SHEET NO. |
|---|---|---|---|---|---|---|---|---|
| Opening and Concreting of Brgy. Estrella to Brgy. Laurel FMR, Brgy. Estrella and Brgy. Laurel, Mabini, Batangas | PLAN AND PROFILE<br>STA. 0+0000 - STA. 0+260.00 | **MARK LEE M. DALANGIN**<br>ENGINEER II<br>PREPARED:<br>**JUNEIL RAY M. CHAVEZ**<br>ENGINEER II<br>DATE: | **BRYAN EDWARD R. ANDAL**<br>ENGINEER II<br>DATE: | **GEMMA L. OLAN**<br>CHIEF<br>PLANNING AND DESIGN SECTION<br>DATE: | **ARIEL V. ARMEDILLA**<br>ASSISTANT DISTRICT ENGINEER<br>DATE: | **SONIA D. PAGLICAUAN**<br>DISTRICT ENGINEER<br>DATE: | R<br>7 \| 16 | 14<br>23 |

# PLAN

SCALE : 1 : 1250 M.



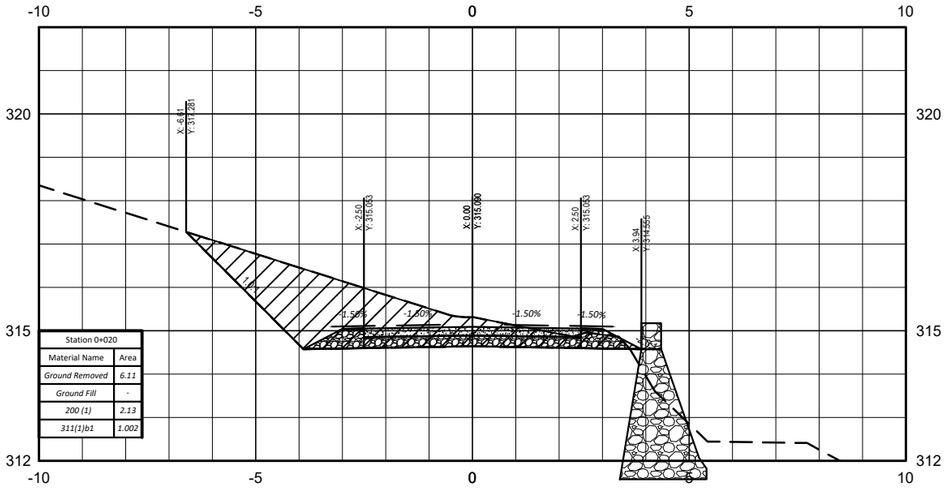

| PI NO. | PI STATION | COORDINATES | | AZIMUTH | DISTANCE | Included Angle | RADIUS | MID ORDINATE | EXTERNAL TANGENT | EXTERNAL SECANT | CHORD LENGTH | CHORD DIRECTION | STATION OF PC | STATION OF PT | Lc (m) | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EASTING | NORTHING | | | | (m) | (m) | (m) | (m) | (m) | | | | | |
| POT | | | | 356d14'49" | 6.25 | | | | | | | | | | | |
| 1 | 0+006.25m | (489529.6705m, | 1518113.3206m) | 31d10'13" | 33.63 | 145.0768 (d) | 16.348m | 0.753 | 5.142m | 0.790m | 9.811m | S13° 4Ź 31"W | 0+001.10m | 0+011.07m | 9.964m | 34.9232 (d) |
| 2 | 0+039.56m | (489512.2632m, | 1518084.5438m) | 67d3'47" | 106.99 | 144.1071 (d) | 50.000m | 2.433 | 16.194m | 2.557m | 30.813m | S49° 07 00"W | 0+023.36m | 0+054.69m | 31.322m | 35.8929 (d) |
| 3 | 0+145.48m | (489413.7352m, | 1518042.8490m) | 96d45'44" | 76.28 | 150.3007 (d) | 80.000m | 2.672 | 21.211m | 2.764m | 41.005m | S81° 54' 46"W | 0+124.27m | 0+165.74m | 41.468m | 29.6993 (d) |
| 4 | 0+220.80m | (489337.9899m, | 1518051.8305m) | 305d7'21" | 70.5 | 28.3602 (d) | 13.000m | 9.815 | 51.451m | 40.068m | 25.208m | S20° 56' 33"W | 0+169.35m | 0+203.76m | 34.406m | 151.6398 (d) |
| 5 | 0+222.81m | (489395.6531m, | 1518011.2703m) | 296d10'37" | 89.32 | 171.0546 (d) | 120.000m | 0.365 | 9.387m | 0.367m | 18.716m | S59° 21' 01"E | 0+213.42m | 0+232.15m | 18.735m | 8.9454 (d) |



