

## **LAMPIRAN**

**LAMPIRAN 1**

**PEMERIKSAAN KETIDAKBERATURAN HORIZONTAL**

**STRUKTUR DAN SIMPANGAN ANTAR LANTAI TINGKAT**

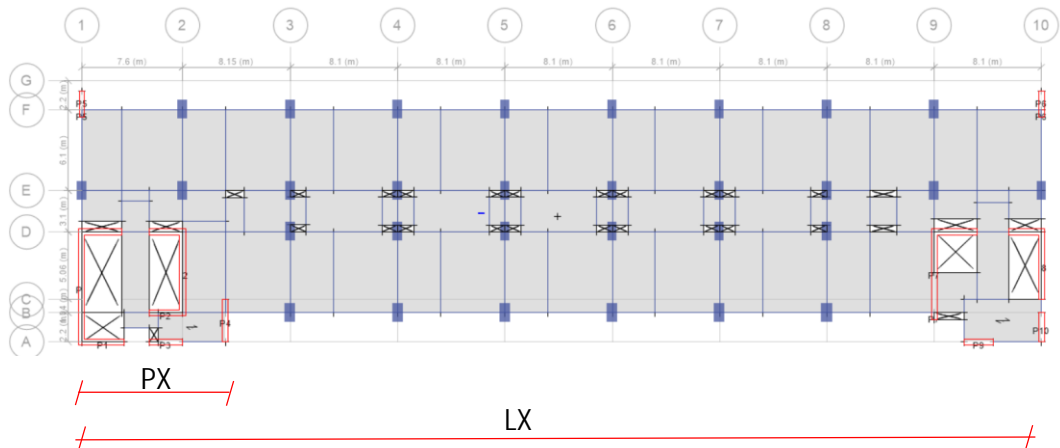
**1. Ketidakberaturan Torsi**

Tabel 1 Ketidakberaturan Torsi

| Story   | Load Case/Combo | Direction | Maximum | Average | Ratio | Keterangan             | Amplifikasi Torsi |
|---------|-----------------|-----------|---------|---------|-------|------------------------|-------------------|
|         |                 |           | mm      | mm      |       |                        | Ax                |
| Story12 | EX              | X         | 29.03   | 28.936  | 1.003 | Tanpa Ketidakberaturan | 1                 |
| Story11 | EX              | X         | 27.336  | 27.266  | 1.003 | Tanpa Ketidakberaturan | 1                 |
| Story10 | EX              | X         | 25.393  | 25.346  | 1.002 | Tanpa Ketidakberaturan | 1                 |
| Story9  | EX              | X         | 23.165  | 23.138  | 1.001 | Tanpa Ketidakberaturan | 1                 |
| Story8  | EX              | X         | 20.65   | 20.64   | 1     | Tanpa Ketidakberaturan | 1                 |
| Story7  | EX              | X         | 17.887  | 17.884  | 1     | Tanpa Ketidakberaturan | 1                 |
| Story6  | EX              | X         | 14.938  | 14.924  | 1.001 | Tanpa Ketidakberaturan | 1                 |
| Story5  | EX              | X         | 11.856  | 11.836  | 1.002 | Tanpa Ketidakberaturan | 1                 |
| Story4  | EX              | X         | 8.742   | 8.72    | 1.002 | Tanpa Ketidakberaturan | 1                 |
| Story3  | EX              | X         | 5.735   | 5.716   | 1.003 | Tanpa Ketidakberaturan | 1                 |
| Story2  | EX              | X         | 3.037   | 3.023   | 1.005 | Tanpa Ketidakberaturan | 1                 |
| Story1  | EX              | X         | 0.954   | 0.947   | 1.007 | Tanpa Ketidakberaturan | 1                 |
| Story12 | EY              | Y         | 27.597  | 22.366  | 1.234 | Ketidakberaturan 1a    | 1.0572668         |
| Story11 | EY              | Y         | 24.992  | 20.211  | 1.237 | Ketidakberaturan 1a    | 1.0618519         |
| Story10 | EY              | Y         | 22.296  | 17.987  | 1.24  | Ketidakberaturan 1a    | 1.0670234         |
| Story9  | EY              | Y         | 19.521  | 15.71   | 1.243 | Ketidakberaturan 1a    | 1.0722332         |
| Story8  | EY              | Y         | 16.692  | 13.4    | 1.246 | Ketidakberaturan 1a    | 1.0775679         |
| Story7  | EY              | Y         | 13.851  | 11.092  | 1.249 | Ketidakberaturan 1a    | 1.0828793         |
| Story6  | EY              | Y         | 11.052  | 8.83    | 1.252 | Ketidakberaturan 1a    | 1.0879222         |
| Story5  | EY              | Y         | 8.363   | 6.669   | 1.254 | Ketidakberaturan 1a    | 1.0920443         |
| Story4  | EY              | Y         | 5.866   | 4.671   | 1.256 | Ketidakberaturan 1a    | 1.0952213         |
| Story3  | EY              | Y         | 3.655   | 2.911   | 1.256 | Ketidakberaturan 1a    | 1.0947825         |
| Story2  | EY              | Y         | 1.842   | 1.473   | 1.251 | Ketidakberaturan 1a    | 1.0859536         |
| Story1  | EY              | Y         | 0.557   | 0.452   | 1.231 | Ketidakberaturan 1a    | 1.0545594         |

Dari Tabel 1, gedung mengalami ketidakberaturan torsi pada arah sumbu Y dan tidak mengalami ketidakberaturan torsi pada arah sumbu X.

