

ORDINANCE NUMBER 72

MUDDY CREEK TOWNSHIP, BUTLER COUNTY, PENNSYLVANIA

AN ORDINANCE REQUIRING PERMITS BE OBTAINED PRIOR TO CONSTRUCTING, ALTERING, OR REPAIRING DRIVEWAYS, AGRICULTURAL FIELD CUTS, DRAINAGE FACILITIES, AND PRIVATE STREETS AND/OR CONNECTING TO OR ALTERING ANY DRAINAGE FACILITY WITHIN THE TOWNSHIP'S RIGHTS-OF-WAY; REQUIRING THE SUBMISSION OF PLANS AND PAYMENT OF PERMIT FEES PRIOR TO THE ISSUANCE OF PERMITS; PROVIDING FOR TEMPORARY PERMITS; REQUIRING INSPECTIONS; AND ESTABLISHING PENALTIES FOR VIOLATIONS.

SECTION 1: SHORT TITLE.

This Ordinance shall be known and may be referred to as the "Muddy Creek Township Driveway Permit Ordinance."

SECTION 2: PURPOSE AND LEGISLATIVE INTENT.

The purpose and the legislative intention of the Board of Supervisors ("Board") in enacting this Ordinance are as follows:

- A. The Township has suffered damage to its public roads and rights-of way because of improper design, construction, repair, and/or maintenance of driveways, agricultural field cuts, drainage facilities, and private streets in the Township's right-of-way.
- B. The Township deems it necessary for the proper management, maintenance, and control of its public road system to regulate the connection of driveways, agricultural field cuts, and private streets to Township roads and the construction of drainage facilities in the Township's rights-of-way.
- C. The Township deems it to be in the public interest to regulate the location, design, and construction of driveways, agricultural field cuts, drainage facilities, and private streets in the Township's rights-of-way for security, economy of maintenance, preservation of proper drainage and safe and reasonable access.

SECTION 3: STATUTORY AUTHORITY.

Muddy Creek Township is empowered to regulate these activities pursuant to the authority granted by the provisions of the Second Class Township Code, Act of May 1, 1933 (P.L. 103, No. 69) Reenacted and Amended November 9, 1995 (P.L. 350, No. 60), as amended, 53 P.S. §§ 65101 *et seq.*

SECTION 4: DEFINITIONS.

For the purposes of this Ordinance, the following terms shall be defined as follows:

AGRICULTURAL FIELD CUT: Unimproved, privately owned and maintained entrance- or exit-ways on agricultural property abutting a public road used exclusively to provide farm equipment and/or farm machinery access and/or egress to the public road.

BOARD - The Board of Supervisors of Muddy Creek Township, Butler County, Pennsylvania.

CONTRACTOR - The person or business entity installing a driveway, agricultural field cut, drainage facility, or private street in the Township's rights-of-way, including but not limited to, all agents, subcontractors, officers, or employees of that person or business entity.

DRAINAGE FACILITY – Any structure, natural or man-made, that, due to its condition, design, or construction, conveys, stores, or otherwise affects stormwater runoff. Typical drainage facilities include, but are not limited to: pipes, culverts, catch basins, open channels, and storm sewers.

DRIVEWAY – Any privately owned and maintained entrance- or exit-way on property, residential or non-residential, abutting a public road used by vehicular traffic to access and/or egress the public road. The term includes, but is not limited to: streets, lanes, alleys, courts, and ways and such drainage structures as may be necessary for the proper construction and maintenance of the driveway. The term does not include agricultural field cuts.

OWNER - The owner of the land upon which the driveway, agricultural field cut, drainage facility, or private street is located.

PENNDOT - Pennsylvania Department of Transportation.

PERMIT - A driveway permit issued by the Township pursuant to this Ordinance.

PERSON - Any natural person, firm, partnership, corporation, entity, association or other group of persons.

PRIVATE STREET - Any road, street, lane, alley, court, way, bridge, or privately owned and maintained thoroughfare, and not dedicated by the developer/property owner for public use or not accepted for public use by the Township. The term includes, but is not limited to, such drainage structures as may be necessary for the proper construction and maintenance of the street.

PUBLIC ROAD – Any road, street, lane, alley, court, way, bridge, or public thoroughfare, including the entire area between rights-of-way lines, either presently maintained by the Commonwealth or Township or dedicated by the developer for public use as shown on a subdivision or land development plan, and accepted for public use by the Township. The term includes but is not limited to such drainage structures as may be necessary for the proper construction and maintenance of the road.