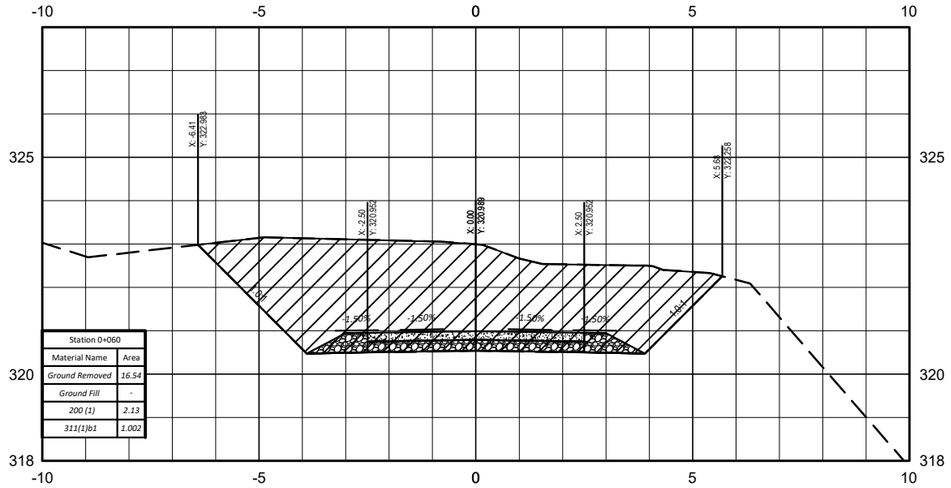

| No. | PVI Station | PVI Elevation | Grade In | Grade Out | A (Grade Change) | Profile Curve Type | Profile Curve Length | K Value | Curve Radius |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0+000.00m | 312.471m | | 13.00% | | | | | |
| 2 | 0+060.00m | 320.271m | 13.00% | 19.00% | 6.00% | Sag | 95.779m | 15.963 | 1596.316m |
| 3 | 0+360.00m | 377.271m | 19.00% | 10.91% | 8.09% | Crest | 150.000m | 18.546 | 1854.573m |
| 4 | 0+609.49m | 404.495m | 10.91% | | | | | | |

| STATION | 0+000 | 0+020 | 0+040 | 0+060 | 0+080 | 0+100 | 0+120 | 0+140 | 0+160 | 0+180 | 0+200 | 0+220 | 0+240 | 0+260 | 0+280 | 0+300 | 0+320 | 0+340 | 0+360 | 0+380 | 0+400 | 0+420 | 0+440 | 0+460 | 0+480 | 0+500 | 0+520 | 0+540 | 0+560 | 0+580 | 0+600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FINISHED GRADE | 312.47 | 315.09 | 317.91 | 320.99 | 324.31 | 327.89 | 331.67 | 335.47 | 339.27 | 343.07 | 346.87 | 350.67 | 354.47 | 358.27 | 362.07 | 365.81 | 369.34 | 372.66 | 375.75 | 378.64 | 381.31 | 383.76 | 386.00 | 388.18 | 390.37 | 392.55 | 394.73 | 396.91 | 399.09 | 401.28 | 403.46 |
| EXISTING GRADE | 312.47 | 315.31 | 318.12 | 323.00 | 326.54 | 329.80 | 334.78 | 339.39 | 341.61 | 346.82 | 351.98 | 355.07 | 357.27 | 354.84 | 371.55 | 373.63 | 375.14 | 377.07 | 378.88 | 380.90 | 381.97 | 383.84 | 385.44 | 387.22 | 389.74 | 392.35 | 395.63 | 398.83 | 400.61 | 402.86 | 404.40 |
| HORIZONTAL GEOMETRY | L=9.96m L=16.35m | L=12.30m | L=31.32m R=50.00m | L=69.58m | L=4.47m R=80.00m | L=3.84m | L=34.41m R=13.00m | L=9.66m | L=18.74m R=120.00m | L=27.99m | L=48.13m R=20.00m | L=5.51m | L=11.77m R=40.00m | L=2.98m | L=14.12m R=20.00m | L=10.96m | L=38.42m R=80.00m | L=14.70m | L=35.43m R=175.00m | L=51.63m | L=29.17m R=20.00m | L=2.57m | L=25.71m R=20.00m | L=4.14m | L=31.37m R=20.00m | L=32.52m | | | | | |
| VERTICAL GEOMETRY | g=13.00% L=60.00 | LVC = 95.78 | g=19.00% L=300.00 | LVC = 150.00 | g=10.91% L=249.49 | | | | | | | | | | | | | | | | | | | | | | | | | | |