## 2. Ketidakberaturan Sudut Dalam



Gambar 1 Denah Gedung  
(Sumber: ETABS)

$$PX < 0.15LX$$

$$10.84 \text{ meter} < 0.15 (72.45) \text{ meter}$$

$$10.84 \text{ meter} < 10.868 \text{ meter}$$

Karena  $PX < 0.15LX$ , maka tidak ada ketidakberaturan sudut dalam.

## 3. Ketidakberaturan Diskontinuitas Diafragma

Berdasarkan Gambar 1, secara visual dapat dilihat bahwa lubang atau void tidak melebihi dari 50 persen luas lantai. Maka tidak ada ketidakberaturan diskontinuitas diafragma.

#### **4. Ketidakberaturan Pergeseran Melintang Terhadap Bidang**

Contoh gedung yang diteliti memiliki dimensi elemen struktur yang tipikal pada seluruh lantai dan tidak ada pergeseran melintang terhadap bidang.

#### **5. Ketidakberaturan Sistem Non Paralel**

Dari Gambar 1, dapat dilihat terdapat letak dan dimensi dinding geser yang tidak simetris dalam satu lantai. Maka gedung memiliki ketidakberaturan sistem non paralel.

## 6. Simpangan Antar Lantai

Tabel 2 Simpangan Antar Lantai

| Story   | Diaph | hsx | Simpangan Antar Lantai |            |            |              |            |            |            |     |
|---------|-------|-----|------------------------|------------|------------|--------------|------------|------------|------------|-----|
|         |       |     | $\delta x_e$           | $\delta x$ | $\Delta x$ | $\delta y_e$ | $\delta y$ | $\Delta y$ | $\Delta a$ | CEK |
|         |       |     | (m)                    | (m)        | (m)        | (m)          | (m)        | (m)        | (m)        | (m) |
| STORY12 | D1    | 3.5 | 0.02893                | 0.15911    | 0.00916    | 0.027891     | 0.02232    | 0.00220    | 0.0538     | OKE |
| STORY11 | D1    | 3.5 | 0.02726                | 0.14995    | 0.01055    | 0.025819     | 0.02012    | 0.00222    | 0.0538     | OKE |
| STORY10 | D1    | 3.5 | 0.02534                | 0.13939    | 0.01214    | 0.023564     | 0.01791    | 0.00227    | 0.0538     | OKE |
| STORY9  | D1    | 3.5 | 0.02314                | 0.12725    | 0.01373    | 0.021158     | 0.01564    | 0.00230    | 0.0538     | OKE |
| STORY8  | D1    | 3.5 | 0.02064                | 0.11351    | 0.01515    | 0.018638     | 0.01334    | 0.00230    | 0.0538     | OKE |
| STORY7  | D1    | 3.5 | 0.01788                | 0.09836    | 0.01627    | 0.016037     | 0.01104    | 0.00225    | 0.0538     | OKE |
| STORY6  | D1    | 3.5 | 0.01493                | 0.08209    | 0.01698    | 0.013382     | 0.00879    | 0.00215    | 0.0538     | OKE |
| STORY5  | D1    | 3.5 | 0.01184                | 0.06510    | 0.01714    | 0.010709     | 0.00664    | 0.00199    | 0.0538     | OKE |
| STORY4  | D1    | 3.5 | 0.00872                | 0.04797    | 0.01652    | 0.008062     | 0.00465    | 0.00175    | 0.0538     | OKE |
| STORY3  | D1    | 3.5 | 0.00572                | 0.03144    | 0.01481    | 0.005502     | 0.00290    | 0.00143    | 0.0538     | OKE |
| STORY2  | D1    | 3.5 | 0.00302                | 0.01663    | 0.01142    | 0.003119     | 0.00147    | 0.00102    | 0.0538     | OKE |
| STORY1  | D1    | 3.5 | 0.00095                | 0.00521    | 0.00521    | 0.001098     | 0.00045    | 0.00045    | 0.0538     | OKE |

Dari Tabel 2, dapat dilihat bahwa struktur memenuhi syarat batas maksimum simpangan antar lantai.