RIGHTS-OF-WAY - The area which has been maintained or acquired by or dedicated to the Township for road purposes.

ROUTINE MAINTENANCE/REPAIR – Maintenance and/or repair activity performed on a driveway, agricultural field cut, drainage facility, or private street to restore the driveway, agricultural field cut, drainage facility, or private street to its original configuration. Routine maintenance/repair does not include any activity which significantly alters the location, slope, grade, width, and/or other physical property of the driveway, agricultural field cut, drainage facility, or private street.

SIGHT DISTANCE - The distance required by a driver traveling at a given speed to stop the vehicle after an object on the roadway becomes visible to the driver.

TOWNSHIP – Muddy Creek Township, Butler County, Pennsylvania, or its duty appointed representative.

SECTION 5: REQUIREMENT TO OBTAIN A PERMIT.

- A. No driveway, agricultural field cut, drainage facility, or private street shall be constructed, altered, or repaired within the Township’s rights-of-way without first obtaining a driveway permit from the Township. Each driveway, agricultural field cut, drainage facility, and private street shall require an individual driveway permit.
- B. No drainage facility owned and/or maintained by the Township may be altered or connected onto without first obtaining a driveway permit from the Township. Each connection shall require an individual driveway permit.
- C. No residential driveway shall be converted to or used for joint residential and non-residential use without first obtaining a driveway permit from the Township.
- D. No non-residential driveway shall be converted to or used for joint residential and non-residential use without first obtaining a driveway permit from the Township.
- E. No agricultural field cut shall be converted to or used for joint agricultural and residential or non-residential use without first obtaining a driveway permit from the Township.
- F. No agricultural field cut shall be converted to or used for residential or non-residential use without first obtaining a driveway permit from the Township.
- G. No driveway, residential or non-residential, shall be constructed within the Township’s rights-of-way for temporary use by vehicular traffic to access or egress the public road without first obtaining a temporary driveway permit from the Township.
 - 1. Temporary driveway permits shall expire ninety (90) days after being issued. If necessary, the property owner may submit a written request for an extension of time. If granted by the Board, the extension may be authorized for up to ninety (90) days.

2. When the temporary use is completed, the area of the driveway in the Township's rights-of-way shall be returned to its original condition
- H. No existing driveway, agricultural field cut or private street shall be used, or altered, modified or improved for use by over posted weight vehicles to temporarily access or egress the public road without first obtaining a temporary driveway permit from the Township.
1. Temporary driveway permits for overweight hauling operations shall expire ninety (90) days after being issued. If necessary, the property owner may submit a written request for an extension of time. If granted by the Board, the extension may authorize hauling operations to continue for up to ninety (90) days.
 2. When the temporary overweight hauling operation is completed, the area of the driveway, agricultural field cut or private street in the Township's rights-of-way shall be returned to its original condition and any repairs to the public road and/or Township drainage facilities completed before the over posted weight vehicle bond may be released by the Township.
- I. Generally, a permit is not required for routine maintenance and/or repair of driveways, agricultural field cuts, drainage facilities, or private streets when such maintenance/repair is conducted completely outside of the Township's rights-of-way.

SECTION 6: APPLICATION REQUIREMENTS, CRITERIA FOR PERMIT ISSUANCE, AND PERMIT REVOCATION.

- A. All driveway permit applications shall be submitted to the Township at least thirty (30) days prior to the construction, alteration, or repair of any driveway, agricultural field cut, drainage facility, or private street within the Township's rights-of-way, or no later than concurrent with the first building permit application for the construction of any building or structure which the proposed driveway, drainage facility, or private street will serve.
- B. All driveway permit applications shall be submitted in the name of and signed by the owner(s) of the property.
- C. All driveway permit applications shall be submitted in person or by mail to the Township on a form provided by the Township.
- D. All driveway permit applications shall be accompanied by such permit issuance fees and general inspection fees, as the Township deems appropriate, in amounts determined by Board by resolution, from time to time.
1. Issuance fees are used to defray costs incurred by the Township in reviewing and processing the application and plan(s), including the preliminary review of the site location identified in the application and issuing and processing the permit.