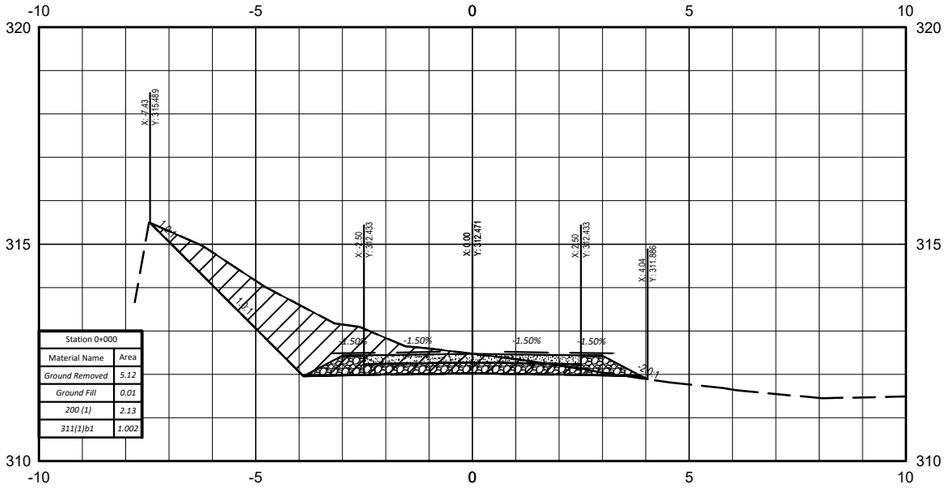
| | | | | | | |
|---|---|---|---|---|---|---|
| REPUBLIC OF THE PHILIPPINES<br>**DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS**<br>REGIONAL OFFICE No. IV-A<br>BATANGAS 2ND DISTRICT<br>ENGINEERING OFFICE<br>KUMINTANG ILAYA, BATANGAS CITY | PROJECT NAME AND LOCATION:<br>Opening and Concreting of Brgy. Estrella to Brgy. Laurel FMR, Brgy. Estrella and Brgy. Laurel, Mabini, Batangas | SHEET CONTENT:<br>PLAN AND PROFILE<br>STA. 0+000 - STA. 0+260 | DRAFTED:<br>**MARK LEE M. DALANGIN**<br>ENGINEER II<br>PREPARED:<br>**JUNEIL RAY M. CHAVEZ**<br>ENGINEER II | REVIEWED :<br>**BRYAN EDWARD R. ANDAL**<br>ENGINEER II<br>DATE: | SUBMITTED :<br>**GEMMA L. OLAN**<br>CHIEF<br>PLANNING AND DESIGN SECTION<br>DATE: | RECOMMENDED:<br>**ARIEL V. ARMEDILLA**<br>ASSISTANT DISTRICT ENGINEER<br>DATE: | APPROVED:<br>**SONIA D. PAGLICAUAN**<br>DISTRICT ENGINEER<br>DATE: | SET NO.<br>R<br>8 16 | SHEET NO.<br>15<br>23 |