## LAMPIRAN 2

### TABEL PERHITUNGAN MOMEN INERSIA POLAR

Tabel 1 Momen Inersia Arah Sumbu X Dengan Menggunakan *Modifier 1*

| Letak                  | Dx*Yi <sup>2</sup> |             |             |             |             |             |             |             |             |             |             |              |
|------------------------|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|                        | Story 12           | Story 11    | Story 10    | Story 9     | Story 8     | Story 7     | Story 6     | Story 5     | Story 4     | Story 3     | Story 2     | Story 1      |
| As B                   | 733176360          | 804958471   | 753108327   | 752616559   | 754500581   | 757642494   | 762425331   | 771482512   | 790432440   | 833290945   | 938998449   | 1782085458   |
| As D                   | 13268384150        | 12488254860 | 12269450978 | 12207196316 | 12240294473 | 12274199982 | 12338975069 | 12437422252 | 12651592408 | 12993495735 | 14623116492 | 17089796847  |
| As E                   | 35260302164        | 32630639146 | 33020492650 | 33142834625 | 33422785099 | 33696818154 | 34013064124 | 34477675491 | 35158193725 | 36812324613 | 40226658131 | 64363261614  |
| As F                   | 55784463353        | 55940577073 | 54512623157 | 54997383738 | 55418956014 | 55850459214 | 56382352716 | 57159335762 | 58480635174 | 61492150111 | 67479846273 | 115620685545 |
| P1                     | -1446197904        | 645669955   | 2905590330  | 4344398665  | 5255710481  | 5944036236  | 6641455368  | 7589574455  | 9120733595  | 11910970865 | 18356126002 | 44379515437  |
| P2                     | 221020433          | 4843235459  | 6708068310  | 7911923649  | 8817046450  | 9600425955  | 10381070651 | 11298771720 | 12604732275 | 14851655745 | 21028161470 | 52564000564  |
| P3                     | 0                  | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0            |
| P4                     | 125972414          | 113046223   | 126413345   | 131097040   | 133873844   | 135848160   | 137462843   | 139225329   | 141869209   | 146712025   | 159304914   | 180133397    |
| P5                     | 2805932289         | 2432340493  | 2543439872  | 2569156384  | 2606590221  | 2638591737  | 2672464011  | 2712191366  | 2758865600  | 2870763436  | 2924347324  | 5273640936   |
| P6                     | 2775962042         | 2307609768  | 2456259139  | 2466876837  | 2489324856  | 2506679351  | 2526731392  | 2553365279  | 2588633893  | 2695197142  | 2803342473  | 5160609851   |
| P7                     | -296942168         | 5521339506  | 8335603454  | 9912539459  | 11044964181 | 12055049476 | 13073006129 | 14258893751 | 15897613580 | 18877558528 | 25989900876 | 59319159770  |
| P8                     | 997960843          | 4624602542  | 7028063539  | 8366125735  | 9313057418  | 10117605915 | 10912453065 | 11801668085 | 12979823671 | 14911334034 | 19351737071 | 44854331524  |
| P9                     | 0                  | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0            |
| P10                    | 1421330            | 5178231     | 8628876     | 10718238    | 12261115    | 13486725    | 14558649    | 15623287    | 16909404    | 18650755    | 23626881    | 36061369     |
| Σ(Dx*Yi <sup>2</sup> ) | 1.10E+11           | 1.22E+11    | 1.31E+11    | 1.37E+11    | 1.42E+11    | 1.46E+11    | 1.50E+11    | 1.55E+11    | 1.63E+11    | 1.78E+11    | 2.14E+11    | 4.11E+11     |
| ΣDx*Ycr <sup>2</sup>   | 9.17E+10           | 8.96E+10    | 9.45E+10    | 9.87E+10    | 1.02E+11    | 1.05E+11    | 1.08E+11    | 1.12E+11    | 1.18E+11    | 1.30E+11    | 1.57E+11    | 2.96E+11     |
| Jx<br>(kN*mm)          | 1.85E+10           | 3.27E+10    | 3.61E+10    | 3.81E+10    | 3.94E+10    | 4.05E+10    | 4.15E+10    | 4.29E+10    | 4.49E+10    | 4.89E+10    | 5.70E+10    | 1.15E+11     |