2. General inspection fees are used to defray costs incurred by the Township in spot inspection(s) during the progress of the work and after it has been completed to ensure compliance with the permit and these regulations.
- E. All driveway permit applications shall also be accompanied by such performance bonds, certificates of insurance, and/or blasting bonds, as the Township deems appropriate, in amounts determined solely by the Board, and in forms acceptable to the Township.
- F. All driveway permit applications shall contain, at a minimum, the following information:
1. Tax map and parcel number of the property on which the project is proposed.
 2. Name, address, and telephone and fax number of the owner/applicant.
 3. Name, address, and telephone and fax number of the contractor performing the work.
 4. Date work is scheduled to begin.
 5. Date work is scheduled to be completed.
 6. The volume of traffic expected, and the types of vehicles using the driveway or private street.
 7. Drawing or sketch plan of the proposed project which, at a minimum, shall indicate:
 - (a) Geometric information such as width, radius, dimensions, and location of the public road and rights-of-way, and course, width, radius, dimensions, location, slope, and grade of the driveway or private street, and distance to property lines and nearest driveway(s) and intersection(s). In conjunction with submission of the application, the applicant shall place stakes outlining the connection at the desired location, the location of which shall coincide with the submitted sketch.
 - (b) Safe sight distances shall be indicated on the sketch as obtained from actual field measurement. Sight distances shall be measured in accordance with PENNDOT requirements at the posted speed. In the absence of a posted speed limit, a minimum velocity of forty (40) mph shall be utilized, unless the Township engineer determines that a higher design speed is to be used, based on specific site conditions.
 - (c) Drainage facilities, including related grades, as may be required. The determination for installation of a culvert pipe or swale shall be made by the Township following the Township's initial review of the application. The application must also include a long-term drainage and erosion control plan which shall specify provisions for roadside drainage and control and mitigation of surface water runoff created by installation or improvement of the driveway or private street.

8. Driveway or private street profile.
 9. Narrative describing the purpose and scope of the proposed drainage project, including but not limited to the size and depth of the project.
 10. Drawing or sketch plan detailing the construction of the proposed drainage facilities or structures with respect to the public road.
 11. Date the application is signed by the owner/applicant.
 12. Such other information, diagrams, sketches, forms, and plans as the Township may deem necessary.
- G. If, following the Township's initial review, the application or plan is found to be deficient, or in the opinion of the Township the plan should be revised to meet the criteria above, the Township may reject the application outright, or return the application to the applicant with a notice of the deficiencies or changes to be made.
- H. Following the initial review of the application, the Township may determine that a stormwater management plan is required. In which case, the property owner shall submit and obtain approval of such plan from the Board prior to the issuance of the driveway permit.
- I. Driveway, agricultural field cut, drainage facility, or private street projects shall be permitted where the Township determines that:
1. The driveway, agricultural field cut, drainage facility, or private street meets or exceeds all the requirements of this Ordinance.
 2. The driveway, agricultural field cut, drainage facility, or private street will not cause damage to public roads;
 3. Sight distances are adequate to safely allow each permitted movement to be made into or out of the driveway, agricultural field cut, or private street;
 4. The driveway, agricultural field cut, drainage facility, or private street will not create hazards caused by storm water run-off;
 5. The free movement of normal traffic on the public road is not impaired;
 6. The driveway, agricultural field cut, drainage facility, or private street will not create a traffic hazard; and
 7. The driveway, agricultural field cut, drainage facility, or private street will not create an area of undue traffic congestion on public roads.

- J. Once the Township determines that the application and/or plan meets the criteria above, the permit shall be issued, subject to this Ordinance and the conditions contained on the permit and its attachments and/or supplements. The permit will be the authority of the applicant to proceed with the work and will also serve as a receipt for the fees accompanying the application.
- K. Permits will be issued only to the owners of the property. Permits will not be issued to contractors of the property owner nor to any person other than the current owner of the property.
- L. The Township will examine and determine the genuineness, regularity, and legality of every application, and may reject any application if not satisfied of its genuineness, regularity or legality, or the truth of any statement contained in the application. The Township may also make such investigations and require such additional information as it deems necessary.
- M. Driveway permits shall apply only to the work specified in the application and shall expire six (6) months from the date of issuance. The permit may contain such conditions or limitations as the Township deems necessary for the protection of persons and property. If all authorized work is not completed by the specified completion date, the property owner may submit a written request for an extension of time. If granted by the Board, the extension may authorize work to continue for up to an additional three (3) months.
- N. Driveway permits may not be transferred or assigned without the prior approval of the Board.
- O. Revocation.
 - 1. The Township may revoke a driveway permit whenever it determines that the driveway, agricultural field cut, drainage facility, or private street, their approaches, or their use constitute a hazard to traffic or interfere with the proper use of a public road.
 - 2. The Township may revoke a permit for nonpayment of any fee specified in this Ordinance including default of a check submitted for the payment of such fee.
 - 3. In the event of failure or neglect by the property owner to perform and comply with the requirements of the permit or notice of violation, the Township may immediately revoke and annul the permit and order and direct the owner to remove any or all structures, equipment, or property belonging to the owner and/or contractors from the legal limits of the Township's rights-of-way and to restore the rights-of-way to its former condition.