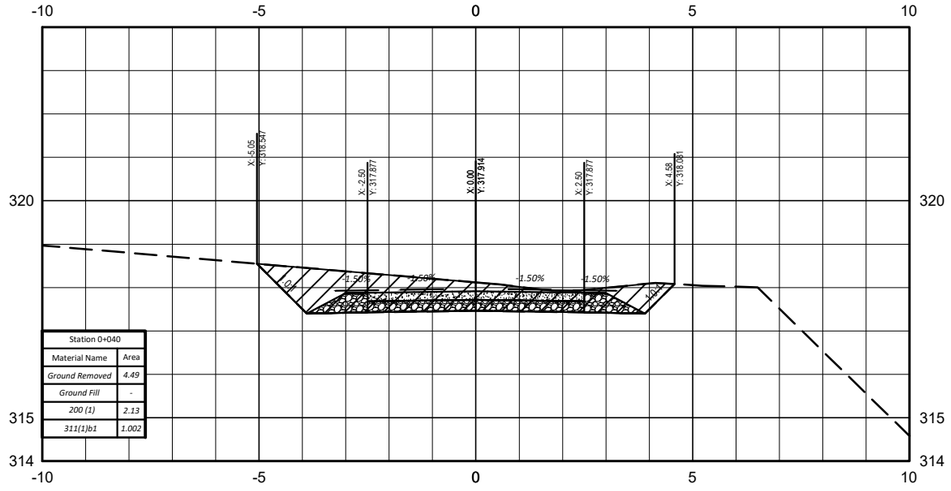

STA 0+020.00




STA 0+060.00




STA 0+000.00




STA 0+040.00

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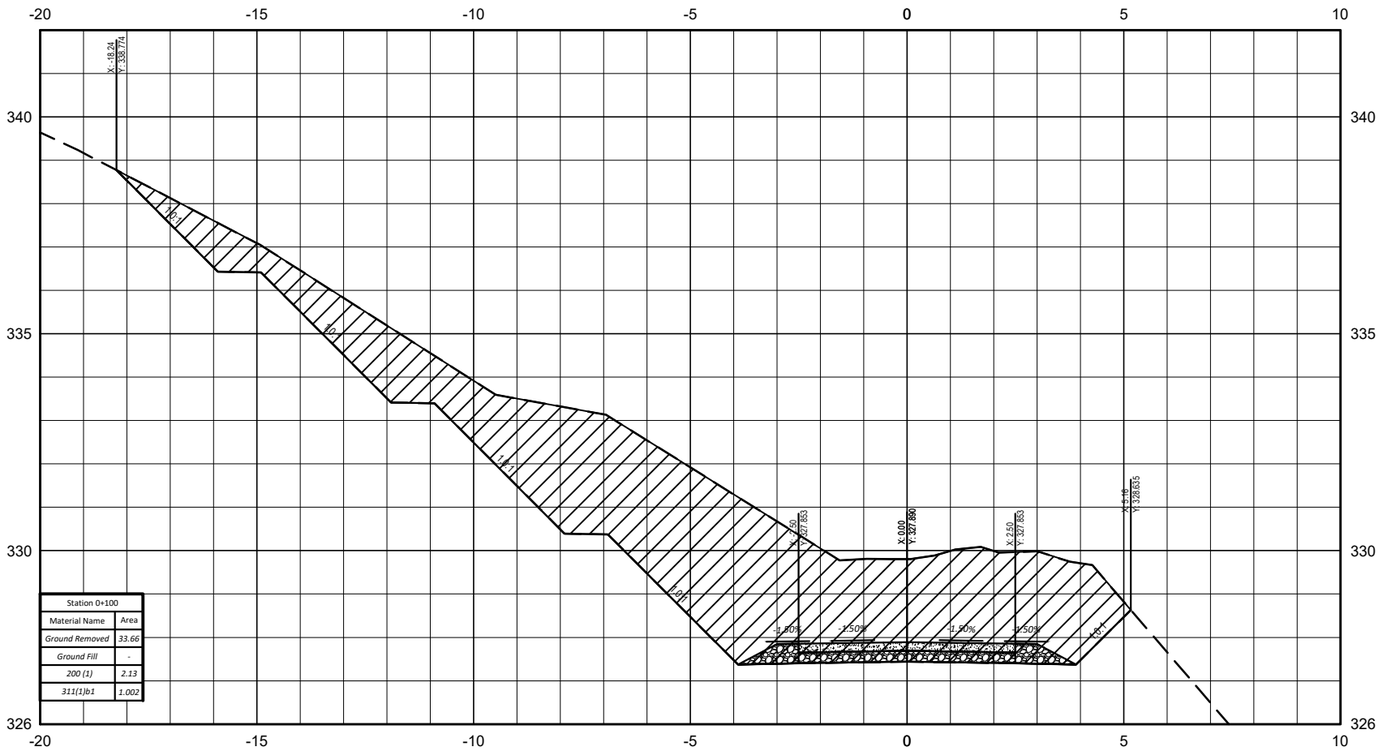
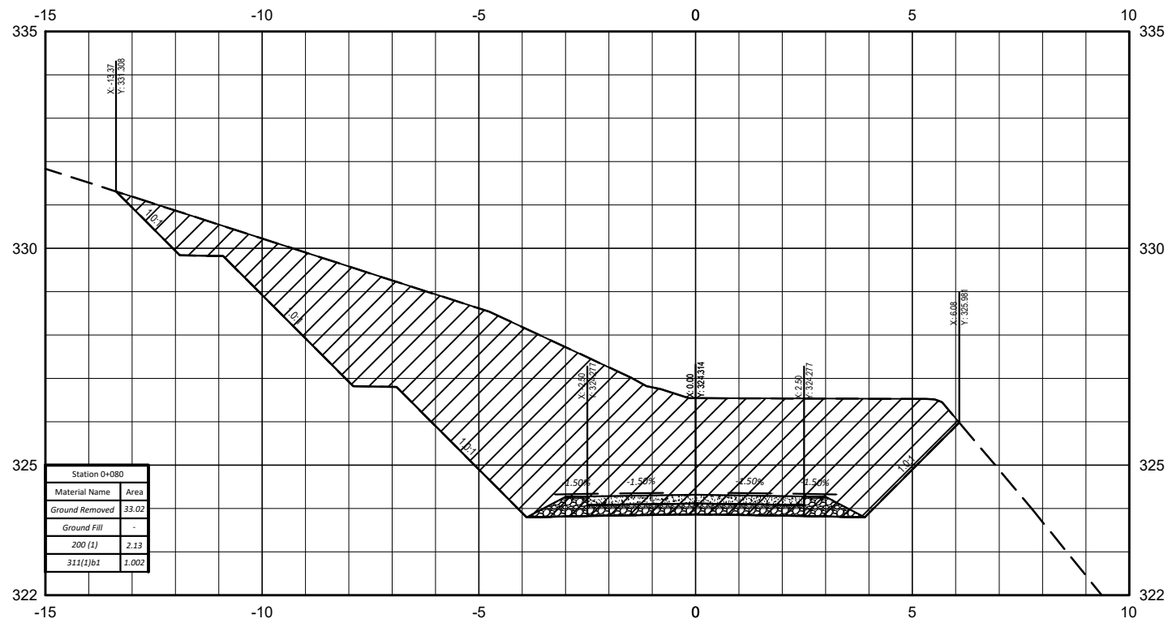
| Opening and Concreting of Brgy. Estrella to Brgy. Laurel FMR, Brgy. Estrella and Brgy. Laurel, Mabini, Batangas | CROSS SECTION<br>STA. 0+000 - STA. 0+060 | **MARK LEE M. DALANGIN**<br>ENGINEER II<br>PREPARED:<br>**JUNEIL RAY M. CHAVEZ**<br>ENGINEER II | **BRYAN EDWARD R. ANDAL**<br>ENGINEER II<br>DATE: | **GEMMA L. OLAN**<br>CHIEF<br>PLANNING AND DESIGN SECTION<br>DATE: | **ARIEL V. ARMEDILLA**<br>ASSISTANT DISTRICT ENGINEER<br>DATE: | **SONIA D. PAGLICAUAN**<br>DISTRICT ENGINEER<br>DATE: | R<br>9 \| 16 | 16<br>23 |




STA 0+100.00




STA 0+080.00

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