Tabel 2 Momen Inersia Arah Sumbu Y Dengan Menggunakan *Modifier 1*

| As                | Dy*Xi^2      |             |             |             |             |             |             |             |             |             |             |             |
|-------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                   | Story 12     | Story 11    | Story 10    | Story 9     | Story 8     | Story 7     | Story 6     | Story 5     | Story 4     | Story 3     | Story 2     | Story 1     |
| As 1              | 13132527394  | 10563655577 | 10150210179 | 10371084046 | 10510463887 | 10653093787 | 10808191945 | 11004927963 | 11172824480 | 11306974771 | 12946670844 | 26017853765 |
| As 2              | 28026667301  | 25265524285 | 24684044653 | 24991245921 | 25361534558 | 25811741748 | 26363299222 | 27099446304 | 28073695907 | 29760063532 | 36119906766 | 84315813464 |
| As 3              | 51968156072  | 63289621400 | 63558164270 | 62921222482 | 63852021427 | 65687954670 | 68148021161 | 71365847429 | 75795047920 | 86578061409 | 1.10244E+11 | 2.81956E+11 |
| As 4              | 79068701604  | 1.03963E+11 | 1.0261E+11  | 1.01017E+11 | 1.02377E+11 | 1.05417E+11 | 1.09492E+11 | 1.146E+11   | 1.22799E+11 | 1.36248E+11 | 2.07125E+11 | 1.18754E+11 |
| As 5              | 1.11133E+11  | 1.55921E+11 | 1.50825E+11 | 1.47968E+11 | 1.49752E+11 | 1.54239E+11 | 1.60123E+11 | 1.67855E+11 | 1.79051E+11 | 2.06003E+11 | 2.58567E+11 | 6.68612E+11 |
| As 6              | 1.54384E+11  | 2.12841E+11 | 2.07729E+11 | 2.03608E+11 | 2.06179E+11 | 2.12328E+11 | 2.20461E+11 | 2.31163E+11 | 2.47017E+11 | 2.81204E+11 | 3.64397E+11 | 8.91807E+11 |
| As 7              | 2.09164E+11  | 2.75884E+11 | 2.72168E+11 | 2.67885E+11 | 2.7181E+11  | 2.79961E+11 | 2.90693E+11 | 3.04681E+11 | 3.25638E+11 | 3.68914E+11 | 4.86097E+11 | 1.14367E+12 |
| As 8              | 2.75783E+11  | 3.39709E+11 | 3.3674E+11  | 3.36848E+11 | 3.42624E+11 | 3.52809E+11 | 3.66055E+11 | 3.84081E+11 | 4.09675E+11 | 4.64554E+11 | 6.19608E+11 | 1.40576E+12 |
| As 9              | 3.00416E+11  | 2.6794E+11  | 2.68594E+11 | 2.76096E+11 | 2.82024E+11 | 2.882E+11   | 2.95786E+11 | 3.07046E+11 | 3.20095E+11 | 3.51095E+11 | 4.56137E+11 | 8.33286E+11 |
| As 10             | 4.12692E+11  | 3.1995E+11  | 3.24473E+11 | 3.31432E+11 | 3.36711E+11 | 3.41839E+11 | 3.47737E+11 | 3.55394E+11 | 3.64755E+11 | 3.7582E+11  | 4.54776E+11 | 7.17445E+11 |
| P1                | 11390189783  | 47750396708 | 88205614524 | 1.28079E+11 | 1.67155E+11 | 2.06867E+11 | 2.49861E+11 | 3.00782E+11 | 3.68232E+11 | 4.69635E+11 | 6.52244E+11 | 1.54781E+12 |
| P2                | -1552419684  | 68554467559 | 1.28253E+11 | 1.71495E+11 | 2.05284E+11 | 2.382E+11   | 2.77262E+11 | 3.30482E+11 | 4.1001E+11  | 5.4179E+11  | 7.92985E+11 | 1.71092E+12 |
| P3                | 7653556751   | 5324649765  | 5950466761  | 6089437336  | 6341195700  | 6566298611  | 6785985963  | 7000377394  | 7185115784  | 7344710434  | 7320051146  | 10533132699 |
| P4                | -4149364270  | 9814087477  | 13977984786 | 14915748850 | 15941119494 | 17588790166 | 19852205804 | 22790581963 | 26419572777 | 32381862196 | 67012327275 | 3.71775E+11 |
| P5                | 6657656952   | 6829279867  | 5989953445  | 6103200658  | 6309810064  | 6443529366  | 6603310768  | 6830651637  | 7031971748  | 6903898389  | 8477409008  | 50592612846 |
| P6                | 2.24161E+11  | 2.18998E+11 | 1.99425E+11 | 2.07333E+11 | 2.14209E+11 | 2.18857E+11 | 2.24664E+11 | 2.33057E+11 | 2.43047E+11 | 2.50171E+11 | 2.9692E+11  | 1.61843E+12 |
| P7                | -4.18933E+11 | 2.77209E+11 | 9.26643E+11 | 1.37608E+12 | 1.71223E+12 | 2.02741E+12 | 2.40563E+12 | 2.93744E+12 | 3.778E+12   | 5.23675E+12 | 8.28946E+12 | 2.05609E+13 |
| P8                | 1.89262E+11  | 9.57147E+11 | 1.5313E+12  | 2.01397E+12 | 2.43153E+12 | 2.83603E+12 | 3.28304E+12 | 3.83821E+12 | 4.60728E+12 | 5.83605E+12 | 8.52793E+12 | 1.84451E+13 |
| P9                | 52383918110  | 35935148052 | 40730866847 | 41090827382 | 42290861239 | 43240523485 | 44282526587 | 45341681420 | 46675230868 | 47768790491 | 46327032385 | 1.03547E+11 |
| P10               | 1.98623E+11  | 2.90785E+11 | 4.27842E+11 | 5.48302E+11 | 6.60561E+11 | 7.7054E+11  | 8.87771E+11 | 1.02335E+12 | 1.1952E+12  | 1.42556E+12 | 1.4786E+12  | 5.53305E+12 |
| $\Sigma(Dy*Xi^2)$ | 1.90126E+12  | 3.69367E+12 | 5.12985E+12 | 6.2766E+12  | 7.25305E+12 | 8.20869E+12 | 9.30142E+12 | 1.07196E+13 | 1.27731E+13 | 1.61658E+13 | 2.31733E+13 | 5.61242E+13 |
| $\Sigma Dy*Xi^2$  | 1.44518E+12  | 2.71394E+12 | 3.64936E+12 | 4.36714E+12 | 4.9672E+12  | 5.55408E+12 | 6.235E+12   | 7.13481E+12 | 8.45968E+12 | 1.069E+13   | 1.53984E+13 | 3.73278E+13 |
| Jy<br>(kN*mm)     | 4.56079E+11  | 9.79736E+11 | 1.48049E+12 | 1.90946E+12 | 2.28585E+12 | 2.65461E+12 | 3.06642E+12 | 3.58476E+12 | 4.31347E+12 | 5.47583E+12 | 7.77486E+12 | 1.87964E+13 |