SECTION 7: DESIGN REQUIREMENTS.

All driveway, agricultural field cut, drainage facility, and/or private street projects shall be designed to meet the following requirements:

A. Generally, all driveways, agricultural field cut, drainage facilities, and private streets shall be located, designed, constructed, and maintained in such a manner as not to interfere or be inconsistent with the design, maintenance, and drainage of public roads.

B. Sight Distance.

1. Driveways, agricultural field cuts, and private streets shall be located at a point within the property frontage limits which provides at least the minimum sight distance listed in **Exhibit A**, PENNDOT Form M-950S (3-04), Formula Sight Distance Table, as revised, attached hereto, and which is hereby adopted by reference and declared to be a part of this Ordinance.

2. The sight distance values in Exhibit A are desirable for the safe operation of driveways, agricultural field cuts, and private streets. Sight distance values less than desirable will be accepted by the Township only if it is impossible to achieve the desirable value by locating the driveway, agricultural field cut, or private street at any point within the property frontage boundaries and such values are determined by a registered Professional Engineer. The minimum acceptable sight distance values shall be computed from the following formula:

$$SSSD = \{1.47(V)(t) + [1.075*V^2/a]\}$$

SSSD = Minimum safe stopping sight distance (feet).

V = Velocity of vehicle (miles per hour) (design speed).

t = Perception time of driver (2.5 seconds).

a = Deceleration (11.2 ft./sec.²).

- C. Normally, only one (1) driveway will be permitted for a residential property, one (1) agricultural field cut will be permitted for an agricultural property, and not more than two (2) driveways will be permitted for a non-residential property, unless otherwise approved by the Board.
- D. Driveways, agricultural field cuts, or private streets shall not be located within one hundred (100) feet of the right-of-way line of an intersecting street.
- E. Driveways, agricultural field cuts, or private streets shall not be located within five (5) feet of a fire hydrant, catch basin, or drain inlet.
- F. Driveways or private streets shall not exceed a slope of seven (7) percent within fifteen (15) feet of the public road right-of-way line.
- G. Driveways, agricultural field cuts, or private streets shall not be located within three (3) feet of a property line.

- H. Driveways, agricultural field cuts, or private streets shall not be permitted at locations that would interfere with the placement, functioning, or maintenance of street signs, detectors, lighting, or other devices that affect traffic control.
- I. Driveways, agricultural field cuts, or private streets on property which abuts two or more public roads may be restricted to only that road which can more safely accommodate its traffic.
- J. Driveways, agricultural field cuts, or private streets shall not alter the existing drainage pattern or the existing flow rate or velocity of drainage water.
- K. Driveways, agricultural field cuts, or private streets shall not direct additional drainage of surface water onto or into the public road or right-of-way in any way which would have a detrimental effect on the road or right-of-way.
- L. Agricultural field cuts shall be restricted to agricultural traffic and/or vehicles being used for agricultural purposes. Agricultural field cuts shall not be used for non-agricultural traffic and/or as a means of accessing or egressing the abutting public road for vehicles that are not being used for agricultural purposes.

M. Paving to Limits.

1. Residential driveways which have access to a paved public road may be required to be paved with asphalt to at least twenty-five (25) feet from the edge of the existing public road. The driveway pavement shall be at least four (4) inches thick within the right-of-way. Compliance with PENNDOT Construction Specifications, Publication 408, latest edition, is required for such construction.
 2. All private streets and non-residential driveways which have access to a paved public road shall be required to be paved with asphalt to at least fifty (50) feet from the edge of the existing public road. The driveway pavement shall be at least four (4) inches thick within the right-of-way. Compliance with PENNDOT Construction Specifications, Publication 408, latest edition, is required for such construction.
- N. All driveways and private streets shall meet Township grade specifications. Grade specifications for uncurbed shoulders within the right-of-way are set forth in **Exhibit B**, attached hereto, and which is hereby adopted by reference and declared to be a part of this Ordinance.
 - O. The minimum width of a residential driveway shall be twelve (12) feet and the maximum width shall be twenty (20) feet.
 - P. The maximum width of an agricultural field cut shall be sixteen (16) feet.

- Q. Cut and fill slopes created during construction of driveways or private streets shall be no greater/steeper than 2:1 slope. All slopes and other disturbed areas shall be stabilized with appropriate grass, vegetative, or other approved cover to prevent erosion.
- R. Where a drainage ditch or swale exists, the property owner shall install adequate pipe under the driveway or private street in accordance with Township specifications.

SECTION 8: CONSTRUCTION INSPECTION, COMPLETION, AND CORRECTIVE MEASURES.

- A. The Township may inspect the driveway, agricultural field cut, drainage facility, or private street projects at any time during construction and after completion.
- B. The owner shall notify the Township, in writing, within seven (7) calendar days of the completion the construction project.
- C. In the event settling or other defects are identified in the project area, during or after the completion of construction, the Township may require the property owner to institute corrective measures.

SECTION 9: PROPERTY OWNER'S RESPONSIBILITIES.

- A. The property owner shall restore all disturbed portions of the public road and rights-of-way including slopes, and all appurtenances and structures such as guide rails or drain pipes, to a condition at least equal to that which existed before the start of any work authorized by the permit.
- B. The property owner shall be responsible for all damage to any portion of the public road or rights-of-way caused by any construction, maintenance, or repair activity at the site.
- C. The property owner shall be responsible for continuous, long-term maintenance and repair of the driveway, agricultural field cut, or private street connection and installed drainage facilities to conform to the permit and so as not to interfere or be inconsistent with the design, maintenance, and drainage of the public road, or the safe and convenient passage of traffic upon the road.
- D. In the event excess stormwater runoff or sediment is diverted onto the public road the property owner will be given written notice and required to make necessary corrections, at the owner's expense, to bring the driveway, agricultural field cut, drainage facility, and/or private street into compliance with the requirements of this Ordinance.
- E. In the event culvert pipes become blocked, crushed, or damaged the property owner shall clean, repair, and/or replace the pipe at the owner's expense.

- F. The property owner shall be responsible for damage to any portion of the public road or rights-of-way and/or public drainage facility caused by water or sediment runoff from the owner's property.
- G. The property owner shall be responsible for the timely removal of mud, dirt, gravel, and/or debris from the public road, associated rights-of-way, and public drainage facilities. In the event the material condition of the road, rights-of-way, and/or drainage facilities requires restoration, as determined solely by the Township, then the Township shall notify the owner of the restoration work required. In the event the road, rights-of-way, and/or drainage facilities is/are not properly and timely restored, to the sole satisfaction of the Township, then the Board shall perform or cause the restoration work to be performed and completed. An invoice for the reasonable expenses of the restoration work shall be sent to the property owner for full and timely reimbursement.

SECTION 10. ACCESS TO A STATE HIGHWAY.

Permits for driveways, drainage, or private street projects accessing a state highway shall be obtained from PENNDOT. A separate driveway permit from the Township is not required for access to a state highway.

SECTION 11. ENFORCEMENT AND PENALTIES.

- A. Upon receipt of a notice of a violation from the Township or its authorized representative(s), the permittee/owner shall immediately cease further work in the permitted area, except the work necessary to restore the area to a safe condition. The permittee/owner may not commence further work until all other repairs required by the Township have been completed and approved by the Township.
- B. If the violation presents an immediate or imminent safety or public health hazard, as determined by the Township, the Township shall immediately issue verbal notice of the violation to the permittee/owner. In addition, the Township shall send written notice of the violation to the permittee/owner within two (2) work days of the issuance of the verbal notice. If the permittee/owner fails to make the needed repairs within forty-eight (48) hours of receipt of the verbal notice, the Township may complete the repairs or contract with a third party to perform the repairs. The permittee/owner shall be responsible for fully reimbursing the Township for the costs of the repairs, together with an additional fifteen percent (15%) of the costs, within thirty (30) days of receipt of the Township's invoice.
- C. For all other violations, the Township shall send written notice of the violation to the permittee/owner. If the permittee/owner fails to make the necessary repairs within sixty (60) days of receipt of the written notice, the Township may complete the repairs or contract with a third party to perform the repairs. The permittee/owner shall be responsible for fully reimbursing the Township for the costs of the repairs, together with an additional fifteen (15) percent of the costs, within thirty (30) days of receipt of the Township's invoice.