Tabel 3 Momen Inersia Arah Sumbu X Dengan Menggunakan *Modifier* 0.4

| Letak             | Dx*Yi <sup>2</sup> |             |             |             |             |             |             |             |             |             |             |             |
|-------------------|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                   | Story 12           | Story 11    | Story 10    | Story 9     | Story 8     | Story 7     | Story 6     | Story 5     | Story 4     | Story 3     | Story 2     | Story 1     |
| As B              | 704168423.8        | 813284119.3 | 764715450.3 | 754033593.4 | 754927506.5 | 758398947   | 763440366.5 | 772237347.9 | 790463532.8 | 828836402.5 | 936845482.8 | 1832290658  |
| As D              | 12667804450        | 12760100786 | 12382393634 | 12253531583 | 12260324101 | 12300121030 | 12362945569 | 12455166178 | 12662668611 | 12977229844 | 14512367400 | 18001118516 |
| As E              | 34129665945        | 33127216464 | 33250059391 | 33236110009 | 33476291405 | 33749233901 | 34058943044 | 34515246123 | 35168540818 | 36755910663 | 39970282536 | 66433969992 |
| As F              | 53106140799        | 57051832187 | 55062190013 | 55045483728 | 55463204611 | 55914266432 | 56419582527 | 57180710482 | 58527161865 | 61159050977 | 67033621749 | 1.20209E+11 |
| P1                | -1300029438        | 636036605.8 | 2850348691  | 4300514569  | 5225980045  | 5928439008  | 6643416483  | 7600108285  | 9128162806  | 11904415224 | 18327662997 | 44459117498 |
| P2                | 464224388.7        | 4732520385  | 6648099511  | 7879999909  | 8784454869  | 9578630840  | 10367939497 | 11288038125 | 12594726604 | 14841616572 | 21082003933 | 52618165961 |
| P3                | 0                  | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| P4                | 125844721.3        | 113001280   | 126114275.1 | 130865768.6 | 133717623.3 | 135707680.2 | 137398031.4 | 139199298   | 141988793.7 | 146943426.8 | 159471519.8 | 179636334.2 |
| P5                | 2742764246         | 2466189719  | 2551146614  | 2569138478  | 2606077042  | 2639666817  | 2673394153  | 2712407009  | 2758673351  | 2855488337  | 2907613615  | 5368505027  |
| P6                | 2744651232         | 2324012563  | 2457376473  | 2468851655  | 2490851341  | 2507657674  | 2525656561  | 2551373150  | 2588338472  | 2694082638  | 2800962817  | 5210036046  |
| P7                | -68472828.21       | 5368999234  | 8308480225  | 9935990637  | 11056267245 | 12038043010 | 13029944469 | 14187925945 | 15822365135 | 18861667914 | 26043512740 | 59584030021 |
| P8                | 1119862638         | 4538605288  | 6962505497  | 8357556807  | 9308511734  | 10108883808 | 10895170580 | 11774805061 | 12963774555 | 14922160095 | 19409901813 | 44840332856 |
| P9                | 0                  | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| P10               | 1543319.593        | 5002588.235 | 8568707.706 | 10726630.76 | 12270951.73 | 13468693.82 | 14520500.64 | 15581193.96 | 16904982.01 | 18759757.42 | 24016232.02 | 35991613.13 |
| $\Sigma(Dx*Yi^2)$ | 1.06438E+11        | 1.23937E+11 | 1.31372E+11 | 1.36943E+11 | 1.41573E+11 | 1.45673E+11 | 1.49892E+11 | 1.55193E+11 | 1.63164E+11 | 1.77966E+11 | 2.13208E+11 | 4.18773E+11 |
| $\Sigma Dx*Ycr^2$ | 87457652821        | 91040328944 | 95042746606 | 98798165118 | 1.02132E+11 | 1.05177E+11 | 1.08351E+11 | 1.12313E+11 | 1.18239E+11 | 1.29191E+11 | 1.56307E+11 | 3.01495E+11 |
| Jx<br>(kN*mm)     | 18980515076        | 32896472276 | 36329251876 | 38144638250 | 39440507589 | 40495074810 | 41541253170 | 42879672638 | 44924989875 | 48775168912 | 56901718770 | 1.17277E+11 |



Tabel 4 Momen Inersia Arah Sumbu Y Dengan Menggunakan *Modifier* 0.4

| As                | Dy*Xi^2      |             |             |             |             |             |             |             |             |             |             |             |
|-------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                   | Story 12     | Story 11    | Story 10    | Story 9     | Story 8     | Story 7     | Story 6     | Story 5     | Story 4     | Story 3     | Story 2     | Story 1     |
| As 1              | 13018999840  | 10740078440 | 10157013263 | 10353430296 | 10499824276 | 10653253603 | 10814765063 | 10997084411 | 11125184836 | 11283778428 | 12976345854 | 26141137697 |
| As 2              | 27736646651  | 25493803533 | 24739277797 | 25007936929 | 25364232651 | 25785983815 | 26347339346 | 27059921454 | 28038127321 | 29719754650 | 35925698729 | 85532835760 |
| As 3              | 48700705891  | 63447168068 | 65055483333 | 63973553852 | 64069052082 | 65472835332 | 67784995180 | 71073866897 | 75918388175 | 87683589965 | 1.10711E+11 | 2.81488E+11 |
| As 4              | 74090202015  | 1.03771E+11 | 1.05019E+11 | 1.0277E+11  | 1.02823E+11 | 1.05022E+11 | 1.08891E+11 | 1.14217E+11 | 1.23027E+11 | 1.37777E+11 | 2.08004E+11 | 1.17432E+11 |
| As 5              | 1.03983E+11  | 1.55467E+11 | 1.54351E+11 | 1.50645E+11 | 1.50431E+11 | 1.53648E+11 | 1.59236E+11 | 1.6732E+11  | 1.79595E+11 | 2.07731E+11 | 2.60344E+11 | 6.70974E+11 |
| As 6              | 1.44482E+11  | 2.12061E+11 | 2.12685E+11 | 2.07328E+11 | 2.07096E+11 | 2.11589E+11 | 2.19339E+11 | 2.30292E+11 | 2.47647E+11 | 2.83196E+11 | 3.67232E+11 | 8.9583E+11  |
| As 7              | 1.95119E+11  | 2.75558E+11 | 2.79099E+11 | 2.72688E+11 | 2.7291E+11  | 2.7882E+11  | 2.89217E+11 | 3.03635E+11 | 3.26372E+11 | 3.71539E+11 | 4.88555E+11 | 1.15539E+12 |
| As 8              | 2.56953E+11  | 3.41548E+11 | 3.45398E+11 | 3.4213E+11  | 3.43848E+11 | 3.51686E+11 | 3.64745E+11 | 3.82932E+11 | 4.10654E+11 | 4.68834E+11 | 6.22107E+11 | 1.42107E+12 |
| As 9              | 2.99975E+11  | 2.68894E+11 | 2.68044E+11 | 2.75747E+11 | 2.81841E+11 | 2.88417E+11 | 2.96016E+11 | 3.07382E+11 | 3.20455E+11 | 3.54331E+11 | 4.54834E+11 | 8.13129E+11 |
| As 10             | 4.09056E+11  | 3.25537E+11 | 3.23576E+11 | 3.30866E+11 | 3.36611E+11 | 3.41967E+11 | 3.48145E+11 | 3.55738E+11 | 3.63885E+11 | 3.7723E+11  | 4.53102E+11 | 7.21142E+11 |
| P1                | 12304734068  | 49321035538 | 89292197423 | 1.2858E+11  | 1.66968E+11 | 2.06113E+11 | 2.48609E+11 | 2.98999E+11 | 3.66044E+11 | 4.66091E+11 | 6.47931E+11 | 1.55041E+12 |
| P2                | 4022053529   | 67258882479 | 1.24982E+11 | 1.69759E+11 | 2.0523E+11  | 2.38768E+11 | 2.78251E+11 | 3.31449E+11 | 4.10595E+11 | 5.4056E+11  | 7.88372E+11 | 1.72147E+12 |
| P3                | 7710954431   | 5333747898  | 5940396266  | 6082834432  | 6336538466  | 6560501838  | 6786673930  | 6997625122  | 7175851780  | 7339041648  | 7291690921  | 10563861002 |
| P4                | -4345526634  | 9135770020  | 14182589338 | 15380722998 | 16167071343 | 17592672801 | 19768070805 | 22630961176 | 26159165201 | 33198695304 | 70442095162 | 3.49325E+11 |
| P5                | 6438984452   | 7023904691  | 6084032246  | 6063126934  | 6286305217  | 6447760452  | 6616104099  | 6820492576  | 6929018520  | 6800697054  | 9206720226  | 48233659056 |
| P6                | 2.15394E+11  | 2.26006E+11 | 2.01666E+11 | 2.05733E+11 | 2.1378E+11  | 2.19198E+11 | 2.25373E+11 | 2.33419E+11 | 2.4129E+11  | 2.48334E+11 | 3.20501E+11 | 1.52374E+12 |
| P7                | -3.37704E+11 | 2.58994E+11 | 8.76335E+11 | 1.34127E+12 | 1.69896E+12 | 2.03155E+12 | 2.42084E+12 | 2.96237E+12 | 3.80749E+12 | 5.23163E+12 | 8.23019E+12 | 2.04213E+13 |
| P8                | 1.91477E+11  | 9.47281E+11 | 1.51132E+12 | 1.99392E+12 | 2.42296E+12 | 2.83701E+12 | 3.29143E+12 | 3.84796E+12 | 4.60863E+12 | 5.82483E+12 | 8.55149E+12 | 1.85899E+13 |
| P9                | 52380651791  | 36028257259 | 40677748407 | 41099749499 | 42340130922 | 43324350798 | 44417075964 | 45452140940 | 46845944060 | 47900700302 | 45406150209 | 1.06454E+11 |
| P10               | 2.01312E+11  | 2.88304E+11 | 4.23331E+11 | 5.44367E+11 | 6.58325E+11 | 7.69861E+11 | 8.88434E+11 | 1.02444E+12 | 1.19626E+12 | 1.41982E+12 | 1.45438E+12 | 5.78253E+12 |
| <b>Σ(Dy*Xi^2)</b> | 1.92211E+12  | 3.6772E+12  | 5.08194E+12 | 6.23376E+12 | 7.23285E+12 | 8.20948E+12 | 9.32106E+12 | 1.07512E+13 | 1.28041E+13 | 1.61558E+13 | 2.3139E+13  | 5.62921E+13 |
| <b>ΣDy*Xi^2</b>   | 1.44916E+12  | 2.69388E+12 | 3.61275E+12 | 4.33558E+12 | 4.95271E+12 | 5.55612E+12 | 6.25248E+12 | 7.16353E+12 | 8.49117E+12 | 1.06961E+13 | 1.5385E+13  | 3.7448E+13  |
| <b>Jy (kN*mm)</b> | 4.72946E+11  | 9.83328E+11 | 1.46918E+12 | 1.89817E+12 | 2.28014E+12 | 2.65336E+12 | 3.06858E+12 | 3.58766E+12 | 4.31296E+12 | 5.4597E+12  | 7.75398E+12 | 1.88441E+13 |