- D. The Township may block driveways, agricultural field cuts, or private streets or sever, remove, or block drainage facilities constructed without a permit or in violation of the requirements of this Ordinance.
- E. Any person who shall violate any provision of this Ordinance shall, upon conviction thereof, in a summary proceeding before a magisterial district judge, be sentenced to pay a criminal fine of not less than Two Hundred Dollars (\$200) and not more than One Thousand Dollars (\$1,000) per violation. A separate offense shall arise for each day a violation is found to exist or for each section of this Ordinance which is found to have been violated. The separate offense shall also be subject to the penalty set forth herein.
- F. In addition to or in lieu thereof, the Township may institute injunctive, mandamus, or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, writs of mandamus, or other appropriate forms of remedy or relief.

SECTION 12: SEVERABILITY.

- A. If any sentence, clause, phrase, or section of this Ordinance is for any reason found to be unconstitutional, illegal or invalid, by a court of competent jurisdiction, such unconstitutionality, illegality, or invalidity shall not affect or impair any of the remaining provisions, sentences, clauses, phrases, sections, or parts of this Ordinance.
- B. It is hereby declared as the intention of the Board of Supervisors that this Ordinance would have been adopted had such unconstitutional, illegal, or invalid sentence, clause, phrase, section, or part not been included in this Ordinance.

SECTION 13: REPEALER.

Ordinance No. 50, adopted on March 14, 2001, and Ordinance 59, adopted on August 12, 2008, and all other ordinances or parts of ordinances inconsistent herewith are hereby repealed.


SECTION 14: EFFECTIVE DATE.

This Ordinance shall become effective five (5) days after adoption.

ENACTED AND ORDAINED this 17th day of May 2017.

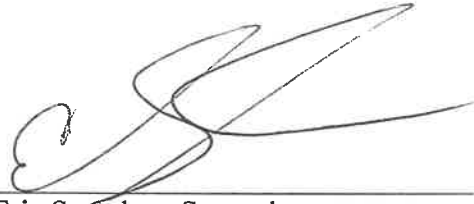
ATTEST:

TOWNSHIP OF MUDDY CREEK


 Kelly Livermore,
 Township Secretary
 (SEAL)

By: 
 Dale R. Kerr, Chair

By:

A handwritten signature in black ink, appearing to read "Eric Saunders", written over a horizontal line.

Eric Saunders, Supervisor

By:

Robert J. Jesteadt, Supervisor

FORMULA SIGHT DISTANCE TABLE

Speed (V) (Miles Per Hour)	Average Grade (G) (Percent)										
	Use plus grades when approaching vehicle is travelling upgrade.										
	0.0	+1.0	+2.0	+3.0	+4.0	+5.0	+6.0	+7.0	+8.0	+9.0	+10.0
25	147	145	144	143	142	140	139	138	137	136	135
30	196	194	191	189	187	185	183	182	180	178	177
35	249	245	242	239	236	233	231	228	226	224	221
40	314	309	304	299	295	291	287	284	280	277	274
45	383	376	370	364	358	353	348	343	339	334	330
50	462	453	444	436	429	422	415	409	403	397	392
55	538	527	517	508	499	490	482	475	468	461	454
	Use negative grades when approaching vehicle is travelling downgrade.										
	0.0	-1.0	-2.0	-3.0	-4.0	-5.0	-6.0	-7.0	-8.0	-9.0	-10.0
25	147	148	150	151	153	155	157	159	161	164	166
30	196	199	201	204	207	210	214	217	221	226	230
35	249	252	256	260	265	269	275	280	286	292	299
40	314	319	325	331	338	345	352	360	369	379	389
45	383	390	398	406	415	425	435	447	459	472	487
50	462	471	481	492	504	517	531	546	563	581	600
55	538	550	562	576	590	606	622	641	661	682	706