Tabel 5 Momen Inersia Arah Sumbu X Dengan Menggunakan *Modifier 0*

| As                | Dx*Yi^2     |             |             |             |             |             |             |             |             |             |             |             |
|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                   | Story 12    | Story 11    | Story 10    | Story 9     | Story 8     | Story 7     | Story 6     | Story 5     | Story 4     | Story 3     | Story 2     | Story 1     |
| B                 | 11725530623 | 13376722956 | 12758635165 | 12440605115 | 12394466175 | 12422827360 | 12477491599 | 12555220164 | 12746083022 | 13032314344 | 14449271982 | 20022567902 |
| D                 | 32705431552 | 34440989683 | 34063537239 | 33668208114 | 33777261966 | 34037213512 | 34321588070 | 34738191257 | 35373079757 | 36889227106 | 39717422607 | 70861842036 |
| E                 | 44838050537 | 55136307692 | 55806554480 | 55441009749 | 55359270234 | 55564614608 | 55925131483 | 56404380841 | 57200526294 | 59363515827 | 68481278037 | 1.31468E+11 |
| F                 | -1068458487 | 673393434.8 | 2764782104  | 4221452757  | 5173765479  | 5903278454  | 6643089489  | 7615831778  | 9142137556  | 11915661250 | 18303085969 | 44556202361 |
| P1                | 884620622.6 | 4640612207  | 6523166706  | 7788571100  | 8730719621  | 9540659164  | 10342655639 | 11277628629 | 12600741778 | 14871366744 | 21156254218 | 52793784612 |
| P2                | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| P3                | 126409299.1 | 112984126.1 | 125414564.9 | 130346479.4 | 133334403.5 | 135417992   | 137222648.9 | 139184823.5 | 142128681.6 | 147231285.4 | 159274338.8 | 178250690.3 |
| P4                | 2320555272  | 2439503903  | 2578569267  | 2588496200  | 2606826988  | 2629477442  | 2654955153  | 2679661394  | 2707569667  | 2790603795  | 2960834396  | 5880403415  |
| P5                | 2610003748  | 2343633328  | 2464753668  | 2475909294  | 2491830091  | 2504932220  | 2521222246  | 2543842402  | 2578852370  | 2678143201  | 2806876760  | 5377516236  |
| P6                | 405023272.3 | 5239991310  | 8243833840  | 9945269132  | 11063963628 | 12007888129 | 12951273059 | 14078379667 | 15726376659 | 18832366341 | 25999271034 | 59548619195 |
| P7                | 1233186280  | 4484476685  | 6838074562  | 8294476387  | 9279549964  | 10083832026 | 10872216710 | 11757393130 | 12959895366 | 14970783576 | 19489561387 | 44838257949 |
| P8                | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| P9                | 1943434.066 | 4926767.831 | 8517211.749 | 10769334.78 | 12324888.01 | 13484594.34 | 14503262.69 | 15573398.37 | 16971654.68 | 19002321.65 | 24565168.46 | 36169892.47 |
| P10               | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| $\Sigma(Dx*Yi^2)$ | 95782296153 | 1.22894E+11 | 1.32176E+11 | 1.37005E+11 | 1.41023E+11 | 1.44844E+11 | 1.48861E+11 | 1.53805E+11 | 1.61194E+11 | 1.7551E+11  | 2.13548E+11 | 4.35561E+11 |
| $\Sigma Dx*Ycr^2$ | 76864355490 | 91530837568 | 96444418255 | 99498907108 | 1.02382E+11 | 1.05228E+11 | 1.08248E+11 | 1.11961E+11 | 1.1753E+11  | 1.28226E+11 | 1.56863E+11 | 3.14212E+11 |
| Jx<br>(kN*mm)     | 18917940664 | 31362704526 | 35731420553 | 37506206553 | 38641407883 | 39615277675 | 40613115866 | 41844004656 | 43664263029 | 47284618274 | 56684687401 | 1.21349E+11 |

Tabel 6 Momen Inersia Arah Sumbu Y Dengan Menggunakan *Modifier 0*

| As            | Dy*Xi^2      |             |             |             |             |             |             |             |             |             |             |             |
|---------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|               | Story 12     | Story 11    | Story 10    | Story 9     | Story 8     | Story 7     | Story 6     | Story 5     | Story 4     | Story 3     | Story 2     | Story 1     |
| As 1          | 12757059292  | 11036799523 | 10242245194 | 10340346728 | 10509826942 | 10684050840 | 10859228083 | 11029635571 | 11100278148 | 11324240106 | 13117207548 | 26176066763 |
| As 2          | 28037409205  | 25430128882 | 24328310891 | 24798403582 | 25358396657 | 25880608817 | 26473393231 | 27199138115 | 28176311914 | 29556618065 | 35948209458 | 89517061066 |
| As 3          | 41786580331  | 60190483510 | 67149676345 | 66962091943 | 65807769642 | 65515223653 | 66812927450 | 70118030014 | 76347161234 | 90855782319 | 1.15088E+11 | 2.93744E+11 |
| As 4          | 62976854620  | 98364475207 | 1.07992E+11 | 1.0774E+11  | 1.05769E+11 | 1.05204E+11 | 1.07305E+11 | 1.12718E+11 | 1.23866E+11 | 1.42161E+11 | 2.16589E+11 | 1.31075E+11 |
| As 5          | 87422036183  | 1.47547E+11 | 1.5871E+11  | 1.58119E+11 | 1.54868E+11 | 1.53884E+11 | 1.56968E+11 | 1.65158E+11 | 1.80619E+11 | 2.14033E+11 | 2.72861E+11 | 7.01512E+11 |
| As 6          | 1.21059E+11  | 2.01138E+11 | 2.18855E+11 | 2.17801E+11 | 2.13356E+11 | 2.12006E+11 | 2.16124E+11 | 2.27253E+11 | 2.48982E+11 | 2.91473E+11 | 3.8432E+11  | 9.43529E+11 |
| As 7          | 1.6148E+11   | 2.62101E+11 | 2.88296E+11 | 2.87023E+11 | 2.81152E+11 | 2.79373E+11 | 2.84752E+11 | 2.99329E+11 | 3.27923E+11 | 3.81954E+11 | 5.116E+11   | 1.22677E+12 |
| As 8          | 2.06431E+11  | 3.28854E+11 | 3.62848E+11 | 3.6173E+11  | 3.54738E+11 | 3.52578E+11 | 3.59316E+11 | 3.78129E+11 | 4.13803E+11 | 4.82085E+11 | 6.50859E+11 | 1.54473E+12 |
| As 9          | 3.168E+11    | 2.64286E+11 | 2.62415E+11 | 2.71873E+11 | 2.79686E+11 | 2.88119E+11 | 2.96868E+11 | 3.08442E+11 | 3.21486E+11 | 3.56872E+11 | 4.40513E+11 | 7.36224E+11 |
| As 10         | 4.01556E+11  | 3.3691E+11  | 3.24274E+11 | 3.30776E+11 | 3.36213E+11 | 3.4225E+11  | 3.48655E+11 | 3.55496E+11 | 3.62323E+11 | 3.77113E+11 | 4.49121E+11 | 7.22984E+11 |
| P1            | 9379269754   | 49593778484 | 90336726884 | 1.2946E+11  | 1.67625E+11 | 2.06423E+11 | 2.48706E+11 | 2.99593E+11 | 3.6703E+11  | 4.67003E+11 | 6.48563E+11 | 1.57046E+12 |
| P2            | 15832323701  | 65557623941 | 1.16572E+11 | 1.62886E+11 | 2.03119E+11 | 2.41205E+11 | 2.83957E+11 | 3.3949E+11  | 4.20482E+11 | 5.50141E+11 | 7.98258E+11 | 1.76647E+12 |
| P3            | 7765058854   | 5345316494  | 5957876452  | 6113991502  | 6366522374  | 6595372162  | 6823230974  | 7039841198  | 7231746831  | 7407138893  | 7307884417  | 10820458042 |
| P4            | -6770208621  | 8250607414  | 14350446085 | 16306617825 | 16885513576 | 17787483242 | 19536351532 | 22281828498 | 26241827285 | 35565366880 | 76106238488 | 3.42137E+11 |
| P5            | 6018221141   | 7314194826  | 6316947968  | 6037860405  | 6242086272  | 6453876924  | 6639486278  | 6792096241  | 6778676629  | 6783630744  | 9905269295  | 46069896653 |
| P6            | 2.03224E+11  | 2.35245E+11 | 2.08068E+11 | 2.05031E+11 | 2.12507E+11 | 2.19338E+11 | 2.25938E+11 | 2.3263E+11  | 2.37798E+11 | 2.46661E+11 | 3.39906E+11 | 1.41862E+12 |
| P7            | -73013836386 | 3.5782E+11  | 8.18856E+11 | 1.24552E+12 | 1.63559E+12 | 2.01573E+12 | 2.4423E+12  | 2.98715E+12 | 3.78951E+12 | 5.1138E+12  | 7.91035E+12 | 1.95004E+13 |
| P8            | 2.27569E+11  | 1.00835E+12 | 1.54427E+12 | 1.99589E+12 | 2.40986E+12 | 2.82219E+12 | 3.27174E+12 | 3.81204E+12 | 4.54563E+12 | 5.71517E+12 | 8.44164E+12 | 1.84618E+13 |
| P9            | 52933270731  | 36604273729 | 40716152896 | 41191455991 | 42337446924 | 43403540193 | 44497095849 | 45522924730 | 46921159475 | 47774133789 | 43380849366 | 1.14062E+11 |
| P10           | 2.19647E+11  | 2.9803E+11  | 4.29841E+11 | 5.46361E+11 | 6.55754E+11 | 7.65642E+11 | 8.81672E+11 | 1.01377E+12 | 1.18283E+12 | 1.3928E+12  | 1.40494E+12 | 6.02265E+12 |
| Σ(Dy*Xi^2)    | 2.10289E+12  | 3.80797E+12 | 5.10039E+12 | 6.19196E+12 | 7.18374E+12 | 8.18026E+12 | 9.30594E+12 | 1.07212E+13 | 1.27251E+13 | 1.59605E+13 | 2.27704E+13 | 5.56697E+13 |
| ΣDy*Xi^2      | 1.59036E+12  | 2.79177E+12 | 3.63354E+12 | 4.31129E+12 | 4.91741E+12 | 5.53061E+12 | 6.23445E+12 | 7.13207E+12 | 8.42392E+12 | 1.05443E+13 | 1.50985E+13 | 3.68947E+13 |
| Jy<br>(kN*mm) | 5.12525E+11  | 1.0162E+12  | 1.46686E+12 | 1.88066E+12 | 2.26634E+12 | 2.64965E+12 | 3.07149E+12 | 3.5891E+12  | 4.30116E+12 | 5.41626E+12 | 7.67191E+12 | 1.8775E+13  |

